

World White Teeth

Determinants and promotion of oral
hygiene behavior in diverse contexts

Yvonne A.B. Buunk-Werkhoven



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Colophon:

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Proefschrift

ter verkrijging van het doctoraat in de
Gedrags- en Maatschappijwetenschappen
aan de Rijksuniversiteit Groningen
op gezag van de
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door

Yvonne Andrea Bernadette Buunk-Werkhoven

geboren op 27 januari 1967
te Gieten

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Ter herinnering aan
drs. Marjan Buunk, psycholoog

Paranimfen: Renata Lubbelinkhof & Jacoline C. Baggerman-de Waal

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Voorwoord

Wanneer men geïnteresseerd is in bepaalde aspecten van menselijk gedrag, gebeurtenissen of situaties en voor het oplossen ervan informatie –gebaseerd op theoretische wetenschappelijke gronden– nodig heeft, dan maakt men vooral gebruik van ‘key-words, auteurs en databases’.

Wanneer men geïnteresseerd is in de auteur van dit proefschrift en meer wil weten over haar motieven voor de keuzes die zij –merendeels intuïtief– heeft gemaakt en haar eigen wijze van handelen, dan kan men het beste informeren naar gedeelde ervaringen van betrokken ‘key-persons’, co-auteurs en instanties.

Er wordt vaak geschreven: ‘een proefschrift schrijf je nooit alleen’. Dit is slechts gedeeltelijk waar, want voor het overgrote deel van het schrijffproces zat ik heel alleen en eenzaam voor mijn Flybook® computer. In gedachten hoorde ik dan vaak de stem van mijn schoonvader: ‘Als jij niet vliegt, dan leef je niet...’

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eens begonnen in het kamp 'Schattenberg' (tegenwoordig voormalig kamp Westerbork). Dit is een bijzonder landschap, een lokatie met een 'historische ervaring'. Het is een plek dat met meerdere zintuigen en met gevoel is waar te nemen; een groene vlakte met een serene uitstraling. Voor mijn moeder, Fransien en haar familie begon een nieuw leven, nadat zij uit Indonesië kwamen, in 'het kamp'. Voor mijn vader, Frans en zijn familie zal 'het kamp' door de WO-II definitief geassocieerd blijven met de dood. Voor mij is Schattenberg de plaats waar mijn ouders elkaar het 'jawoord' gaven, en is het als bestemming de bron voor mijn bestaan. In Gieten werd ik als derde dochter geboren en in Assen groeide ik op als middelste kind in het gezin. Zo'n middenpositie schept enige ruimte om vanuit verschillende perspectieven de familie te bewonderen. Cecile, jouw aangename levenshouding lijkt mij een buitengewone verademing. Astrid, jouw lieve en zorgzame kant is uniek en ongeëvenaard groot. André, jouw open houding, je technische vaardigheden en sociaal menselijke inzichten bieden jou grensverleggende kansen. Karin, met jouw bijzondere combinatie van een nuchtere en een gezellige kijk op de wereld, wist je mij op de juiste momenten steeds weer te kalmeren én te stimuleren om gewoon door te gaan. Ik ben jullie als zussen en broer –met alles wat wordt aangeduid als 'typisch familie Werkhoven'– intens dankbaar voor jullie onvoorwaardelijke liefde en steun. Specifieke of uitgesproken karaktertrekken zijn herhaaldelijk overeenkomstig met het karakter van één van beide ouders of van beiden: Mama, *terimakasih*; veel dank voor alle liefdevolle, zorgzame en intuïtieve steun én ook voor het aanhoren van al mijn verhalen. Tegen mijn vader heb ik eens in een eigenwijze bui geroepen dat ik 'Werkhoven' echt wel op de wereldkaart zal zetten: het moment is nu daar! Papa, ik weet dat je supertrots op mij zou zijn geweest.

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General Introduction

“Optimal oral hygiene behavior is an extremely complex activity; you never know if you do it right or wrong”

Bram Buunk (In: *Nederlands Tijdschrift voor Mondhygiëne*, 2007 nr. 8 p. 28)

Oral health can be defined as ‘a standard of health of the oral and related tissues which enables an individual to eat, speak, and socialize without active disease, discomfort or embarrassment and which contributes to general well-being’ (Kay & Locker, p. 8, 1997). Oral health is an essential aspect of general health throughout life, and essential to individuals’ quality of life (Locker, 2004). Even though the importance of health and personal hygiene, and in particular oral health and oral hygiene self-care is widely acknowledged, it seems that health care systems, including the oral health care system, are not performing as well as they could and as they should (WHO, 2008). For example, dental caries is still a major oral health problem in most industrialized countries, affecting 60–90% of schoolchildren and the vast majority of adults. Throughout the world, losing teeth is still seen as a natural consequence of ageing, but the proportion of edentulous adults aged 65 years and older is still high in some countries. Globally, most children have signs of gingivitis and, among adults, the initial stages of periodontal diseases are prevalent. Severe periodontitis, which may result in tooth loss, is found in 5–15% of most populations (WHO, 2009). Therefore, the WHO calls for a reorientation of oral health care systems from dental curative treatment towards oral disease prevention and oral health promotion. In addition, the Oral Health Programme (ORH) of the WHO emphasizes the application of evidence-based strategies in oral health promotion and prevention worldwide (Petersen, 2009; WHO, 2009).

Recent surveillance data indicate that the best way to avoid oral disease is primary prevention, which implies the promotion of self-care oral hygiene behavior. Moreover, the solution for this long neglected oral health problem is the application of prevention programs on three levels: 1) Primary prevention programs aim to inhibit the development of oral disease before it occurs; 2) Secondary prevention programs aim to identify and detect oral disease in its earliest stages before noticeable, and; 3) Tertiary prevention programs focus on people who are already affected by oral disease and attempt to reduce resultant disability and restore functionality (see editorial of *The Lancet*, 2009; Hovius, 2009). All over the world, preventing oral disease by working at these three levels is desired and generally achievable.

Although simple evidence-based cost-effective prevention programs, including oral behavioral interventions, have been carried out in recent decades, the oral health problem is unattained by most individuals (Davidson, Rams & Andersen, 1997; Iwata & Beckford, 1981; McCaul, Glasgow & Gustafson, 1985; Richard & Cohen, 1971; Soldani, Young, Jones, Walsh & Clarkson, 2008; Stacey, Abbott & Jordan, 1972; Suvan & D’Aiuto, 2008; Tedesco, Keffer & Fleck-Kandath, 1991). This may be related to two major shortcomings of many existing interventions. Firstly, most interventions do not target the actual psychological determinants of behavior; they are not based on state-of-the-art psychological models and theories of behavior and behavior change. Secondly and related to this, most existing interventions try to influence oral health behavior in very different (groups of) people and in diverse contexts in the very same way; they use the “one size fits all”-approach. Therefore, the present thesis aims to contribute scientific knowledge on the psychology of oral health and oral health behavior in different contexts, as a scientific basis for the development of effective interventions (Buunk & Van Vugt, 2008; Kay & Locker, 1996; Tedesco, Keffer, Davis & Christersson, 1992).

To start a rational process of solving the population oral health problem through influencing individuals' behavior, in the present thesis the PATH (Problem-Analysis-Test-Help) model is applied (Buunk & Van Vugt, 2008).

The Problem Phase

According to the first step in PATH methodology (the Problem phase), the main problem in this thesis is defined as follows: All over the world, the prevalence of oral diseases is moderate to high. This is problematic, firstly, because it poses a burden on health care systems; resources are now allocated to oral health problems that largely can be prevented. Secondly, another aspect of the problem is the individual suffering. This individual suffering is due to the negative outcomes of bad oral health, such as pain, speaking problems, eating problems, and social problems. Lastly, in principle the problem can be prevented largely through changing individual's oral health behaviors. On the basis of the effectiveness of prevention studies with regard to other health behaviors (Goldgruber & Ahrens, 2009; Song, Huttunen-Lenz & Holland, 2009; Tobler & Stratton, 1997), it can be expected that it is possible to develop and apply effective preventive interventions for oral health. With regard to oral health behavior, there is tentative evidence from low quality studies that psychological approaches to behavior management can improve oral hygiene related behaviors (Renz, Ide, Newton, Robinson & Smith, 2007). Thus, there is a world-wide problem with regard to oral health, but the solution is within reach.

One aspect that is part of the problem and that should be taken into account in developing effective interventions is the (cultural) context of the problem. Oral health behaviors, the meaning of oral health and disease and the reception of information on oral health may differ for individuals and may differ for individuals in different contexts. For example, psychological individual differences (e.g., personal goals or level of education), and contextual (cultural) differences (e.g., related to country or culture) should be taken into account in the development and application of oral hygiene prevention programs. Indeed, there are profound differences in oral health behavior across ethnic groups, regions, and countries (Davidson et al., 1997; Ronis, Antonakos & Lang, 1996; Sakki, Knuuttila & Antilla, 1998; Schou, 2000). Such differences may influence the relationship between psychological factors on the one hand and oral health behavior on the other hand. Therefore, such differences are relevant for program effectiveness.

The behavior that should be changed in order to decrease the problem is oral health behavior (OHB). It is important to have an elaborate perspective on what oral health behavior is.

A limitation of many previous studies on oral health behavior is that simple and, according to professional oral hygiene standards, often incomplete conceptualizations and measures of OHB were used. For example, often self-reports of tooth brushing and flossing are assessed using a simple dichotomous measure (yes/no), not taking into account all the specific details of adequate OHB. Optimal self-care OHB, grounded in evidence-based dentistry, is not always performed in an effective manner, and is apparently not simply a matter of daily removal of dental plaque by 'just tooth brushing and exclusively flossing' (Tedesco et al., 1991). Although the notion that flossing results in the detection and prevention of gum diseases is not yet supported by scientific evidence, interdental cleaning is an important complementary aspect of oral hygiene self-care (Berchier, Slot, Haps & Van der Weijden, 2008; Galgut, 1991; Hoenderdos, Slot, Paraskevas & Van der Weijden, 2008; Slot, Dörfer & Van der Weijden, 2008).

Optimal self-care oral hygiene behavior is a complex activity. Moreover, a complete measure of actual oral hygiene behavior based on the consensus of dental professionals did not exist. Therefore, in the present thesis, first a new measure of oral hygiene behavior (OHB) was developed to be able to assess this main outcome variable validly (chapter 2). In addition, because part of the problem of the oral health and disease is the individual suffering, the quality of life is also relevant in this context. The subjective suffering due to oral diseases and malfunctions can be conceptualized as oral health-related quality of life (OH-QoL; Locker, 1988). Therefore, in this thesis a Dutch version of an instrument to assess the OH-QoL is also developed and tested: The Oral Health Impact Profile-14 (OHIP-14-NL; chapter 6).

The Analysis Phase

In the second step of the PATH model (the Analysis phase), the task is to analyse the factors that can determine the outcome variable, in the present case OHB and OH-QoL. In this thesis, the primary perspective is on the psychological determinants of these oral health related states (Richard & Cohen, 1971). Researchers have successfully applied social psychological theories to predict levels of OHB (McCaul et al., 1985), and have they studied associations with OH-QoL (Locker, 2004). In general, there is consensus on utility and applicability of health behavior models in individuals' oral health behavior (Hollister & Anema, 2004; Kay & Locker, 1997; Schou, 2000).

In this thesis, the theory of planned behavior (TPB; Ajzen, 1988, 1991) is used as basis for understanding the psychology of OHB (chapter 2, 3, 4 and partly in 5). This behavioral model is the most used model in applied research to map the psychological causes of health behaviors, including OHB (McCaul et al., 1985; McCaul, O'Neill & Glasgow, 1988; McCaul, Sandgren, O'Neill & Hinsz, 1993). The TPB-model is used to identify the potential psychological determinants of OHB: attitude (i.e., a person's positive or negative feelings about a given behavior), social norms (i.e., the belief that specific important persons think that one should or should not perform a given behavior), and perceived behavior control (i.e., a person's perception of his/ her capabilities to perform a behavior). On the basis of this theory, that assumes that people's actions are shaped by their intentions, it is expected that, overall, the more positive the attitude towards oral self-care practices, the stronger the social norms, and the higher the perceived behavior control, the more likely it is that an individual will (have the intention to) perform OHB. The predictive utility of the TPB has been supported in a wide range of behaviors. Godin and Kok (1996) and also Armitage and Conner (2001) reported that the psychological factors identified by the TPB accounted for an averages of 34% and 27% of the variance in behaviors, respectively. In most previous studies on oral health behavioral issues intention to perform OHB instead of actual OHB was predicted, and although intention is the strongest psychological predictor of behavior, meta-analyses show that it accounts for only about 22% of behavior (Armitage & Conner, 2001; Godin & Kok, 1996). In this thesis, the focus is on predicting behavior.

Inherent to the social aspects of poor oral health, and as acknowledged by the TPB, health-related concerns are not the only motive for oral hygiene behavior. That is, unhealthy teeth may affect a person's social interactions negatively, as facial attractiveness has been found to affect social attitudes and actions (Smith, 1974; Oosterhaven, Westert & Schaub, 1989). When people recognize and value these social effects, they may become integrated in the psychological domain of oral health as perceived social outcomes of their personal oral health. Strong per-

ceived social outcomes of having healthy teeth make people active in their oral hygiene self-care, because they notice they approach positive social outcomes or avoid negative social outcomes. Therefore, valuing the social outcomes of adequate oral hygiene and healthy teeth might motivate personal oral hygiene self-care. In turn, through its effects on actual oral health, social outcomes may also determine OH-QoL. In this thesis, the expected social outcomes (ESO) of OHB were also assessed (chapter 2, 3, 4, 5).

In addition, people's knowledge on oral health might be expected to determine their OHB. In this thesis, oral health knowledge (OHK) refers to individuals' theoretical knowledge of oral health issues. According to the TPB model, individuals make rational decisions based in part on their oral health knowledge. In addition, people who have assimilated OHK and experienced some control over their personal oral health are more likely to adopt OHB (Freeman, Maizels, Wyllie & Sheiham, 1993). Especially, given the fact that OHK differed among diverse populations - for instance, in developing regions knowledge about adequate OHB may be limited (Ostberg, Halling & Lindblad, 1999; WHO, 2009; Zavras, Vrahopoulos, Souliotis, Silvestros & Vrotsos, 2002) - this variable was taken into account too (chapter 2, 3, and 4).

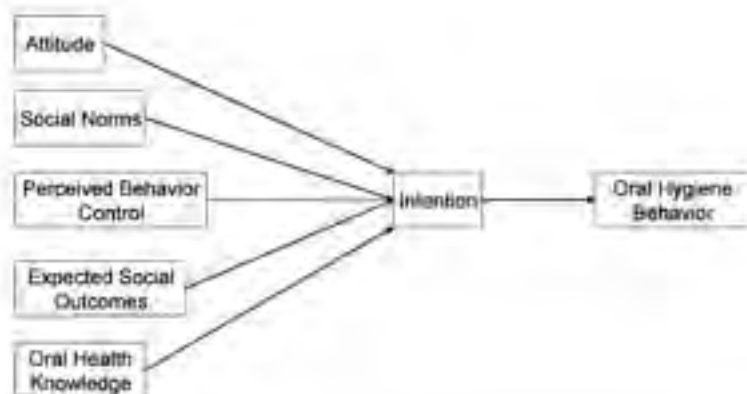


Figure 1. Model Theory of Planned Behavior, including Expected Social Outcomes and Oral Health Knowledge

The expanded TPB used in this thesis, including the two additional variables, ESO and OHK (Figure 1), may inspire our thinking about the causes of the oral health problem. This TPB model offers a structure in analyzing the psychological causes of the behavior that is causally related to the oral health problem, and it helps to identify gaps in our knowledge.

While the TPB is about behavior, the conceptual model of oral health is about oral functioning and about how oral health is experienced (Inglehart & Bagramian, 2002; Locker, 1988). This model is used as a point of departure to assess OH-QoL. This multidimensional model provides a framework for the understanding of oral disease and its consequences. It suggests that oral disease can lead to sequentially related impairments on several dimensions, such as physical, psychological and social, and that these impairments lead to functional limitation, pain and discomfort, which, in turn, lead to disability and handicap. Functional limitation may also lead directly to handicap (Figure 2).

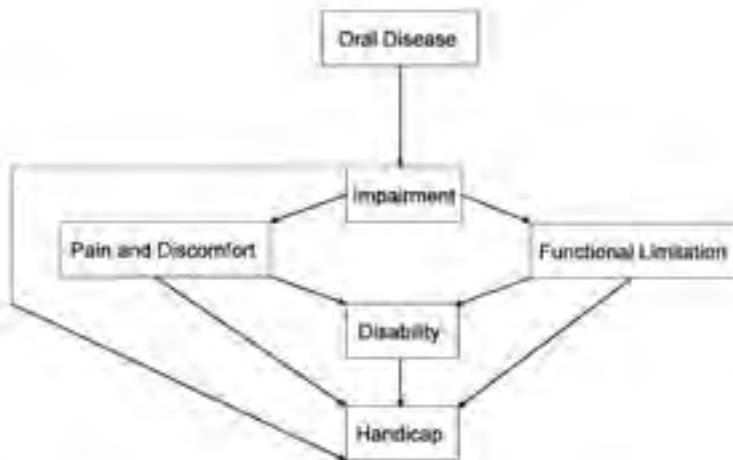


Figure 2. Model Locker (1988). Oral Health-related Quality of Life

Although of great utility because of its heuristic function, the Locker model is not a psychological model of OH-QoL. Therefore, in the present thesis a model was applied that provides a focus on some relevant psychological factors in relation to OH-QoL. Thus, to increase our knowledge of whether and how a set of potential causes and effects of OH-QoL are related to OH-QoL, five such factors were included in this model: dental anxiety, general health perception, oral health status, expected social outcomes and oral hygiene behavior (Figure 3).



Figure 3. Mapping model of OH-QoL, including Dental Anxiety, General Health Perception, Oral Disease versus Oral Health, Expected Social Outcomes, and Oral Hygiene Behavior

Two of these factors were mentioned earlier, social expected outcomes (SEO) of having healthy teeth and oral hygiene behavior (OHB). Dental anxiety as factor was included in the model because it is a very common negative emotion related to oral health care, and it is thought to be an important negative determinant of OH-QoL (Mehrstedt, John, Tönnies & Micheelis, 2007; Vermaire, de Jongh & Aartman, 2008). In addition, dental anxiety may manifest as avoidance behaviors (e.g., not adhering to treatments or cancelling appointments), that in turn may increase oral diseases, and therefore it is likely that the more dental anxiety individuals report, the lower their OH-QoL will be. General health perception may also be related to OH-QoL. General health perception refers to the evaluation of one's health in general, taking into account all relevant domains, including the oral domain (Marino, Schofield, Wright, Calache & Minichiello, 2008; Mason, Pearce, Walls, Parker & Steele, 2006). It is reasonable to expect that the higher OH-QoL will contribute to people's general health perception. In addition, the relation between oral health status and OH-QoL is relevant. Underscoring the psychological and experiential nature of quality of life OH-QoL, OH-QoL is expected to be only partly determined by the objective dental health status. Lastly, there are profound oral hygiene behavior disparities and various OH-QoL experiences, among diverse populations, across regions and countries and within countries. Therefore, dependent on individual and contextual differences, oral health behavior and OH-QoL may be related differentially to each other but also differentially to the psychological factors (Baker, 2007; Sakki et al., 1998).

The Test Phase

By using the relevant social psychological theories described in the analysis phase, and according to the third step of the PATH model (the Test phase), a process model is formulated. Such a model can give an evidence based recommendation regarding the nature of interventions necessary to influence the main problems described in the problem phase, the OHB and OH-QoL. Figure 4, presents a process model in which the TPB with respect to OHB, and the model of Locker on OH-QoL and our psychological version of it, are integrated. The arrows depict the direction of the associations, and the rationales of the relationships between the variables could be described as follows. This model assumes that OHB is influenced by behavioral intention, which in turn is determined by five psychological factors; attitude, social norms, perceived behavioral control, expected social outcomes and oral health knowledge. Next, OHB has a mutual relationship with oral health status. That is, obviously OHB can influence oral health status, but oral health status may also influence OHB through a motivational process. As mentioned, oral health status is one of the factors influencing OH-QoL, in addition to social outcomes of having healthy teeth, dental anxiety, and general health perception. Thus, the model depicted in Figure 4 is an attempt to summarize the main psychological factors that are involved in the OHB and OH-QoL. The model provides an integration of the psychological factors related to oral health.

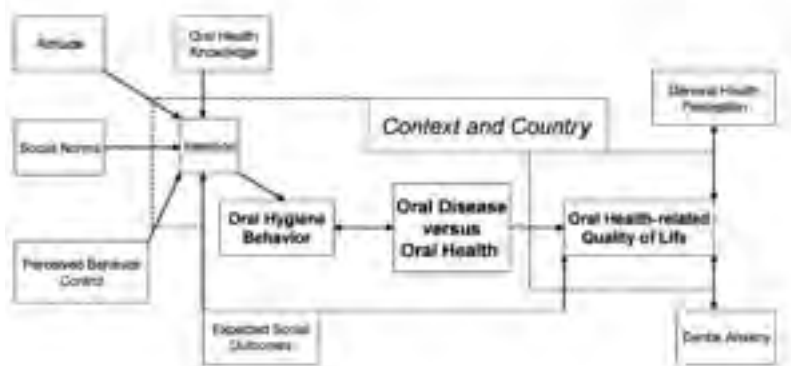


Figure 4. An overall process model of the determinants of Oral Hygiene Behavior and OH-QoL, with Context and Country as moderators

From relevant and available oral health research (earlier mentioned meta-analytic tests and peer-review articles) there is already a solid empirical basis for parts of the model. However, to find further empirical support for all the relationships in the formulated process model, including the ones that not have been documented in the literature, applied social psychological research is needed. The present thesis reports of applied social psychological research in 8 empirical chapters, conducted in 12 different samples.

The Help Phase

The identified and mapped factors in the process model can be used for the development of tailored oral hygiene self-care interventions for influencing OHB and OH-QoL. Conform the last step of the PATH model (the Help phase), an adequate intervention targets one or more causal factors in the process model that are modifiable and have the largest effect on the outcome variable. After deciding what psychological factors will be targeted with the intervention in order to change OHB or OH-QoL, the right *channel* must be chosen, appropriate *methods* must be selected, and the *strategies* must be developed. The *channel* is the way in which the target group is reached, for example, flyers, magazines, internet/e-mail, radio/television, and counselling/therapy or through a community intervention. Of course, intended changes can only take place when the target group is actually exposed to the channel. Methods for interventions are mostly derived from theoretical frameworks. For example, according to Bandura's Social Cognitive Theory (1986), experiences shape perceptions of reality and subsequent experiences through a process of enactive learning, which is the most powerful source of interpretations of events and accomplishments. Other examples of methods are argumentation, fear-appeals, framing, feedback and social comparison (Bartholomew, Parcel, Kok & Gottlieb, 2001; Buunk & Van Vugt, 2008; Green & Kreuter, 1999). While determinant models like the TPB focus on the psychological factors that should be changed in order to change behavior, methods are the psychological principles of how change can be brought about. Lastly, *strategies* are the translations of these methods into actual visible, readable, and hearable interventions to which people are exposed to. While feedback may be the method, the strategy might be the wording of the feedback; while fear-appeal may be the

method, the actual scary picture of an oral health disease or the presented facts on oral health diseases might be strategies.

In the present thesis, two chapters are specifically devoted to the evaluation of an oral hygiene intervention. The case-report presented in chapter 8 demonstrates a short-term effect of a tailored oral hygiene self-care intervention in three sessions over a period of three months, on halitosis and oral health-related quality of life, in a forensic psychiatric patient. Chapter 9 presents an experimental intervention study, which examines the effect of two differentially framed persuasive oral hygiene communications in Uruguay and Spain. The positively framed message contained information on the positive outcomes that would follow adequate OHB, whereas the negatively framed message contained information on the negative outcomes that would follow in-adequate OHB. Thus, although the presented outcomes were in principle the same, the wording differed. It was tested whether individual differences in outcome preferences (promotion versus prevention focus; Higgins, 1997, 1998), level of education, and country (Uruguay versus Spain), moderated the persuasive effects of the frames. The findings are meant to further built the case that the context of individuals (e.g., country), is relevant for the effectiveness of intervention and that in the development of interventions context should be taken into account.

Aims and overview of the thesis

The present thesis investigates psychosocial factors in relation to OHB and OH-QoL. The research topics in question are mainly studied in a variety of field settings/contexts and among diverse populations. Chapter 2 addresses the development of an Oral hygiene behavior Index (OHB) and provides insight into the determinants of Oral Hygiene Behavior assessed with the TPB in a general Dutch sample. In order to enhance the generalizability of these results - to assess whether the TPB is applicable among other populations/contexts - and to assess whether the determinants differ for populations/contexts, chapter 3 presents results in a sample of recruits in the Dutch Army, chapter 4 is on a sample health care seekers in the Caribbean and Nepal, and chapter 5 (in an English and in a Spanish version) describes the findings in patients treated at the faculty of Odontology of the Catolic University in Uruguay. With regard to OH-QoL, two studies are presented. Chapter 6 (Studies 1 and 2) tests the OH-QoL in Dutch forensic psychiatric patients, using the short form of the Dutch linguistically validated version of the Oral Health Impact Profile (OHIP-14-NL). In order to enhance the generalizability of these results and to assess whether the OHIP-14-NL is applicable among different groups, chapter 7 studies whether and how a set of potential causes and effects of OH-QoL are related to OH-QoL among first year students and dental patients. The case-report presented in chapter 8 demonstrates a short-term effect of a tailored oral hygiene self-care intervention, and chapter 9 presents an experimental intervention study. Finally, Chapter 10 provides a summary and integration of the main findings from the empirical chapters, and discusses the results in view of the implications for oral health promotion research and practice. In this thesis it may be noted that some overlap in the introduction and method sections between the chapters was unavoidable.

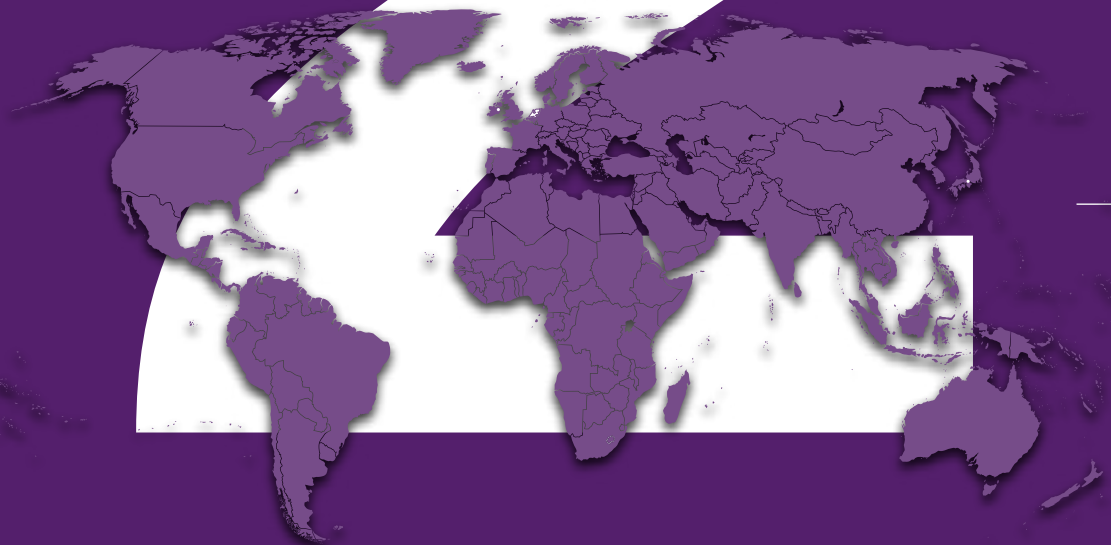
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Determinants of Oral Hygiene Behavior: A study based on the Theory of Planned Behavior

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Determinants of Oral Hygiene Behavior: A study based on the Theory of Planned Behavior.

Abstract

Objective: The aim of this study was to develop an index for oral hygiene behavior (OHB), and to examine potential predictors of this actual behavior based on the Theory of Planned Behavior (TPB). Measures of oral health knowledge and the expected effect of having healthy teeth on social relationships were included too.

Material and Methods: Using an Internet questionnaire, 487 participants were asked about actual oral hygiene behavior, attitudes (ATT), social norms (SN), perceived behavioral control (PBC), oral health knowledge (OHK), and expected social outcomes (ESO). Based on a Delphi method involving oral health professionals, a new index for OHB was developed, including tooth brushing, interdental cleaning, and tongue cleaning.

Results: Regression analysis revealed that the TPB variables (ATT, SN, and PBC), and OHK explained 32.3% of the variance in self-reported oral hygiene behavior.

Conclusion: The present findings indicate that socio-psychological consequences play a role in oral health care.

Key words: Behavioral science, Psychosocial aspects of oral health, Oral hygiene, Prevention

Introduction

Professionals in oral health care have recognized that assessments of oral health and oral hygiene outcomes are of great importance for developing oral health care interventions. Oral self-care practices based on personal choice may be considered an important aspect of oral hygiene behavior. Therefore, individual beliefs and attitudes toward this behavior have an important role in oral health care. The relevance of the behavioral sciences for modifying individual oral hygiene behavior has been shown since the early seventies and from that moment the behavioral and social sciences were definitively linked with dentistry in the Fédération Dentaire International's publication of *Social Sciences and Dentistry* (1). For instance, researchers successfully applied Social Learning Theory (2) to predict levels of oral health behavior (3). In line with this study, the relationship between psychosocial variables and oral health behavior has been examined in several other studies. Moreover, there is consensus on the applicability and effectiveness of health behavior models in individual oral health behavior change (4-7).

Health models and health behavior theories have been applied to oral health care in several studies. For example, the Theory of Reasoned Action, TRA (8) has been used to predict patients' tooth brushing and dental flossing behavior in a sample of 131 first-year psychology students (9). Results from this study showed that attitude and subjective norm accounted for 32% of the variance in intention to brush at least twice a day, and 30% of the variance in intention to floss frequently. In addition, intention explained 27% of the variance in brushing behavior, and 37% of the variance in flossing behavior. However, self-efficacy expectations (10) as an additional measure for control in the study among students (9), failed to improve the prediction. In contrast, in a study including 39 participants, it was shown that addition of self-efficacy variables to the TRA did increase the explained variance in brushing and flossing behavior (11). Moreover, data on 81 college students in the context of a regimen of daily brushing and flossing showed the importance of perceived behavioral control (12). According

to the findings of a study among 214 participants, adequate oral hygiene behavior (tooth brushing and the use of interdental cleaning aids) was associated with an individual's attitude toward oral health – 'clean teeth' and 'fresh breath' – and with the perceived influence of 'important others', such as the dentist, family, and friends (13).

The findings of these earlier studies based on social cognitive models show that attitudes, subjective norms, and self-efficacy or perceived behavioral control, are the determinants of oral health behavior. For two reasons, however, this so called 'state-of-the-art' with regard to oral health behavior is not satisfactory. First, in several studies, intention to perform oral health behavior instead of actual oral hygiene behavior was predicted. Although intention is the strongest psychological predictor of behavior, meta-analyses show that it accounts for only about 22% of behavior (14,15). In addition, the meta-analysis findings show that although changes in intention may lead to changes in behavior, the effects are mostly weak to moderate (16). Therefore, interventions based on determinant studies in which principally intention was predicted can be expected to have some limited efficacy. A second limitation of the above-mentioned studies on oral health behavior is that simple and, according to oral hygiene standards and based on the worldwide consensus of oral health professionals, incomplete measures of actual oral hygiene behavior were used.

Given these limitations, and because of the precisely of optimal self-care oral hygiene behavior as recommended by oral health professionals, and the lack of a complete measure of this behavior, the present study was aimed at developing a new measure of actual oral hygiene behavior (OHB), and immediately investigating its social cognitive determinants, using the Theory of Planned Behavior, TPB (17,18). Notable, in this study we focused exclusively on transparent oral hygiene behavior, and not on intention to perform behavior, such as just tooth brushing and flossing frequency.

A much more elaborate index for OHB was used in this study. It is well known among oral health professionals that optimal self-care OHB is not simply a matter of daily removal of dental plaque by 'just tooth brushing and flossing'. Flossing is often neglected, and tooth brushing is often not done in the way it should be done (11). Optimal OHB concerns some other behaviors in addition to just accurate tooth brushing and flossing. Although the notion that there is little evidence about the meaningfulness of all the detailed components, the American Dental Associations, ADA (19) recommends a daily regimen of at least brushing (using a soft toothbrush, brushing for at least two minutes twice a day; once after breakfast and once before going to sleep, brushing softly/ without pressure, brushing stepwise by making small strokes – sort of massage – near the gum), thorough interdental cleaning (i.e., use of floss, tooth sticks, or interdental brushes at least once a day), and using fluoride containing toothpaste and tongue cleaning. Thus, to assess actual OHB completely and adequately, it is important to include all tooth brushing details and additional self-care oral hygiene behavior in a measure of OHB.

The TPB, which is the model most often used to map the psychological causes of health behaviors, was used to predict the psychological determinants of OHB. The predictive utility of the TPB has been supported in investigations of a wide range of behaviors. It has been reported in two meta-analytic reviews (14,15) that the psychological factors identified using the TPB accounted for averages of 34% (14) and 27% (15) of the variance in behaviors. The TPB includes three psychological factors as independent determinants of behavioral intention, which in turn influences subsequent behavior:

1. attitude (a person's positive or negative feelings about a given behavior, for example, 'I hate brushing my teeth twice a day, and cleaning interdentally at least once a day');
2. subjective norm (the belief that specific important persons think that one should or should not perform a given behavior, for example, 'My parents think that I should brush my teeth twice a day, and use interdental aids at least once a day');
3. perceived behavior control (a person's perception of his/ her capabilities to perform a behavior, for example, 'I think I will be able to brush my teeth twice a day, and use interdental aids at least once a day').

Overall, for OHB, the TBP suggests that the more positive the attitude towards oral self-care practices, the stronger the social norms, and the higher the perceived behavior control, the more likely it is that an individual will perform an optimal oral hygiene behavior. However, this behavior is quite complex and entails a number of specific behaviors. Therefore, to develop and test the new measure of OHB, the present cross-sectional study was aimed at testing a potential social cognitive determinant of this specific OHB, namely social outcomes. Therefore, in addition to the above three factors defined using the TPB, a measure of social outcomes of oral health was added to the model. Health-related concerns are probably not the only motive for oral self-care. Study reports suggested that behaviors which may promote health are often performed for reasons other than improvements in general health; for example, tooth brushing may be engaged in to look more attractive (20). Indeed, as noted in a review of the literature on physical attractiveness, oral health may have an important, though often neglected, effect on a person's appearance. According to Sugiyama, from an evolutionary point of view, "....strong, even white teeth provide a constellation of cues to health, developmental history, masticatory efficiency, and genotypic quality, and are thus predicted to be attractive" (21, p. 310). In a similar vein, it has been suggested that unhealthy teeth are perceived as negatively affecting a person's image (22). In the present research, therefore, we assessed not only the perceived health consequences of oral hygiene self care, but also the perceived social consequences, i.e., how healthy teeth might affect a person's interpersonal interactions. According to the TPB model, individuals make rational decisions based in part on their oral health knowledge (OHK). In addition, people who have assimilated OHK and experienced some control over their personal oral health are more likely to adopt oral hygiene behavior (13,23); therefore, this OHK variable was assessed too.

Overview of present research

The first aim of this study was to develop a new, elaborate index for desirable OHB. An initial inventory was made of all behaviors identified as relevant for oral hygiene self care. The final index was constructed on the basis of a Delphi method. The second aim of the present study was to examine the relevant predictors of oral hygiene behavior as assessed using the new index. These predictors were the variables specified in the TPB. As mentioned before, a measure of expected social outcomes (ESO) of having healthy teeth and a measure of OHK were also used as predictors.

Material and Methods

Permission for this cross-sectional study was obtained from the ethical committee of the Faculty of Behavioral and Social Sciences, University of Groningen and the study was conducted according to universal ethical principles.

Procedure

From 31st October 2005 (the start of 'National Brushing Week 2005') to 19th December 2005, the questionnaire was administered to a convenient sample of the Dutch population. The questionnaire was published on the Internet, and subjects were invited via several websites concerning general and oral health to fill in the questionnaire. During 'National Brushing Week 2005,' radio audiences in the Groningen region were informed through an interview on the local radio station, and about 150 dental and dental hygienist practices in all provinces in the Netherlands were informed by e-mail about the online research. In addition, about 200 dentists and dental hygienists received posters and flyers to hand out to their patients to invite them to participate in this study. For students, participation announcements were placed on intranet and in student newspapers of the University of Groningen and of Hanze University Applied Sciences Groningen. To check if people had answered the questionnaire more than once, they were asked to mention their postal code.

Development of measures of oral hygiene behavior (OHB)

For the preliminary version of the oral hygiene behavior part of the questionnaire, relevant items concerning OHB were defined by the first author based on the literature and on her experience as a dental hygienist. A two-round Delphi-method (24) to identify the experts' views on a broader range of relevant oral hygiene behavior was then carried out. In the first round, the list of items was submitted to the dental professionals of the Center for Dentistry and Oral Hygiene, Hanze University Applied Sciences, Groningen, Dept. of Oral Health Care, University Medical Center Groningen, University of Groningen, with the request to evaluate this list and to mention additional relevant behaviors. A total of 12 experts, including one dietician, three dentists, one PhD student in dentistry, two professors in dentistry, and five dental hygienists, participated in this round. They added a number of oral hygiene-related behaviors, many on a specific level, for example, breastfeeding, use of cleaners for prosthesis, use of stain-removers, thumb-sucking, pencil-chewing, etc. For the final OHB questionnaire, the oral health behaviors were clustered into subcategories: personal oral (home) care (e.g., frequency of tooth brushing, use of fluoride-enriched toothpaste, tongue cleaning) and professional dental health care (e.g., frequency of dental check-up or dental hygienist visits). A group of two dentists, one PhD student in dentistry, and four dental hygienists (who work as lecturers in the Dept. of Oral Health Care) evaluated the relevance of these clusters. There was, concerning the quality a degree of consensus among the experts on these clusters of oral hygiene-related behaviors.

The final set of most relevant oral hygiene behaviors (28 items) was included in the digital questionnaire for 'Research on Oral Health Care 2006.' Items concerning, for example, personal oral (home) care practices were evaluated by determining the percentages of responses on all these items. For the participants who responded, there was low positive response of a number of items, so these items were removed from further consideration; for instance, 74% never used mouth spray and 98% never used medical bandage or cocktail sticks for interdental cleaning.

The new index for OHB (8 items), a method for assessing and evaluating actual oral self-care practices of individuals and population groups, was constructed using the most applicable items, such as tooth brushing (frequency, time of brushing, measures of force, duration in minutes, method, and use of fluoride toothpaste), interdental cleaning (use of floss, tooth

sticks, interdental brushes), and tongue cleaning. Based on the author's experience and the relevant literature, weights (generally based on worldwide consensus for what is relatively most important) were assigned to all these items. A new Delphi-method round, involving the same group dentists and dental hygienists, was then performed to evaluate the index and the weights. An adequate level of consensus was once again reached among the experts and consequently only minor modifications to the index and the weights were necessary (see Table 1).

Development of measures of determinants concerning OHB

Index for oral health knowledge (OHK)

Oral health knowledge refers to the degree to which a person has sufficient or insufficient knowledge of oral health issues. Based on the literature and on the author's own experience, a short list of relevant questions about oral health issues was compiled; this was examined by two other lecturers of the Dept. of Oral Health Care. The index consisted of a number of items to reveal the status of the individual's OHK. Because of a too small number of dichotomy items, this index was not considered a valid scale. However, the face validity of the index for OHK was acceptable.

Expected social outcomes and TPB variables

In addition to a test of the new index for OHB, a measure of social outcomes of oral health was developed in the same manner as described for OHK. The ESO scale of having healthy teeth included 6 items. The scales used for measuring the three TPB variables (attitudes, social norms, and perceived behavioral control) were constructed according to Ajzen (17).

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Questionnaire

General part of the questionnaire

The initial questionnaire included 122 items divided into seven parts, including a few demographic questions on matters such as gender, age, nationality, education, and marital status. Level of education was categorised as low, medium or high. In the Netherlands, low educational level refers to vocational training, medium level to advanced vocational training, and high level to college/university training. These and other items about dental history, experiences, and dental health status were open-ended, multiple choice, or to be answered on bipolar adjective rating or Likert scales.

Oral Hygiene Behavior

Oral hygiene behavior was measured using the new index for OHB (8 items with respect to tooth brushing, interdental cleaning and tongue cleaning). For example, the item "I brush my teeth as follows:" was supported by pictures showing different brushing methods. After the item scores were assigned weights, the item values were calculated and a sum score was computed. The sum OHB score on this index could range from 0 to 16. A high sum score indicated a high level of self-care oral hygiene behavior.

Oral health knowledge

This index for OHK consisted of 16 items to reveal the status of the individual's oral health knowledge, for example, "Gum bleeding is a sign of a periodontal disease." All items were scored with 1 = yes or 0 = no, and a sum score was computed, so that a total OHK score was

formed for each respondent (ranging from 0 to 16). The higher the total score, the higher the individual's knowledge of oral health issues.

Expected social outcomes

Expected social outcomes (ESO) of having healthy teeth included 6 items (Cronbach's $\alpha = .82$). An example of this 5-point scale is, "In social contacts fresh breath is important." Responses varied from 1 = *disagree* to 5 = *agree*, and a sum score (ranging from 6 to 30) was computed by summing up scores on all six items that measured the concept ESO.

Variables of TPB and focal Oral Hygiene Behavior

In accordance with the TPB, the respondents' attitudes, social norms, and perceived behavioral control of the focal OHB were assessed using a total of 17 items. The focal 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 two minutes; 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 the tooth brushing, daily interdental cleaning, (i.e., the use of floss, tooth sticks, or interdental brushes at least once a day), and tongue cleaning is also recommended."

Attitude

Attitudes (ATT) toward this focal OHB were measured using nine worded statements in a semantic differential format ($\alpha = .83$). The respondents indicated on 7-point scales how they evaluated this advised OHB, on the dimensions 1 = *unimportant* to 7 = *important*, 1 = *unpleasant* to 7 = *pleasant*, and so on: *unhealthy-healthy*, *negative-positive*, *annoying- not annoying*, *not useful-useful*, *boring-exciting*, *painful-painless*, and *stupid-smart*. A sum score for respondents' attitudes was constructed by adding the 9 items (ranging from 19 to 63). Higher scores indicate a more positive attitude.

Social norms

To assess social norms (SN) toward OHB, the respondents rated the perceived opinions of seven different significant others with respect to taking better care of their teeth, e.g., "my dentist," "my dental hygienist," "the dental nurse," "my partner," "my family (parents, brothers, and sisters)," "my friends," and "my colleagues." Because of near non-response on the items concerning "my dental hygienist" and "the dental nurse", these two items were removed from the scale. Thus, the final 7-point scale for social norms (SN) was based on 5 items instead of the original 7 items ($\alpha = .92$). A sum score on this SN scale varied from 5 to 35.

Perceived behavioral control

Perceived behavioral control (PBC) was measured using a sum score constructed from 3 items ($\alpha = .71$), e.g., "If I wanted to, I could take care of my teeth as described," which was answered with endpoints 1 = *don't agree* to 5 = *agree*, "I find it difficult or easy to take care of my teeth based on the daily OHB," with the endpoints 1 = *difficult* to 5 = *easy*, and "I am able to take care of my teeth as described," which was answered with endpoints 1 = *don't agree* to 5 = *agree*.

The sum score for respondents' PBC was constructed by adding the 3 items (ranging from 3 to 15).

In all three cases, the mean sum scores of each of these scales were assessed via calculation of means, and high sum scores indicated a positive attitude, strong perceived approval from significant others, and a high level of perceived behavioral control of the focal oral hygiene behavior.

Results

Four hundred and eighty-seven participants were examined; eighty-two percent of the participants were women; 97% were of Dutch nationality; the mean age was 28.4 years ($SD = 11.93$; [12 - 67]). Sixty-five percent of the respondents were unmarried, and 77% had no children. The highest level of education for 42% of the participants was high school; 31% had polytechnic or university level. About a quarter of the group (26%) had a lower level of education. The frequencies in percentages of the items concerning the OHB index are presented in Table 1. The means, standard deviations, and range 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.

Table 1.			
Index for Oral Hygiene Behavior (OHB index): Values ('weights') and per cent per item, N = 487			
Items	Values	Weight	Per cent
Frequency of tooth brushing	'Twice a day' or 'more than 2 times a day'	2	82.8
	'Once a day'	1	16.4
	'Not every day'	0	0.8
Moments of tooth brushing	Three times or more a day, including: 'After dinner in evening' and 'Before going to sleep'	4	42.7
	Twice a day: - 'Morning after breakfast' and 'Before going to sleep'	3	15.9
	- 'Morning before or after breakfast' and 'Noon'	2	16.2
	- 'Morning before breakfast' or 'Noon' and 'Before going to sleep'	2	19.5
	- 'After dinner in evening' and 'any other moment' or all combinations	1	5.8
	Once a day: - 'Before going to sleep'	1	9.7
	- 'Any other moment' than 'Before going to sleep'	1	6.4
Measure of force of tooth brushing	Softly ('1, 2, 3')	2	25.1
	Softly/Forcefully ('4, 5')	1	63.7
	Forcefully ('6, 7')	0	11.3

Duration of tooth brushing	‘Two minutes’ or ‘Three minutes’	2	65.7
	‘Longer than three minutes’ or ‘One minute’	1	28.1
	Shorter than ‘One minute’	0	6.2
Method of tooth brushing	‘Bass-method’	2	17.5
	‘Horizontal movement’ or ‘Combination of methods’	1	39.1
	‘Vertical movement’ or ‘Circular movement’	0	43.1
Fluoride tooth-paste	‘Toothpaste with fluoride’	1	76.0
	‘Toothpaste without fluoride’ or other alternatives	0	24.0
Interdental cleaning	‘At least once a day’ floss and/or tooth sticks and/or interdental brushes	2	26.7
	‘Not every day’ interdental cleaning	1	54.8
	‘Never’ interdental cleaning	0	18.5
Tongue cleaning	‘Every day’	2	20.5
	‘Sometimes’	1	45.0
	‘Never’	0	34.5

The mean scores with standard deviation, and the range values of the main variables, i.e., attitude (ATT), social norms (SN), perceived behavioral control (PCB), expected social outcomes (ESO), and oral health knowledge (OHK), for the whole sample are presented in Table 2. It can be seen that participant’s attitude toward the focal OHB was quite positive. Participants attached much value to positive social outcomes of having healthy teeth, and their knowledge of oral health was also good. Participants reported hardly any pressure from their social environment to perform this behavior, and felt they had considerable control over carrying out the oral hygiene self-care practices. For instance, the reported results of the OHB index showed that two-thirds of the respondents brushed their teeth as recommended by professionals, two minutes twice a day. In addition, 76% used toothpaste with fluoride, the percentage that used interdental cleaning aids at least once a day was just over 25%, and between 20% to 45% cleaned their tongue everyday or sometimes.

Table 2.

Cronbach’s α , Range, Means, and Standard deviation (SD) for the main variables

Variables	Cronbach’s α	Range	Mean (SD)
Attitude ^a	.83	9 - 63	50.04 (7.12)
Social norms ^b	.92	5 - 35	11.39 (6.53)
Perceived behavioral control ^a	.71	3 - 15	11.97 (2.47)
Expected social outcomes ^a	.82	6 - 30	25.38 (3.56)
Oral health knowledge ^a	--	0 - 16	12.57 (1.63)
Oral hygiene behavior ^c	--	0 - 16	10.56 (2.45)

Note. ^an = 487. ^bn = 421. ^cn = 478

In addition, correlational analyses were carried out to establish the direction and magnitude of the associations between the variables (Table 3). OHB was found to correlate positively and significantly with ATT, PBC, ESO, and OHK; and negatively and significantly with SN.

According to the TPB subjective norms are positively associated with behavior, but in this study social norms are not. All other relations are in the expected directions.

Table 3.

Intercorrelations between the main variables and OHB score

Variables	1	2	3	4	5	6
1. Attitude ^a	—					
2. Social norms ^b	-.34**	—				
3. Perceived behavioral control ^a	.57**	-.33**	—			
4. Expected social outcomes ^a	.33**	-.18**	.22**	—		
5. Oral health knowledge ^a	.11*	-.09	.10*	.14**	—	
6. Oral hygiene behavior ^c	.42**	-.35**	.46**	.24**	.22**	—

Note. ^an = 487. ^bn = 421.
 * p < .05. ** p < .001.

Finally, linear regression analysis was performed to examine the multivariate relationships of the TPB variables and the two additional variables, expected social outcomes and oral health knowledge, with OHB (Table 4). All variables were entered at once. This model proved to be significant, and accounted for 32.3 % of the variance in self-reported OHB. The TPB variables and OHK emerged as significant predictors of OHB. In these multivariate analyses, ESO was no longer related significantly to OHB.

Table 4.

Linear regression of self-reported OHB on TPB variables, ESO and OHK

Determinants	Self-reported OHB Beta
Attitude (ATT)	.18**
Social norms (SN)	-.16**
Perceived behavioral control (PBC)	.30**
Expected social outcomes (ESO)	.08
Oral health knowledge (OHK)	.17**

Note. In total model (** p < 0.001):
 R2 = .32 F (5,415) = 41.02, p < .001

The finding that ESO was related to OHB in a univariate analysis but not in the multivariate analysis might result from the relationship of ESO with OHB being mediated by one or more of the other independent variables. Generally speaking, the criteria for a potential mediation are that 1) ESO should be significantly related to the mediator, 2) ESO should be significantly related to OHB in the absence of the mediator, 3) the mediator should be significantly related to OHB, and 4) the relationship of ESO with OHB should decrease upon addition of the mediator to the model (25). A Sobel test (26) reveals whether a mediator had influenced the relationship of ESO with OHB.

In this model there were three variables that may be considered mediators: 1) SN; that is, the individual’s expectations about the importance of oral health in social interactions (ESO) may contribute to the construction of ideas about how others think the individual should behave.

2) ATT; this idea is theoretically plausible too, and means that the individual's expectations about the importance of oral health in social interactions (ESO) may contribute to the person's own beliefs or ideas about having a favorable or unfavorable evaluation or appraisal of this specific oral hygiene behavior. 3) PBC; that is, the individual's expectations about the importance of oral health in social interactions (ESO) may enhance the motivation to engage in OHB, and thus contribute to the construction of ideas about the person's own abilities to perform the given behavior.

The findings of regression analyses showed that the criteria for mediation were met by all three separate variables. In addition, the Sobel test revealed that the changes for all the variables separately were significant, i.e., the relationship of ESO with OHB decreased upon addition of the mediator. These results show that the relationship between ESO and OHB was in part mediated by SN, ATT, and PBC (Table 5).

Apart from these mediations, ESO also had an independent relation with OHB that was independent of SN; ESO and ATT both had a unique relation with OHB. ESO also had an independent relation with OHB that was independent of PBC.

Table 5.

Criteria for mediation ESO → OHB to be met			
	Beta	R ²	F
ESO → OHB	.24	.06	(1,485) = 29.79
SN as mediator			
ESO → SN	-.35	.03	(1,420) = 13.64
SN → OHB	-.18	.12	(1,420) = 59.56
ATT as mediator			
ESO → ATT	.33	.10	(1,485) = 57.09
ATT → OHB	.42	.18	(1,485) = 105.34
PBC as mediator			
ESO → PBC	.22	.05	(1,486) = 25.59
PBC → OHB	.46	.21	(1,486) = 129.79
Mediation analyses ESO → OHB ¹			
	Beta		Sobel z
With SN as mediator	.18 (.24)		3.22
With ATT as mediator	.12 (.24)		5.94
With PBC as mediator	.15 (.24)		4.87
¹ Beta after test for mediation, between parentheses the original β , $p < .001$.			

Discussion

The first phase of this cross-sectional study consisted of the development of a new index for oral hygiene behavior (OHB index). The OHB index appears to be a useful method for assessing and evaluating oral hygiene self-care practices of individuals. In contrast to the 4-item oral hygiene scale constructed from self-reported tooth brushing and dental flossing (27), this new OHB index included all brushing details and other potential components of

personal oral hygiene regimens, such as use of tooth sticks, interdental brushes, toothpaste with fluoride (28), and tongue cleaning (29). This new OHB index was used to measure realistic preventive oral hygiene self-care behavior, and given the relatively low number of items, and the substantial variety in the content of the items, the index had a sufficient internal structure, as was apparent from its face validity. Especially noteworthy is the fact that the total scores in this population were normally distributed; many scales or indices used in the behavioral sciences have a skewed distribution. Underlining the validity of the OHB index, it correlated with all variables of the model of TPB as well as with the variables of ESO and OHK. The real test of a new measurement system such as the OHB index is when it is employed in relation to general oral health, and needs to be used in other populations in the Netherlands and abroad (30-33).

In this study, we also determined the predictors and the predictive power of the TPB and two other variables, ESO and OHK related to OHB. Regression analysis indicated that PBC was the best predictor of OHB and explained, together with ATT, SN, and OHK 32.3 % of the variance in self-reported OHB. Different from previous and recent studies, in which social cognitive models were used for the prediction of intention and behavior relevant to oral health (22,34-39), in the present study we used actual oral hygiene self-care behavior assessed using the OHB index as focal behavior (cross-sectional rather than prospective measure of behavior), instead of exclusively the intention to brush teeth or to use dental floss. The findings of this study are consistent with evidence from previous research, in which was founded that TPB variables accounted for comparable percentages of the variance dental hygiene behavior (i.e., just tooth brushing and flossing) (8). The present results are also consistent with the findings of meta-analyses to investigate a wide range of health behaviors, which have shown that the TPB explains between 27% and 34% of the variance in behavior (14,15).

Whereas the TPB variables (PBC more than ATT and SN), and also OHK emerged as significant independent predictors of OHB, ESO of having healthy teeth did not independently predict variance in OHB scores. As proposed, the relationship between self-efficacy and outcome expectancies (in this study, PBC and ESO) is that outcome expectancy beliefs affect self-efficacy estimates (10). Because ESO is generally dependent on PBC, it is possible that ESO did not add much to the prediction of behavior (in this study, oral hygiene behavior). The role of particular self-efficacy and ESO in OHB has not been adequately tested. For example, researchers had developed measures of self-efficacy and outcome expectancies in the oral hygiene domain, but did not explore the role of these variables in oral hygiene behavior (40). Also in a qualitative study the role and formation of perceived self-efficacy in describing and understanding oral health behavior were examined (41). The present results are particularly in line with meta-analyses in which it has been found that PBC is, in general, a strong independent predictor of health behavior (14,15,18). In addition, as theorized above, the findings of mediational analyses showed that SN, ATT, and PBC mediated between ESO and OHB.

This study has some limitations that need to be addressed in future studies. First, the large proportion of female participants may have biased the results. Because of the selective sample of mainly relatively young, high-educated, unmarried women without children, these findings cannot be considered representative of the population as a whole. As known from past studies, there are apparent differences in oral hygiene behaviors across demographic variables (e.g., gender, age, and lifestyle) and socioeconomic status. For instance, females brush their teeth more often than males, and people with a healthy lifestyle use more extra cleaning aids

(5, 27, 42, 43). Although this does not imply that the relation between the variables of the TPB differ in different populations, it is recommended that our results be replicated in different groups. In a similar vein, online studies, though, can often be biased, as only highly motivated individuals with strong opinion respond, or the possibility that some people had answered the questionnaire more than once. Just asking for postal codes had limitations to prevent duplication, especially for members of one family or people who live in the same postal code area. Recruitment by Internet will have excluded some elderly people who could not fill in the questionnaire too. Thus, we recommend examining our model using written questionnaires among senior citizens, even though Internet use is becoming increasingly common among the elderly. In addition, a more controlled or alternative sampling strategy, and implementation of that strategy may be also crucial to ensuring valid results. Finally, TPB may perform differently in different sociocultural contexts; it is, therefore, important to test the applicability of the TPB, for instance, in developmental countries as well (5).

The present study may have several implications, as it provides support for the TPB model in predicting actual OHB as recommended by dental professionals. Our findings are particularly important because we developed an elaborate index for OHB that corresponds closely with what dental professionals consider relevant oral hygiene behaviors. Therefore, it is safe to make practical recommendations based on our research. Our findings suggest that, in order to increase oral hygiene self-care behavior, interventions should target not only the well-known determinants from the TPB and OHK, but especially the target individual's ESO of having healthy teeth.

For instance, in order to increase individual's motivation to perform optimal OHB, PBC seems to be the most important factor to influence, followed by ATT, OHK, and ESO.

All factors had significant association with actual OHB, suggesting both a motivational and a structural educational approach. These findings may not only assist dental associations and dental schools, but also dental hygienists in what was refers to as "the most dignified tasks" of the dentists, i.e., educating patients in oral health and changing patient's oral hygiene habits (44). But also from a theoretical point of view, assessing behavior on a specific level as we did in the present research may contribute to a greater external validity of the findings. In conclusion, while the results of this study need replication in other samples to gauge the generalization of the findings, the expanded TPB model developed in the present research may be a fruitful perspective to guide future research and practice in oral hygiene behavior.

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Promoting Oral Hygiene Behavior in Recruits in the Dutch Army

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Promoting Oral Hygiene Behavior in Recruits in the Dutch Army

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ABSTRACT Objectives: To make practical recommendations for improving oral hygiene behavior (OHB) potential predictors based on the Theory of Planned Behavior (TPB) were assessed. Measurements of oral health knowledge (OHK) and the expected social effect for having healthy teeth were included. Methods: 216 recruits in the Dutch Army ground forces completed a questionnaire about oral hygiene behavior, attitudes, social norms, perceived behavioral control (PBC), intention to perform optimal OHB, OHK, and expected social outcomes. Results: The multivariate regression analysis revealed that attitude and PBC explained 37.2% of the variance in intention to perform optimal oral hygiene behavior, which is a substantial proportion. Furthermore, actual oral hygiene behavior was only predicted by attitude, explaining 7.1% of the variance. Conclusion: The present findings suggest that recruits' oral hygiene behavior may be improved by promoting a more positive attitude and especially by enhancing perceived behavior control.

INTRODUCTION

To maintain good oral health, adherence to optimal oral hygiene behavior is required. Despite the importance of oral hygiene, which is widely acknowledged, it seems to be a problem for military recruits to perform oral hygiene practices in an appropriate and efficient manner. For example, in a study of 912 members of the Croatian Army it was shown that oral health of the examined soldiers was in general poor, as a consequence of insufficient oral hygiene.¹

The Netherlands Armed Forces has a complete health care system at its disposal. The first line military health care is provided by clinics at the home units and operational medical units during training and deployments. In both situations integrated health care is provided, with a combination of general practice medicine, preventive medicine, and occupational health services.² Oral health care is part of this integrated health care system. As for recruits who are selected to be deployed, dental fitness is one of the most important conditions. Before deployment, a soldier has to comply with a NATO agreed mandatory minimum level of sufficient oral health care, called Dental Fit

class 1 or 2 (according to Standard NATO Agreement 2466 "Dental fitness standards for military personnel and a dental fitness classification system"). Thus far it is not clear what the actual prevalence of oral diseases among Dutch recruits is, but results from an earlier study in The Netherlands showed that only one out of approximately 2,000 military recruits (18–20 years old) appeared to be absolutely free of caries experience.³

Professionals in oral health care have recognized that assessments of oral health and oral hygiene outcomes are of great importance for developing oral health care interventions. In addition, oral self-care based on recruits' personal choice may be considered as an important aspect of oral hygiene behavior. Therefore, individual beliefs and attitudes toward optimal oral hygiene behavior may play an important role in the maintenance of good oral health. In turn, good oral health may lead to a reduced number of dental interventions and omissions during training and deployments.

In the present study, the Theory of Planned Behavior (TPB), which is the model most often used to map the psychological causes of health behaviors, was used to predict psychological determinants of oral hygiene behavior. The TPB includes 3 psychological factors as independent determinants of behavioral intention, which in turn influences subsequent behavior:^{4,5}

- (1) Attitude (i.e., a person's positive or negative feelings about a given behavior, for example "I hate brushing my teeth twice a day, and cleaning interdentally at least once a day").
- (2) Subjective norm (i.e., the belief that specific important persons think that one should or should not perform a given behavior, for example, "My dentist thinks that I should brush my teeth twice a day, and use interdental aids at least once a day").
- (3) Perceived behavior control (i.e., a person's perception of his/her capabilities to perform a behavior, for example

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"I think I will be able to brush my teeth twice a day, and use interdental aids at least once a day").

Overall, for oral hygiene behavior, the TPB suggests that the more positive the attitude toward oral hygiene practices, the stronger the social norms, and the higher the perceived behavior control, the more likely it is that an individual will perform an optimal oral hygiene behavior.^{4,5} The predictive utility of the TPB has been supported in investigations of a wide range of behaviors. It has been reported that intention is the strongest psychological predictor of behavior, and meta-analyses show that across studies the average explained variance in behavior is 22%.^{6,7}

In addition, according to the TPB model, individuals make rational decisions based in part on their oral health knowledge; this variable was assessed too. However, health-related concerns are probably not the only motive for oral hygiene behavior. Indeed, in a study among girls, it was suggested that behaviors that may promote health are often performed for reasons other than improvements in general health; for example, tooth brushing may be engaged in to look more attractive.⁸ In a similar vein, it has also been suggested that unhealthy teeth are perceived as negatively affecting a person's image.⁹ Therefore, the expected social outcomes of having healthy teeth were assessed too.

The relevance of the behavioral sciences for modifying individual oral hygiene behavior has been shown since the early seventies and from that moment the behavioral and social sciences were definitively linked with dentistry in the *Fédération Dentaire International's* publication of *Social Sciences and Dentistry*.¹⁰ For instance, the findings of a study among 214 participants, adequate oral hygiene behavior (tooth brushing and the use of interdental cleaning aids) was associated with an individual's attitude toward oral health—"clean teeth" and "fresh breath"—and with the perceived influence of "important others."¹¹

Overview Present Research

The aim of the present study was to identify the relevant predictors of optimal oral hygiene behavior. These potential predictors were the variables specified in the TPB. In addition, measures of oral health knowledge and of expected outcomes of having healthy teeth for one's interpersonal relationships were used as predictors.

METHODS

After obtaining official authorization from the commanding officers in charge for participation of the army unit in this study, the administration of a customized questionnaire was linked to the mandatory vaccination program in July, October, and November 2007. The recruits of the Schoolbat North of the post "J. W. F. Kazerne" were asked if they were willing to participate 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 obtained.

Measures

The questionnaire included 58 items divided into several parts, including a few demographic questions on matters such as age, nationality, marital status, and education. Level of education was categorized as low, medium, or high. In The Netherlands, low educational level refers to vocational training, medium level to advanced vocational training, and high level to college/university training. These and other items about dental history, experiences, and dental health status were open ended, multiple choice, or to be answered on bipolar adjective rating scales.

Oral hygiene behavior (OHB) was measured by using an index for oral hygiene behavior (OHB index) developed by Buunk-Werkhoven, Dijkstra, and van der Schans, 2009 (submitted for publication). The index includes 8 items with respect to tooth brushing, interdental cleaning, and tongue cleaning (Appendix 1). For example, the item "I brush my teeth as follows" was supported by pictures showing different brushing methods such as horizontal, vertical, circular, and the Bass method. After the item scores were assigned weights, the index values were calculated and a sum score was computed. The OHB sum score on this index could range from 0 to 16. A high sum score indicate a high level of adequate oral hygiene behavior.

After the recruits had filled in the OHB index, in which they had reported their actual oral hygiene behavior, an elaborate description of a daily regimen of optimal oral hygiene behavior recommended by the American Dental Association (ADA) was given on paper.¹²

Optimal oral hygiene behavior 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 minutes; brushing stepwise by making small strokes—sort of massage—near the gum, along the inside and the outside, and on the jaw areas. In addition to the tooth brushing, daily interdental cleaning, (i.e., the use of floss, tooth sticks, or interdental brushes at least once a day), and tongue cleaning is also recommended."

Directly after this description recruits were asked if they performed this recommended oral hygiene behavior, and the answer could be scored with 1, yes or 0, no.

Intention to perform optimal oral hygiene behavior was measured using a sum score constructed from 2 items, e.g., "Do you intend to perform optimal oral hygiene behavior as described, within the next 6 months?" which was answered with endpoints 1, absolutely not to 7, absolutely yes, and "Is it likely that you will start to perform optimal oral hygiene behavior as described, within the next 6 months?" with the endpoints 1, totally unlikely to 7, totally likely. The intention sum score could range from 2 to 14.

Variables of TPB

In accordance with the TPB, the recruits' attitudes, social norms, and perceived behavioral control of both their intention

to perform adequate oral self-care and their actual oral hygiene were assessed using a total of 17 items.

Attitude toward optimal oral hygiene behavior were measured using 9 worded statements in a semantic differential format. The recruits indicated on 7-point scales how they evaluated this advised oral hygiene behavior, on the dimensions 1, unimportant to 7, important, etc.: unpleasant/pleasant, unhealthy/healthy, negative/positive, annoying/not annoying, not useful/useful, boring/exciting, painful/painless, and stupid/smart. A sum score for attitudes, ranging from 9 to 63, was constructed by adding these items. Higher scores indicate a more positive attitude.

Social norms toward the focal oral hygiene behavior were assessed by having the recruits rate the perceived opinions of 5 different significant others with respect to taking better care of their teeth, e.g., "my dentist," "my partner," "my family (parents, brothers, and sisters)," "my friends," and "my colleagues." The 7-point scale for social norms (SN) was based on 5 items, and a sum score on this SN scale varied from 5 to 35.

Perceived behavioral control (PBC) was measured using a sum score constructed from 3 items, e.g., "If I wanted to, I could take care of my teeth as described," which was answered with endpoints 1, don't agree to 5, agree or "I find it difficult or easy to take care of my teeth based the described optimal oral hygiene behavior," with the endpoints 1, difficult to 5, easy. The sum score on the PBC 5-point scale ranged from 3 to 15. In all 3 cases, high sum scores indicated a positive attitude, strong perceived approval from significant others, and a high level of perceived behavioral control of the intention to perform optimal oral hygiene behavior.

Expected social outcomes (ESO) for having healthy teeth included 6 items. An example of this 5-point scale is: "In social contacts fresh breath is important." Responses varied from 1, disagree to 5, agree, and a sum score (ranging from 6 to 30) was computed by summing up scores on all 6 items that measured the concept ESO.

Oral health knowledge refers to the degree to which a recruit has sufficient or insufficient knowledge of oral health issues. The index consists of 16 items to reveal the status of the individual's oral health knowledge. All items could be scored with 1, yes or 0, no, and a sum score was computed, so that a total oral health knowledge score was formed for each recruit (ranging from 0 to 16). The higher the total score, the higher the individual's knowledge of oral health issues.

Statistical Analysis

The Statistical Package for Social Sciences 14.0 (SPSS, Chicago, Illinois) was used for data analysis. The internal consistency of the used scales was assessed by Cronbach's α . Pearson correlations were calculated for univariate associations between the variables, and subsequently multivariate correlation analyses (linear regression analysis) were performed to identify the variables that accounted for a significant proportion of the variance in oral hygiene behavior.

RESULTS

A total of 216 (92% male) recruits, with a mean (SD) age of 19 (2) years (ranging from 17 to 30 years) participated in the study. Ninety-five percent of the recruits were of Dutch nationality; they lived with their parents, and they had a medium (48%) or a low (37%) level of education.

The question regarding recruits' ability to perform optimal oral hygiene behavior as described was answered with 'yes' by 108 recruits (50%). This subgroup performed this oral hygiene behavior for the average of 3 years, ranging from 2 months to 20 years. The other half of the total sample (49%) did not perform optimal oral hygiene behavior as recommended. However, the reported results of the OHB index showed that around two-thirds of the recruits brushed their teeth as recommended by professionals; 2–3 minutes (73%) softly (69%) twice a day (69%), and 45% of the recruits brushed their teeth in the morning, and 83% before they go to sleep. In addition, 68% used fluoride-containing toothpaste, only 13% used interdental cleaning aids, and about 25% cleaned their tongue.

Table I shows that the Cronbach's α values of the used measures were moderate to good. Furthermore, the recruits' intention to perform optimal oral hygiene behavior is quite high, and, according to their attitude scores, they evaluated the recommended oral hygiene behavior positively. They attached a moderate value to the positive social outcomes of having healthy teeth, and their knowledge of oral health was good. Their scores on social norms indicated that the recruits reported some pressure from their social environment to perform optimal oral hygiene behavior. In addition, they felt they had considerable control over carrying out the oral self-care practices.

Correlational analyses were carried out to establish the direction and magnitude of the associations between the variables (see Table II). The recruits' actual oral hygiene behavior was found to correlate positively and significantly with attitude, perceived behavioral control, intention to perform oral hygiene behavior, and expected social outcomes. Moreover, oral hygiene behavior was negatively and not significantly associated with social norms, and also not significantly, but positively associated with oral health knowledge.

Finally, 2 linear regression analyses were performed to examine the multivariate relations of the TPB variables and

TABLE I. Cronbach's α , Range, Means, and Standard Deviation (SD) for the Main Variables

Variable	Cronbach's α	Range	Mean (SD) (Whole Sample)
Oral hygiene behavior ^a	–	0–16	10.08 (2.32)
Intention to perform OHB ^b	0.92	2–14	9.62 (3.59)
Attitude ^c	0.91	9–63	50.86 (9.32)
Social norms ^d	0.84	5–35	11.99 (6.38)
Perceived behavioral control ^e	0.73	3–15	11.82 (2.79)
Expected social outcomes ^d	0.79	6–30	21.42 (4.65)
Oral health knowledge ^e	–	0–16	13.18 (1.50)

In the whole sample: ^a*n* = 210; ^b*n* = 209; ^c*n* = 208; ^d*n* = 214; ^e*n* = 206.

TABLE II. Correlations Between the Main Variables and Actual Oral Hygiene Behavior

Variables	1	2	3	4	5	6	7
(1) Attitude	—						
(2) Social norms	-0.27**	—					
(3) Perceived behavioral control	0.26**	-0.13	—				
(4) Expected social outcomes	0.23**	0.17*	0.28**	—			
(5) Oral health knowledge	0.22**	0.07	0.19**	0.17*	—		
(6) Intention to perform OHB	0.38**	-0.08	0.57**	0.21**	0.17*	—	
(7) Oral hygiene behavior	0.27**	-0.09	0.18*	0.16*	0.13	0.30**	—

* $p < 0.05$; ** $p < 0.001$.

the 2 additional variables expected social outcomes and oral health knowledge, with intention to perform optimal oral hygiene behavior and subsequently with actual oral hygiene behavior (see Table III). Because this research focused primarily on the independent effects of the predictors, in line with the common procedure in research on the TPB, all variables were entered in a single step. In addition, the variances of predictor variables were sufficiently similar to include them in one model. The first regression analysis with intention as dependent variable proved to be significant $F(5,192) = 24.36$, $p < 0.001$ and accounted for 37.2% of the variance, which is a substantial proportion of the intention to perform the recommended oral hygiene behavior. Only perceived behavioral control and attitude emerged as significant predictors of the intention to perform this behavior. In these multivariate analyses, social norms, expected social outcomes, and knowledge were no longer significantly related to intention. Next, the second regression analysis with oral hygiene behavior as dependent variable proved to be significant too, $F(5,192) = 4.01$, $p < 0.001$, but accounted for only 7.1% of the variance in actual oral hygiene behavior. Only attitude emerged as a

significant predictor of oral hygiene behavior. In this multivariate analysis, perceived behavioral control and expected social outcomes were no longer significantly related to oral hygiene behavior (see Table III for all β s).

DISCUSSION

The findings of this study are particularly important as an elaborate OHB index was used that corresponds closely with what professionals consider optimal oral hygiene behavior. Furthermore, the predictors related to oral hygiene behavior were also determined. It was found that the recruits held fairly favorable attitudes toward oral hygiene behavior and generally felt in control of performing this behavior. The associations of these factors with intention and oral hygiene behavior varied, with multivariate analyses showing perceived behavior control to be strongly associated with intention to perform oral hygiene behavior and not with actual oral hygiene behavior. A regression analysis indicated that perceived behavior control was the best predictor of intention to perform oral hygiene behavior and explained, together with attitude, 37.2% of the variance in intention to perform oral hygiene behavior. In contrast, for actual oral hygiene behavior attitude was the significant predictor, and only 7.1% of the variance was explained. This research highlights the relative importance of the TPB constructs for behavioral intention and actual behavior, and these associations should be considered when designing practical recommendations for improving oral hygiene behavior. For instance, to increase recruits' motivation or intention to perform optimal oral hygiene behavior, perceived behavior control seems to be the most important factor to influence, followed by attitudes. Both intention and attitude had significant association with actual oral hygiene behavior, suggesting both a motivational and a structural educational approach.

This study has some limitations that need to be addressed in future studies. First, the large proportion of male participants may have biased the results. Because of the selective sample of mainly adolescents, medium/low educated, and unmarried man-of-the-land forces, these findings cannot be completely generalized to the population of army recruits as a whole. As known from past studies, there are apparent differences in oral health behaviors across demographic variables (e.g., gender, age, and lifestyle) and socioeconomic status.¹³ Although this does not imply that the relationships between the variables differ in different populations, it is recommended that these results be replicated in different military groups and in diverse contexts, such as during military training, which is a simulation of a real battlefield situation.

Nevertheless, one may make some practical recommendations for clinical practice, based on these findings, which suggest that interventions should target especially recruits' perceptions of behavioral control when seeking to increase intentions to perform optimal oral hygiene behavior and promote actual oral hygiene behavior. This study may assist military oral health professionals working with recruits and professional soldiers in what are referred to be "the most dignified

TABLE III. Linear Regression of Intention to Perform Optimal Oral Hygiene Behavior and Actual Oral Hygiene Behavior on TPB Variables, Expected Social Outcomes, and Oral Health Knowledge

Determinants	Intention to Perform Optimal Oral Hygiene Behavior	Actual Oral Hygiene Behavior
	β	β
Attitude	0.25*	0.21*
Social norms	0.05	-0.01
Perceived behavioral control	0.51*	0.09
Expected social outcomes	0.16	0.08
Oral health knowledge	0.13	0.06

* $p < 0.001$.

tasks” of such professionals, i.e., educating recruits and professional soldiers in oral health and changing individuals’ oral hygiene behavior.¹⁴

CONCLUSION

In The Netherlands Armed Forces oral health has to meet minimum standards according to the NATO agreement. This implies that the possibility of oral health problems has to be minimized during the period of the operational commitment, e.g., the deployment. Beside this mandatory oral health standard, which will be primarily monitored and executed by the military dentist, there is also an explicit place for preventive measures. To maximize the oral hygiene behavior, the military oral health professionals have to be easily accessible. Dental hygienists constitute a subgroup in the oral health work force that is more easily accessible than dentists. In addition, dentists have taken little interest in advocacy to promote good oral health, preferring to treat rather than prevent oral diseases,¹⁵ so dental hygienists can promote desired oral hygiene behavior by adequate professional communication with the recruits.

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APPENDIX 1

Index for oral hygiene behavior (OHB)

The following questions are about your oral hygiene self-care practices.

(1) How often do you brush your teeth?

<input type="checkbox"/>	Not every day
<input type="checkbox"/>	Once a day
<input type="checkbox"/>	Twice a day
<input type="checkbox"/>	More than 2 times a day

(2) When do you brush your teeth?

Morning before breakfast	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No
Morning after breakfast	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No
Noon	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No
After dinner in the evening	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No
Before going to sleep	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No

(3) How do you brush your teeth?

I brush my teeth

Softly	1	2	3	4	5	6	7	Forcefully
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

(4) How much time do you spend on brushing your teeth?
I brush my teeth

<input type="checkbox"/>	Shorter than 1 minute
<input type="checkbox"/>	1 minute
<input type="checkbox"/>	2 minutes
<input type="checkbox"/>	3 minutes
<input type="checkbox"/>	Longer than 3 minutes

(5) I brush my teeth as follows:

<input type="checkbox"/>	Back and forth movement (“horizontal” method)
<input type="checkbox"/>	Up and down movement (“vertical” method)
<input type="checkbox"/>	Circular movement (“circular” method)
<input type="checkbox"/>	Brushing softly with a massing movement near the gum (“Bass” method)

(6) What do you use to clean your teeth?

Mostly I use:

<input type="checkbox"/>	Toothpaste with fluoride
<input type="checkbox"/>	Toothpaste without fluoride
<input type="checkbox"/>	I don’t know

(7) Do you clean your tongue?

<input type="checkbox"/>	Never
<input type="checkbox"/>	Sometimes
<input type="checkbox"/>	Every day

(8) Which of the following interdental tools do you use?

	Never	Not every day	Once a day	Twice or more times a day
Floss	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tooth sticks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Interdental brushes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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Determinants and Promotion of Oral Hygiene Behavior in the Caribbean and Nepal

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'Determinants and promotion of oral hygiene behavior in the Caribbean and Nepal'

Abstract

Objective and Design: The purpose of this study was to identify psychosocial determinants of oral hygiene behavior (OHB) based on the Theory of Planned Behavior (TPB) among dental care seekers in two culturally different regions: the Caribbean (Aruba/ Bonaire) and Nepal. Measures of oral health knowledge (OHK) and the expected social outcomes of having healthy teeth (ESO) were included too. **Methods:** In total 221 participants in this cross-sectional study completed a multiple culturally adapted questionnaire. **Results:** A regression analysis examined the main effects of the determinants as well as their interactions with region (Caribbean vs. Nepal). The interaction term contributed significantly to the amount of explained variance. In the Caribbean, OHB was determined by Attitude and Social Norms, and in Nepal by Perceived Behavior Control and ESO. **Conclusion:** On the basis of these findings, quite different oral health care interventions are called for in the two regions. This study illustrates how the TPB may be used as a basis to assess adequate interventions in developing and underdeveloped countries.

Key words: Behavioral science, Psychosocial aspects of Oral Hygiene Behavior, Oral Health Promotion, Caribbean, Nepal

Introduction

Even though the importance of health and personal hygiene is widely acknowledged, especially in developing and underdeveloped countries it seems that health systems are not performing as well as they could and as they should (WHO, 2008). Oral health is an important part of total health and essential to quality of life. Nowadays, the WHO calls for a reorientation of oral health systems towards prevention and health promotion. The Oral Health Programme (ORH) of the WHO emphasizes the application of evidence-based strategies in oral health promotion and prevention as well as in the treatment of oral diseases worldwide (WHO, 2009). As a consequence of unsuccessful oral health prevention, individuals often do not perform oral hygiene practices in an appropriate and efficient manner. In addition, the oral health of disadvantaged and poor population groups in developed and developing countries is generally poor (Knevel, 2005; Vignarajah, 1997).

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. Due to differences in lifestyles and risk factors that arise from environmental, economic, social and behavioral causes, such as poor living conditions and low education, as well as differences in traditions with regard to oral self care, a so called 'one size fits all'-approach for adequate oral hygiene behavior will not be effective. Identification and the assessment of the psychosocial determinants of oral hygiene behavior (OHB) within culturally subgroups or different regions are therefore of great importance for developing oral health care interventions that effectively target the determinants in culturally different regions or culturally subgroups. Such interventions need to be embedded within oral health systems that are financially fair for disadvantaged and poor population groups (Knevel et al., 2008; Petersen, 2009; WHO, 2009).

Health models and health behavior theories have been applied to oral health care in several studies. On the basis of such a social cognitive theory, the Theory of Reasoned Action (TRA; Ajzen and Fishbein, 1980), one would expect that OHB is determined by the individual's attitude towards OHB, and the perceived social norms of relevant others (e.g., McCaul et al., 1988). In line with this, Freeman and Linden (1995) found that tooth brushing and the use of additional cleaning aids were associated with a more positive attitude toward oral health, and with supportive norms of 'important others', such as the dentist, family, and friends. Moreover, in a study of Tedesco et al. (1991), it was shown that, in addition to the variables of the TRA, self-efficacy (i.e., self-control) for oral hygiene self-care did increase the explained variance in brushing and flossing behavior. Data on students in the context of a regimen of daily brushing and flossing showed the importance of perceived behavioral control, a variable similar to self-efficacy (McCaul et al., 1993).

However, there are profound OHB differences across regions, countries and within countries. These may relate to socioeconomic status, race or ethnicity, age, gender or general health status (Sakki, et al., 1998). These differences may influence the relationship between psychological factors on the one hand and OHB on the other hand: Culturally subgroups may differ in the psychological factors that determine OHB. For interventions to be effective, they must take into account these differences. Therefore, the present study aimed to examine the psychosocial determinants of OHB among dental care seekers in two culturally different regions: the Caribbean and Nepal.

We chose to compare two culturally different regions with relatively disadvantaged and poor population groups in so called developed and developing regions, i.e., two islands in the Caribbean (Aruba and Bonaire) and Nepal, using a health behavior theory, which is the model most often used to map the psychological causes of health behaviors: the Theory of Planned Behavior (TPB; Ajzen, 1988, 1991). The TPB includes besides attitude (i.e., a person's positive or negative feelings about a given behavior) and social norms (i.e., the belief that specific important persons think that one should or should not perform a given behavior), also perceived behavior control (i.e., a person's perception of his/ her capabilities to perform a behavior) as an independent determinants of behavior. On the basis of this TPB model, one would expect that, overall, the more positive the attitude towards oral self-care practices, the stronger the social norms, and the higher the perceived behavior control, the more likely it is that an individual will perform adequate OHB.

Aruba and Bonaire are part of the Netherlands Antilles. The population on the islands is mainly mixed Black, with the remaining group of being White, Amerindian and Asian background. About 75% of the population is Roman Catholic, and the surplus holds a membership in other religions. In 2005, on Bonaire the unemployment rate for the economically active population was almost nine per cent, whereas on Aruba the unemployment rate was a bit more than six per cent (PAHO, 2007).

Nepal is a poor developing landlocked country situated in the Himalayas, and positioned between China and India in Western Asia. Nearly 85% of the population, predominantly children, live in villages, in remote terrain that is difficult to access. Under-nutrition is widespread, particularly among children, the growth rate is high, and the expectation of life is around 61 years. Hinduism is practiced by a greater majority of people, and Buddhism by a minority (WHO, 2009).

Given the differences between both culturally regions, the psychosocial determinants of OHB may also differ. For example, people in the Caribbean have relatively easy access to a dentist for regular screening or dental problems, and a lack of adequate OHB may be merely a matter of one's individual attitudes. In contrast, for Nepalese there is limited availability of dental care, and therefore, Nepalese may generally experience more problems with their teeth, and may feel more unable to engage in adequate OHB (Yee and Maveen, 2004). The bottom-line is that the task of oral hygiene related behavior is influenced by environmental and cultural factors that may, in turn, influence the psychological determination of OHB.

Health-related concerns are not the only motive for oral hygiene behavior. For example, tooth brushing may be engaged in to look more attractive, which in turn may influence one's social interactions, and for instance, in some cultures golden teeth are a trend or have become popular and are used as a status symbol (Smith, 1974; Oosterhaven, *et al.*, 1989). In this study, therefore, the perceived social consequences of OHB, i.e., how one feels healthy teeth might affect one's interpersonal interactions (ESO) were also assessed. Finally, given the fact that in developing regions, knowledge about adequate OHB may be limited, and according to the TPB model, people make rational decisions based in part on their oral health knowledge (OHK), this variable was also included. Especially, people who have assimilated OHK and experienced some control over their personal oral health are more likely to adopt oral hygiene behavior (Freeman, *et al.*, 1993).

To summarize, the present research examined in the Caribbean and in Nepal the potential psychosocial determinants of OHB as assessed using a culturally adapted questionnaire, including a culturally adapted version of the OHB index. When different determinants are associated with OHB in culturally different regions, this may have direct implications for the development of interventions promoting oral hygiene behavior in these regions.

Methods

Permission for this cross-sectional study was obtained from the ethical committee of the Faculty of Behavioral and Social Sciences, University of Groningen, and the study was conducted according to universal ethical principles. Moreover, the dental patients and dental care seekers were invited to take part in this international study on oral hygiene behavior, and after providing informed consent they answered voluntarily a multiple culturally adapted paper-and-pencil-questionnaire, just before the screening/dental examination or dental treatment.

Participants and procedure

Participants were patients who visited a dental practice in Bonaire and in Aruba, (Caribbean sample), and dental care seekers who visited a dental camp (Nepal sample). Participants in the Caribbean answered a questionnaire in the dental waiting room before the dental screening. Participants in Nepal were recruited during a dental camp of the Netherlands Oral Health Society (NOHS) in the region of Newalparasi: a questionnaire in Sanskrit was filled out by 69 participants, whereas the data for 39 participants were collected through a semi-structured interview by a Nepalese translator. In both samples also the impact of individual's clinical oral health status was examined by a dental hygienist.

Measures

The questionnaire included 35 items divided into several parts, including a few demographic questions. Level of education was categorized as low, medium or high. In the Netherlands Antilles, a low educational level refers to vocational training, medium level to advanced vocational training, and high level to college/university training. In Nepal, a low educational level refers to primary school, medium level to 'School Leaving Certificate'/ vocational training, and high level to advanced vocational training/college/university training.

Oral Hygiene Behavior (OHB index) was measured by a culturally adapted version of the OHB index developed by Buunk-Werkhoven (Buunk-Werkhoven et al., 2008; 2009a,b,c,d). This culturally adapted index includes 6 items with respect to tooth brushing and tongue cleaning. Based upon the author's experience, consultation of oral health professionals, and the relevant literature, realistic tuned weights were assigned to these items. Because of cultural differences, for some items, the weights relatively differed between samples. For example, in Nepal the majority of people brush their teeth not more than once a day, because that is the norm. Therefore, the weights for frequencies of tooth brushing were in Nepal: "not every day" = 0 points, "once a day" = 1 point, and if "once a day before they go to sleep" = 2 points, "twice a day" = 2 points or "twice a day, including once before they go to sleep" = 3 points. In contrast, in the Caribbean: "not every day" = 0 points, "once a day" = 1 point, "twice a day" or "more than 2 times a day" = 2 points. The OHB index sum score could range from 0 to 14. A high sum score indicated a high level of self-care OHB.

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 two minutes; 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 the tooth brushing, daily interdental cleaning (i.e., use of floss, tooth sticks, or interdental brushes in the Caribbean, and use of *sinca* (i.e., known as a wooden 'tooth stick' in Nepal) and tongue cleaning is also recommended."

Attitude (ATT) toward this focal OHB were measured using four worded statements in a semantic differential format (Cronbach's $\alpha = .65$ in the Caribbean, and $\alpha = .83$ in Nepal). Participants indicated on seven-point scales how they evaluated this advised oral hygiene behavior, on the dimensions 1 = unimportant to 7 = important, 1 = unpleasant, unhealthy, and painful-painless. A sum score for participants' attitudes was constructed by adding the items (ranging from 4 to 28). Higher scores indicated a more positive attitude. Social norms (SN) toward the focal OHB were assessed by having the participants rate the perceived opinions of different significant others with respect to taking better care of their teeth, e.g., "my dentist," "my partner," "my (best) friends," and "my nearest family (parents, brothers, and sisters)." This seven-point scale for social norms was based on four items (Cronbach's $\alpha = .91$ in the Caribbean, and $\alpha = .86$ in Nepal). A sum score on this SN scale varied from 4 to 28.

Perceived behavioral control (PBC) was measured using a sum score constructed from two items (Cronbach's $\alpha = .60$ in the Caribbean, and $\alpha = .40$ in Nepal), e.g., "Do you succeed in taking care of your teeth based on the daily OHB," which were answered with endpoints 1 = don't agree to 5 = agree. The sum score on this five-point scale ranged from 2 to 10.

In all three domains, high sum scores indicated a positive attitude, strong perceived approval

from significant others, and a high level of perceived behavioral control of the focal oral hygiene behavior.

Expected social outcomes (ESO) (Buunk-Werkhoven et al., 2008; 2009a,b,d) of having healthy teeth were assessed with a scale of six items (Cronbach's $\alpha = .68$ in the Caribbean, and $\alpha = .76$ in Nepal). An example of an item is: "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 (ranging from 6 to 30).

Oral health knowledge (OHK) was measured with an index consisting of seven items to reveal the status of the individual's oral health knowledge, for example, "Gum bleeding is a sign of a periodontal disease." All items could be scored with 1 = yes or 0 = no, and a sum score was computed (ranging from 0 to 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.

Dentition characteristics

In both samples a relative simple record of dentition characteristics (category I = healthy dentition, II = slightly unhealthy dentition (i.e., minimal caries and gingival problems), III = mutilated dentition, IV = pre-edentulous, and V = edentulous) was registered by a dental hygienist.

Statistical Analyses

The Statistical Package for Social Sciences 14.0 (SPSS, Chicago, Illinois) was used for data analysis. The internal consistency of the used scales was assessed by Cronbach's alpha (α). A one-way analysis of variance was performed to determine whether any significant differences in mean scores of the variables existed between the patients in the Caribbean sample and in the Nepal sample. Linear regression analyses were performed to identify the determinants that accounted for a significant proportion of the variance in OHB.

Results

Characteristics of participants

Participants in the Caribbean

The Caribbean sample included 113 patients (55% female), and their mean (SD) age was 36.5 (13.2) years. Although Dutch is the official language, Papiamentu – a mixture of Portuguese, Spanish, English and Dutch words – as the native language is spoken by 73% as its mother tongue. 48% of the participants in the sample were married. Only 5% of the Caribbean participants had a low level of education, 74% had a medium level, and 23% had a high level of education. The record list of dentition characteristics in the Caribbean sample showed that just 16% of the participants had healthy teeth (category I), and more than the half had slightly unhealthy dentition (category II, 54%). Almost one-third of the Caribbean participants had mutilated dentition (category III, 30%).

In Table 1 it can be seen that participants evaluated the focal oral hygiene behavior very positively, they attached much value to positive social outcomes of having healthy teeth, and their knowledge of oral health was moderate. They reported hardly any pressure from their social environment to perform this behavior, and they felt they had good control over carrying out the oral hygiene self-care practices. For instance, the findings of the OHB index showed that 83% of the respondents brushed their teeth as recommended, twice a day. In addition, the half of the participants brushed their teeth in the morning and before they

go to sleep for two minutes each time. 70% cleaned their tongue twice daily and 23% once a day. 55% of the Caribbean participants reported the use of any interdental cleaning methods, and 77% used fluoride concerning toothpaste.

Table 1.		
Means and Standard deviation (SD) for the main variables for the Caribbean and Nepal participants		
Measures	Caribbean	Nepal
Attitude ^{ab}	24.09 (3.23)	23.71 (5.08)
Social Norms ^{cd}	15.17 (6.73)	24.44 (4.67)
Perceived Behavior Control ^{ef}	8.6 (1.62)	8.38 (0.97)
Expected Social Outcomes ^{bd}	24.8 (3.9)	21.65(4.42)
Oral Health Knowledge ^{gh}	4.05 (1.3)	3.14 (1.1)
Note. In total sample: ^a n = 103. ^b n = 102. ^c n = 78. ^d n = 106. ^e n = 100. ^f n = 104. ^g n = 107. ^h n = 94.		

Dental care seekers in Nepal

A total of 108 dental care seekers in Nepal (54% female); their mean (SD) age was 40.1 (16.5) years completed the questionnaire. The sample is a multi-ethnic group of Brahmin, Magar, and Newari, Tharu, Chettri, and Gurung. Nepali as the national language is spoken by 90% as its mother tongue. 74% of the participants in the sample were married. The level of education varied from none education (28%), low (27%), medium (32%) to a high level (13%). A record of dentition characteristics in the Nepal sample showed that almost a quarter (23%) of the participants had healthy teeth (category I), and almost the half had slightly unhealthy dentition (category II, 49%). More than a quarter of the Nepalese participants had mutilated dentition (category III, 28%). Table 1 shows that Nepalese participants evaluated the focal oral hygiene behavior positively, they attached much value to positive social outcomes of having healthy teeth, and their knowledge of oral health was moderate. They reported much pressure from their social environment to perform this behavior, and they felt they had considerable control over carrying out the oral hygiene self-care practices. For instance, the reported results of the OHB index showed that 58% of the participants brushed their teeth once a day, as Nepalese normally do; brushing the teeth only in the morning as a part of their bath ritual. 13% of the participants were not used to brush their teeth daily. 29% of the participants brushed twice a day, and just very few of them brushed their teeth in the morning and before they go to sleep. About 55% and 34% also cleaned their tongue daily, twice and once a day, respectively. Only 7% reported the use of any interdental cleaning methods, 21% used tooth powder, and only 3% used a ‘dattiwan’ as a tooth brush and ‘ash’ as cleaning aids.

Comparing the Caribbean and Nepal

Participants in the Caribbean felt more control over carrying out their oral self-care practices compared to the Nepalese, $F(1,209) = 73.15, p = .001$. In addition, they attached more value to positive social outcomes of having healthy teeth, $F(1,206) = 29.65, p = .001$, and their oral health knowledge was more explicit, $F(1,199) = 27.96, p = .001$. However, Nepalese

participants indicated that they felt much pressure from their social environment to perform OHB than participants in the Caribbean, $F(1,182) = 121.78, p < .001$.

Differential Prediction of OHB in the Caribbean and in Nepal

To examine whether the various predictors played a different role in the two regions, a regression analysis was performed in the combined sample with region as the moderator. The interactions between each of the five predictors on the one hand and region on the other hand were entered in a linear regression analysis. The interaction terms contributed significantly to the amount of explained variance (7.2%), $F(11,138) = 8.28, p < .001$. Three of the five variables had significant interaction effects with region: attitude ($\beta = -.71, p < .05$), perceived behavior control ($\beta = .55, p < .05$), and ESO ($\beta = -.68, p < .05$). Thus, the findings clearly underline that these three predictors had different relations with oral hygiene behavior in the Caribbean than in Nepal. To examine how these predictors different between regions, separate regression analyses were carried out in both samples.

Predicting OHB in the Caribbean

A linear regression analysis, in which the same five predictors were included as in the total sample, was performed in the Caribbean sample (Table 2). The model proved to be significant, $F(5,54) = 3.55, p < .001$, and accounted for 17.7% of the variance, which is a substantial proportion for oral hygiene behavior. Not only attitude ($\beta = .31, p < .05$), but also social norms ($\beta = .24, p < .05$) emerged as significant predictors of OHB.

Predicting OHB in Nepal

The linear regression model with five predictors was significant, $F(5,84) = 2.26, p < .05$, and accounted for only 6.6% of the variance, which is lower than in the Caribbean sample. Only perceived behavior control ($\beta = .28, p < .01$), and expected social outcomes ($\beta = -.23, p < .05$) emerged as significant predictors of OHB (Table 2).

Table 2.		
Linear regression of oral hygiene behavior (OHB) for all variables		
	OHB	OHB
Determinants	Caribbean β	Nepal β
Attitude	.31*	-.08 ns
Social Norms	.24*	.02 ns
Perceived Behavior Control	-.09 ns	.28**
Expected Social Outcomes	.22 ns	-.23*
Oral Health Knowledge	.15 ns	.03 ns
Note. ** $p < .01$. * $p < .05$ Caribbean: $R^2 = .177$. $F(5,54) = 3.55, p < .001$ Nepal: $R^2 = .066$. $F(5,84) = 2.26, p < .05$		

Discussion

The results of this study show that besides the fact that the predictors of OHB were determined in different regions, the culturally adapted version of the OHB index appears to be a useful method for assessing and evaluating oral hygiene self-care practices of individuals in the Caribbean and in Nepal. In contrast to the 4-item oral hygiene scale including only self-reported tooth brushing and dental flossing (Davidson et al., 1997), this OHB index included all brushing details and other potential components of personal oral hygiene regimens, such as the use of interdental cleaning methods, fluoride concerning toothpaste, and tongue cleaning (Soldani et al., 2008). These findings are particularly important as this culturally adapted version of the OHB index corresponds closely to the actual oral hygiene behavior of the participants.

While, overall, the power of the TPB in explaining differences in OHB was substantial, the TPB did perform quite differently in the two different sociocultural contexts examined in this study. That is, clear differences emerged between the Caribbean and Nepal regions in the importance of the TPB predictors of OHB.

In the Caribbean sample, attitude (ATT) and social norms (SN) were found to be significant determinants of OHB. Thus, in the Caribbean individuals are more inclined to engage in OHB when they have a more positive attitude towards it, and perceive more favourable norms towards OHB. This result is in line with the classical prediction of the Theory of Reasoned Action, suggesting that for Caribbean people OHB is indeed a type of planned behavior that is dependent on rational considerations (Ajzen and Fishbein, 1980). In contrast, in the Nepal sample, attitude and perceived social norms were not related to OHB. Although the Nepalese do have attitudes and experience social norms with regard to OHB, these factors seemed not to influence their actual OHB. In the Nepalese sample, however, perceived behavioral control (PBC) was the most important predictor of OHB. Thus, the perceived task complexity of OHB and the feelings of control over OHB seem to be important for the Nepalese. These differences in psychological determinants between both cultural groups must be related to environmental and cultural differences. For example, for the Nepalese, tooth brushing is part of their bath ritual and has primarily a symbolic meaning in the sense of fostering purity. Therefore, OHB as defined in this study may only be performed when they feel able to do so.

In addition to PBC, ESO was the only other factor that contributed to OHB in Nepal. Unexpectedly, for the Nepal region, a higher ESO was associated with a lower OHB. A possible explanation for this finding may be that in Nepal the used ESO-measure reflects primarily the concern with social outcomes. Therefore, Nepalese participants who felt in control of performing their OHB may have felt less concerned or worried about their dental status or oral health in the social domain.

In both the Caribbean and the Nepal sample, oral health knowledge (OHK) was not associated with OHB. It must be noted that knowledge concerning the benefits of fluoride containing toothpaste was not measured, because in the Caribbean fluoride toothpaste is generally accepted, whereas in Nepal hardly any toothpaste is sold, including many global multi-national brands, contained any fluoride at all.

In conclusion, although not all relations can be interpreted unequivocally in this cross-sectional design, these data illustrate that there are substantial differences between the two regions in the way people perceive and experience different aspects of oral health and their

personal oral hygiene behavior (OHB). The results of this study suggest that the importance of the different TPB constructs for actual oral hygiene behavior depends to a considerable extent on the context. In the Caribbean, OHB was determined by Attitude and Social Norms, and in Nepal by Perceived Behavior Control and ESO.

These differential associations should be considered when designing practical recommendations for improving oral hygiene behavior. According to the WHO: "...Self-care practices in relation to oral hygiene are essential to promotion of oral health, and one of the significant reforms is to re-organize oral health services around people's needs and expectations, so as to make them more socially relevant...". On the basis of these findings, promotion of oral hygiene self-care in the Caribbean should be primarily geared towards attitude change, and use methods that may foster a more positive attitude and social norm with respect of appropriate oral hygiene behavior. In contrast, such an approach would likely fail in Nepal, where promotion of oral hygiene self-care should be geared primarily towards increasing perceived control.

Instruction and feedback on how to execute the appropriate behavior would be the most effective method in this context. The gained integrative insight into the determinants of OHB is needed for the development of specific oral health interventions for people in different cultures, and for the implementation of evidence-based, simple, and cost-effective preventive approaches into public-health systems. This study may assist all oral health professionals working with culturally subgroups in what are referred to be "the most dignified tasks" of these professionals, i.e., educating these culturally subgroups in oral health and changing their oral hygiene behavior (Özcan, 2008). Especially dental hygienists may play a central role in promoting OHB, and may deliver these prevention oral health messages globally (Buunk-Werkhoven, 2008; Hovius, 2009). According to the editorial of *The Lancet* (2009), dentists are at times not primarily focussed on educating patients, and in promoting good oral health, preferring to treat rather than prevent oral diseases. Moreover, in low-income and middle-income countries, dental care provided only by dentists is in general costly and unrealistic (Knevel et al., 2008; Petersen, 2009; WHO, 2009; Yee and Maveen, 2004). Therefore, in such countries dental hygienists may be the primary professionals involved in oral health care as they are well-trained to promote desirable oral hygiene behavior by adequate professional communication with the people in diverse cultures (Buunk-Werkhoven, 2009d). At last, while the results of this study need replication in other regions and countries to gauge the generalization of the findings, and the fact that not all three TPB variables including the two additional variables contribute to the prediction of OHB, this expanded TPB model may be a fruitful perspective to guide future research and practice in oral hygiene behavior in diverse contexts.

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Evaluation and Promotion of Patients' Oral Hygiene in Uruguay

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Evaluation and Promotion of Patients' Oral Hygiene in Uruguay

Abstract

The first aim of this study was to describe patients' attitudes with respect to oral self-care practices, social norms, expected social outcomes of having healthy teeth, and oral hygiene behavior, as assessed with the Spanish version of the Oral Hygiene Behavior Index in dental patients of the Faculty of Odontology of the Catholic University in Montevideo, Uruguay. The second aim of the study was to examine the relevant predictors of this oral hygiene behavior. Eighty participants filled out a questionnaire during dental care they received from students. Overall, patients exhibited an adequate level of oral hygiene behavior, a positive attitude, positive social norms (especially on part of the dentist and the family), and positive social outcomes of having healthy teeth. Regression analysis revealed that attitude and social norms explained 21.8% of the variance in reported oral hygiene behavior. The present findings suggest that patients' inadequate oral hygiene habits can be changed in the right direction and indicate that social psychological factors play an important role in oral health care. Moreover, the findings indicate that patients' oral hygiene behavior can be improved not only by promoting a more positive attitude toward the performance of this specific oral hygiene behavior, but especially, by promoting support by significant others, such as the dentist and the patients' family.

Key words: Behavioral Sciences; promoting oral hygiene behavior, attitude, social norms

Even though the importance of oral hygiene is widely acknowledged, it seems to be a problem for individuals to perform oral hygiene practices in an appropriate and efficient manner (Kay and Locker, 1996; Davidson, Rams and Andersen, 1997). Oral self-care based on personal choice may be considered as an important aspect of oral hygiene behavior (Parodi, 2008). Therefore, individual beliefs and attitudes toward adequate oral hygiene behavior are important in the maintenance of good oral health. In line with this notion, it has been suggested that with regard to oral hygiene behavior the more positive the attitude toward oral self-care practices, and the stronger the social norms, the more likely it is that an individual will perform adequate oral hygiene behavior (Schou, 2000).

Health-related concerns are probably not the only motive for oral hygiene behavior. Smith (1974) suggested that behaviors that may promote health are often performed for reasons other than improvements in general health; for example, tooth brushing is related to the desire to look more attractive. Indeed, as noted by Sugiyama (2005) in a review of the literature on physical attractiveness, oral health may have an important, though often neglected, effect on a person's appearance. According to Sugiyama, from an evolutionary point of view, "...strong, even white teeth provide a constellation of cues to health, developmental history, masticatory efficiency, and genotypic quality, and are thus predicted to be attractive" (p. 310). In a similar vein, Stokes, Ashcroft, and Platt (2006) suggested that unhealthy teeth are perceived as negatively affecting a person's image. In the present study, therefore, the perceived social consequences, i.e. how healthy teeth might affect a person's interpersonal interactions, were also assessed.

The relevance of the behavioral sciences for modifying individual oral health behavior has been shown since the early 1970s, and since then these sciences have been definitively linked with dentistry in the Fédération Dentaire Internationale's publication of *Social Sciences and*

Dentistry (Richards and Cohen, 1971). For instance, McCaul, Glasgow, and Gustafson (1985) successfully applied social learning theory (Bandura, 1977) to predict levels of oral hygiene behavior. According to the findings of a study by Freeman and Linden (1995) among 214 participants, adequate oral hygiene behavior (tooth brushing and the use of interdental cleaning aids) was associated with an individual's attitude toward oral health – 'clean teeth' and 'fresh breath' – and with the perceived influence of 'important others', such as the dentist, family, and friends. The primary aim of this study was to describe patient attitudes with respect to oral self-care practices, social norms, expected social outcomes of having healthy teeth, and oral hygiene behavior. The second aim of this study was to examine the relevant predictors of this oral hygiene behavior.

Material and method

Participants and procedure

The participants were patients of the Faculty of Odontology of the Catholic University of Uruguay. Ethical approval for this study was obtained from the ethics committee of the faculty. The questionnaires were filled out by patients who attended the Faculty for different reasons during the period March 28th – September 21st of 2008. For logistical reasons and after providing informed consent, a multiple-choice paper-and-pencil questionnaire was filled out by the patients during their dental check-up or treatment by dental students. The Geisinger procedure (1994) was partly used for the translation of the measures in the questionnaire. The measures were first translated into Spanish by three native speakers of Uruguayan descent, two dental students and a psychologist. Next, each member, working separately, carefully reviewed the three versions of the translation into Spanish and then compared them with the English version. In a group meeting, the members discussed discrepancies and reconciled all differences and concerns regarding the translation, until they agreed that the language was clear and understandable for Uruguayan dental patients and that the instruments tapped the intended construct in this Latin-American population. At the end of the translation process, a translator checked the final questionnaire.

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Measures - questionnaire

General part of the questionnaire

The original questionnaire consisted of 36 items divided into several parts, including some demographic questions identifying gender, age, nationality, education and marital status. These and all the other questions were open questions, multiple-choice questions or questions to be answered on bi-polar adjective rating scales.

Oral hygiene behavior

The oral hygiene behavior was measured with the Oral Hygiene Behavior index, developed by Buunk-Werkhoven, Dijkstra and Van der Schans (2008). This index included eight items about tooth brushing, interdental cleaning and tongue cleaning. For example, the item "I brush my teeth as follows" is followed by images explaining different tooth-brushing methods, such as horizontal, vertical, circular brushing, and the Bass method (see Appendix I for the Spanish version of the Oral Hygiene Behavior index). Next, on the basis of weighted item scores the sum score was computed. The sum score of this index ranged from 0 to 16. A high score indicated a high level of oral self-care practices.

Attitude, social norms and oral hygiene behavior variables

Attitudes and social norms regarding general oral hygiene behavior were evaluated on the basis of a total of 14 items.

Oral hygiene behavior was described as: “Brush your teeth twice a day (of which once at night before going to bed) with a fluoride toothpaste and a soft toothbrush; Place the bristles of the toothbrush against the gum line and brush back and forth gently in order to remove plaque and food debris; Brush for 2 minutes, first the inside and the outside surfaces and after that, the chewing surfaces of each tooth and finally use toothpicks or dental floss to remove plaque and food debris between the teeth”.

Directly after having presented this description to the patients, their oral hygiene behavior (OHB) was assessed by asking them if they usually performed their oral hygiene care as described. The scores for this item were: 1 = yes or 0 = no. If the patients answered ‘yes’, they were asked: “How long have you been cleaning your teeth in this way?”

Attitude

The attitude towards this general oral hygiene behavior was measured with nine items written in a differential semantic format ($\alpha = .82$). The participants indicated on a scale of 1 – 7 how they evaluated this behavior for each of nine characteristics, i.e. “not important – important”, “unpleasant – pleasant”, “healthy – not healthy”, “negative – positive”, “boring – not boring”, “useful – not useful”, “insipid – exciting”, “painful – painless” and “stupid – smart”. The scores of these items were added up (ranging from 9 – 63) as a measure of the attitude of the participants. The higher the scores, the more positive their attitude.

Social norms

To assess the social norms, the participants were asked to rate on 7-point scales the perceived opinions of five different significant others with respect to taking better care of their teeth, e.g. “my dentist”, “my partner”, “my friends”, “my colleagues” and “my family (parents, brothers and sisters).” The social norms scale was based on these 5 items ($\alpha = .86$) so the scores ranged from 5 to 35.

Expected social outcomes

Expected social outcomes (Buunk-Werkhoven et al., 2008) of having healthy teeth included 6 items (Cronbach’s $\alpha = .80$). An example of this 5-point scale is “Is it important in social contacts to have fresh breath?” The answers varied from 1 = strongly disagree to 5 = strongly agree. The sum score was registered (varying from 6 to 30).

At the end of the questionnaire, patients were asked if they thought that others should notice if they had improved their oral hygiene behavior. The question: “If I take better care of my teeth, people around me will notice it” varied from 1 = strongly disagree to 5 = strongly agree.

Statistical Analysis

Data were analyzed to statistically describe the results of the measured variables. The internal consistency (reliability) of the scales used was assessed by Cronbach’s alpha. Pearson correlations were calculated for univariate associations between the variables, and linear regression analyses were performed to identify the variables that accounted for a significant proportion of the variance in oral hygiene behavior. The Statistical Package for Social Sciences (SPSS) 14.0 was used.

Results

Patient characteristics

A total of 80 participants, of whom 68% were women and 32% men of Uruguayan nationality (94%), were interviewed and filled out a questionnaire. Their average age was 35.43 years (SD = 13.93; [18 - 68]) and 44% of them were single. The highest education level was university (50%) and 43% had finished secondary school. Five participants (6%) had a lower level of education. Table 1 shows the percentages per item of the Spanish version of the Oral Hygiene Behavior index, and Table 2 the mean scores with standard deviations and the range values of the main variables: oral hygiene behavior, attitude, social norms and expected social outcomes.

Table 1.

Spanish version of the Oral Hygiene Behavior index: Percentage per item. N = 80

Items	Alternatives	P
tooth brushing	never	3
frequency (N 80)	once a day	19
	twice a day	61
	more than twice a day	17
toothbrush moment	in the morning, before breakfast (N = 72)	46
	in the morning, after breakfast (N = 76)	76
	at noon (N = 80)	80
	after dinner, in the evening (N = 71)	61
	before going to bed (N = 72)	73
tooth-brushing force	gently (1,2,3) (N = 1)	1
	gently / not forcefully (4,5) (N = 55)	68
	forcefully (6,7) (N = 24)	30
duration of tooth	less than one minute (N = 5)	6
brushing	one minute (N = 24)	30
	two minutes (N = 30)	38
	three minutes (N = 12)	15
	more than three minutes (N = 9)	11
tooth-brushing method	horizontal method (N = 5)	6
	vertical method (N = 24)	30
	circular method (N = 8)	10
	Bass method (N = 10)	13
	combination of methods (N = 32)	40
toothpaste	toothpaste with fluoride (N = 71)	89
	toothpaste without fluoride (N = 6)	8
	I don't know (N = 3)	4
tongue cleaning	never (N = 12)	15
	sometimes (N = 33)	41
	always (N = 35)	44
use of dental floss, dental sticks, interdental brushes	never (N = 11)	14
	sometimes (N = 22)	27
	once or twice a day (N = 47)	59

It can be seen that 51 patients (64%) in this sample show adequate current oral hygiene behavior and that this subgroup has performed this oral hygiene behavior for an average of 12 years, ranging from 1 to 45 years. So, out of the total sample, one third (33%) of the patients (mean age = 33.46 years, SD = 14.07) does not perform adequate oral health self-care as described. It is worth noting that almost three quarters of the patients believe that others would notice it if they improve their oral hygiene behavior.

In general, patients felt that they had a reasonably high level of oral hygiene behavior ($M = 11.41$, $SD = 2.55$). For instance, according to the oral hygiene behavior index about half of the patients brushed their teeth as recommended by professionals, two minutes (38%) twice a day (61%). In addition, almost all (89%) used toothpaste containing fluoride, and about 40% also used interdental cleaning aids (mainly floss) and always cleaned their tongues.

The patients evaluated the described oral hygiene behavior extremely positively, compared with the scale's midpoint of 36 ($M = 48.49$, $SD = 6.07$). However, they also reported that the recommended oral hygiene behavior was a little boring. Moreover, within a range of 5 to 35, they reported considerable pressure from their social environment to perform adequate oral hygiene behavior ($M = 17.69$, $SD = 8.53$). It is worth noting that the patients perceived more pressure from the dentist and their family or partner than from their friends and colleagues. Within a range of 6 to 30, the patients valued the positive social outcomes of having healthy teeth highly ($M = 25.88$, $SD = 3.98$).

Table 2.

Cronbach's α , Range, Means, and Standard deviation (SD) for the main variables

Variables	Cronbach's α	Range	Mean (SD)
Oral hygiene behavior _a	--	0 - 16	11.41 (2.55)
Attitude _b	.82	9 - 63	48.49 (6.07)
Social norms _c	.86	5 - 35	17.69 (8.53)
Expected social outcomes _d	.80	6 - 30	25.88 (3.98)

Note. In the sample: ^an = 78. ^bn = 74. ^cn = 65. ^dn = 80.

In addition, correlational analyses were carried out to establish the direction and magnitude of the associations between the variables (Table 3). Oral hygiene behavior was found to correlate positively and significantly with attitude ($r = .28$, $p < .05$), and negatively and significantly with social norms ($r = -.42$, $p < .001$). Expected social outcomes were not significantly correlated with oral hygiene behavior but were associated with attitude ($r = .39$, $p < .001$) and with social norms ($r = -.27$, $p < .05$). These relations go in the expected directions. Apparently, the question: "If I take better care of my teeth, people around me will notice" was correlated with social norms ($r = .39$, $p < .001$).

Table 3.				
Correlations between the main variables and adequate oral hygiene behavior				
Variables	1	2	3	4
1. Oral hygiene behavior	—			
2. Attitude	.28*	—		
3. Social norms	-.42**	-.13	—	
4. Expected social outcomes	.16	.39**	-.27*	—
* $p < .05$. ** $p < .001$.				

In linear regression analysis, in which the attitude and social norms were entered simultaneously, the prediction of oral hygiene behavior proved to be significant $F(2,58) = 9.34$, $p < .001$, and accounted for 21.8 % of the variance. While both attitude and social norms had an effect on oral hygiene behavior, the effect of social norms was stronger.

Table 4.	
Linear regression of oral hygiene behavior on attitude and social norms	
Variables	Oral hygiene behavior β
Attitude	.24*
Social norms	-.40**
* $p < .05$. ** $p < .001$.	
$R^2 = .22$ $F(2,58) = 9.34$, $p < .001$	

Discussion

The findings of this research are particularly important as an elaborate Oral Hygiene Behavior index was used that corresponds closely with what professionals consider adequate oral hygiene behavior. The Spanish version of the Oral Hygiene Behavior index appears to be a useful method for assessing and evaluating the oral hygiene behavior of dental patients in Uruguay. It is worth noting that while many patients mentioned the use of dental floss, virtually no one used dental sticks or interdental brushes.

The real test of a measurement system such as the Oral Hygiene Behavior index is when it is employed in relation to general oral health. This Spanish version of the index needs to be used in other clinical and general populations in Spanish speaking countries.

Furthermore, the predictors related to oral hygiene behavior were also determined.

Regression analysis indicated that social norms were the best predictor of Oral Hygiene Behavior and explained, together with attitude, 21.8 % of the variance in reported oral hygiene behavior.

This study has some limitations that need to be addressed in future studies. First, the large proportion of female participants, who are generally more interested in health issues, may have biased the results. Because of the selective sample of mainly adult, highly educated, unmarried women, these findings cannot be considered representative of the population as a whole. As known from past studies, there are apparent differences in oral health behavior across demographic variables (e.g., gender, age and lifestyle) and socioeconomic status.

For instance, females brush their teeth more often than males (Sakki, Knuuttila, & Antilla, 1998; Schou, 2000). Although this does not imply that the relationships between the variables used differ in different populations, it is recommended that these results be replicated in different groups and in diverse contexts.

The present study may have several implications and it is safe to make practical recommendations for clinical practice based on these findings, which suggest that, in order to increase oral hygiene behavior, interventions should target social norms and attitudes in particular. This study may assist oral health professionals working with patients in what Özcan (2008) refers to as “the most dignified tasks” of the dentists, i.e. educating patients in oral health and changing individual’s oral hygiene habits.

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Appendix I
Index for oral hygiene behavior

The following questions are about your oral hygiene self-care practices.

1. How often do you brush your teeth?

- ☐ not every day
- ☐ once a day
- ☐ twice a day
- ☐ more than twice a day

2. When do you brush your teeth?

- | | | |
|-----------------------------|------------------------------|-----------------------------|
| morning before breakfast | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| morning after breakfast | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| noon | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| after dinner in the evening | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| before going to sleep | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

3. How do you brush your teeth?

I brush my teeth

- | | | | | | | | | |
|--------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
| gently | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | forcefully |

4. How much time do you spend on brushing your teeth?

I brush my teeth for

- ☐ less than one minute
- ☐ one minute
- ☐ two minutes
- ☐ three minutes
- ☐ more than three minutes

5. I brush my teeth as follows:

- ☐ back-and-forth movement ('horizontal' method)



- ☐ up-and-down movement ('vertical' method)



- ☐ circular movement ('circular' method)



- ☐ brushing gently, massaging the gum ('Bass' method)



6. What do you use to clean your teeth?

Mostly I use:

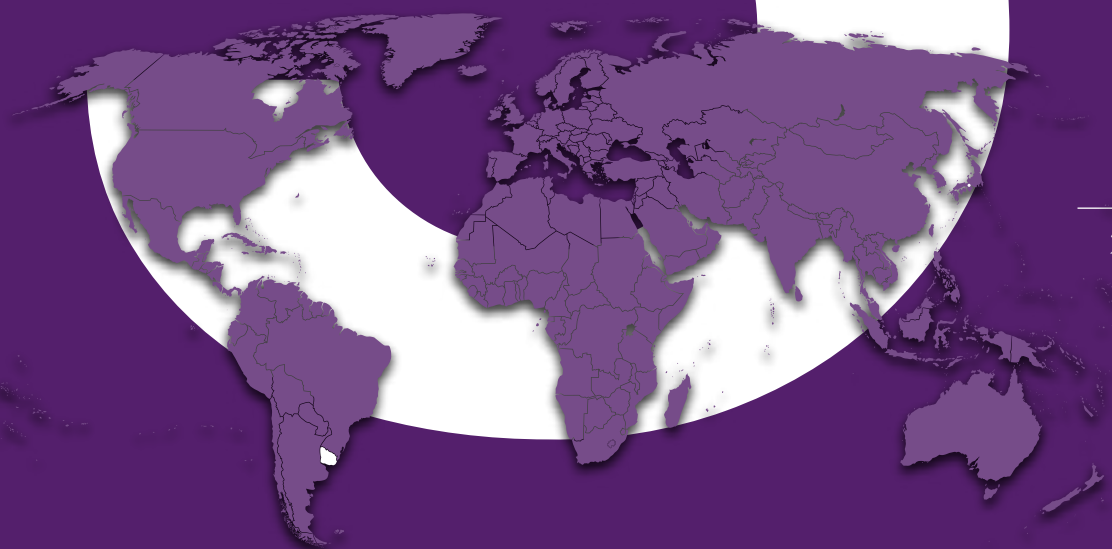
- ☐ toothpaste **with** fluoride
- ☐ toothpaste **without** fluoride
- ☐ I don't know

7. Do you clean your tongue?

- ☐ never
- ☐ sometimes
- ☐ every day

8. Which of the following interdental tools do you use?

	never	not every day	once a day	twice or more times a day
dental floss	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
dental sticks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
interdental brushes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



Evaluación y Promoción de la Actitud hacia la Higiene Oral en Pacientes de la Facultad de Odontología de la Universidad Católica del Uruguay

This chapter is based on Buunk-Werkhoven, Y.A.B., Dijkstra, A., van der Schans C.P., Jaso, M.E., Acevedo, S., Parodi Estellano, G. (2008). Evaluación y promoción de la actitud hacia la higiene oral en pacientes de la Facultad de Odontología de la Universidad Católica del Uruguay. *Actas Odontológicas* Vol. V No. 2 Julio-Diciembre 13-20.

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Evaluation and promotion of patient's oral hygiene behavior in the Faculty of Odontology of the Catholic University in Uruguay.

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Resumen

El primer objetivo de este estudio apuntó a describir la actitud de los pacientes con respecto al cuidado de su salud bucal, las normas sociales, las respuestas sociales percibidas de tener dientes sanos, y el comportamiento acerca de la higiene oral. La evaluación se realizó por medio de la versión en Español del Índice de Comportamiento de Higiene Oral, en un grupo de pacientes de la Facultad de Odontología de la Universidad Católica del Uruguay. El segundo objetivo del estudio fue examinar los predictores relevantes de estas conductas de higiene. Ochenta pacientes llenaron el cuestionario durante su atención por los estudiantes de pregrado encargados del proyecto en las Clínicas de la Facultad. Generalmente, los pacientes mostraron un nivel adecuado de comportamiento acerca de la higiene oral, una actitud positiva, normas sociales positivas, especialmente en el odontólogo y la familia, y un alto valor de las respuestas sociales positivas de tener dientes sanos. El análisis predictivo demostró que la actitud y las normas sociales explicaron un 21.8% de la varianza en los comportamientos de higiene oral reportados. Estos hallazgos sugieren que los pacientes poseen hábitos de higiene oral inadecuados que pueden ser mejorados e indican que los factores psicosociales juegan un rol importante en el cuidado de la salud bucal. Más aún, los hallazgos indican que el comportamiento acerca de la higiene oral del paciente puede ser mejorado no solo promoviendo una actitud más positiva hacia esa conducta específica sino también especialmente por el apoyo del odontólogo y de la familia del paciente.

Palabras claves: Ciencias del Comportamiento; promoción de las conductas de higiene oral; actitud; normas sociales.

Abstract

The first aim of this study was to describe patients' attitude with respect to oral self-care practices, social norms, expected social outcomes of having healthy teeth, and oral hygiene behavior, as assessed with the Spanish version of the Oral Hygiene Behavior Index (OHB) in dental patients of the Faculty of Odontology of the Catholic University in Montevideo, Uruguay. The second aim of the study was to examine the relevant predictors of this oral hygiene behavior. Eighty participants filled out a questionnaire during dental care they received from students. Overall, patients exhibited an adequate level of oral hygiene behavior, a positive attitude, positive social norms, especially in the dentist and the family, and positive social outcomes of having healthy teeth. Regression analysis revealed that attitude and social norms explained 21.8% of the variance in reported oral hygiene behavior. The present findings suggest that patients' inadequate oral hygiene habits can be changed in the right direction and indicate that socio-psychological factors play an important role in oral health care. Moreover, the findings indicate that patients' oral hygiene behavior can be improved by not only promoting a more positive attitude toward the performance of this specific oral hygiene behavior, but especially, by support of significant others, such as the dentist and patients' family.

Keys words: Behavioral Sciences; promoting oral hygiene behavior; attitude; social norms.

A pesar de que la importancia de la higiene oral es ampliamente reconocida, parece ser un problema para los pacientes llevarla a cabo de forma apropiada y eficiente (Kay y Locker, 1996; Davidson, Rams y Andersen, 1997). El auto-cuidado de la boca tomado como una elección personal debe ser considerado como un aspecto importante de las conductas individuales referidas a la higiene oral (Parodi, 2008). De esta manera, las creencias individuales y las actitudes hacia conductas de higiene oral adecuadas son muy importantes para mantener una buena salud bucal. En esta línea de pensamiento y para las conductas relacionadas con la higiene oral, se sugiere que mientras mas positivas sean las actitudes hacia las prácticas de auto-cuidado, y cuanto mas fuertes sean las normas sociales relacionadas, mayor será la probabilidad de que el individuo logre una adecuada conducta de higiene oral (Schou, 2000).

La preocupación acerca de la salud, no es probablemente el único motivo para un correcto comportamiento respecto a la higiene oral. Smith en 1974 sugirió que los comportamientos que promueven la salud se realizan a menudo por razones distintas al hecho de mejorarla; por ejemplo cepillarse los dientes esta relacionado con lucir mas atractivo. Además, como lo describió Sugiyama (2005) en una revisión bibliográfica sobre atracción física, la higiene oral puede tener un importante efecto, aunque a menudo negado, en la apariencia personal. De acuerdo a Sugiyama, desde el punto de vista de la psicología de la evolución «dientes fuertes y blancos representan una constelación de pruebas de salud de eficacia masticatoria y de calidad del genotipo y por eso son atractivos» (p. 310). De forma similar, Stokes, Ashcroft y Platt (2006), sugieren que los dientes no saludables son percibidos de manera que afectan negativamente la imagen de la persona. En el presente estudio también fueron evaluadas las consecuencias sociales percibidas, por ejemplo, cómo unos dientes saludables pueden afectar las relaciones interpersonales.

Desde principios de los setenta ha sido demostrada la relevancia de las Ciencias del Comportamiento para mejorar las conductas relativas a la higiene oral individual, y desde ese momento fueron definitivamente relacionadas

con la Odontología, especialmente desde que la FDI publicara «Social Sciences and Dentistry» (Richards y Cohen, 1971). Por ejemplo, McCaul, Glasgow y Gustafson (1985) aplicaron exitosamente la teoría del aprendizaje social (Bandura, 1977) para predecir los niveles de comportamiento de higiene oral. De acuerdo a los hallazgos de un estudio sobre 214 participantes realizado por Freeman y Linden en 1995, un adecuada conducta de higiene oral (cepillado y uso de complementos para la higiene) se asoció con una actitud individual frente a la salud oral - «dientes limpios» y «aliento fresco» - y con la influencia de «otras personas importantes» como ser amigos, familia, odontólogo.

El primer objetivo de este estudio apuntó a describir la actitud de los pacientes con respecto al cuidado de su salud bucal, las normas sociales, las respuestas sociales percibidas de tener dientes sanos, y el comportamiento acerca de la higiene oral. El segundo objetivo del estudio fue examinar los predictores relevantes de estas conductas de higiene.

MATERIAL Y MÉTODO

Participantes y procedimiento

Los participantes fueron pacientes de la Facultad de Odontología de la Universidad Católica del Uruguay. Se solicitó la aprobación para este estudio al Comité de Ética de la Facultad

Los cuestionarios fueron llenados por los pacientes que concurrieron a la Facultad por diferentes motivos durante el periodo 28 de marzo-21 de setiembre de 2008. Por razones logísticas y luego de otorgar el consentimiento informado, los pacientes respondieron un cuestionario de múltiple opción durante el examen oral o el tratamiento odontológico, procedimientos llevados a cabo por los estudiantes de pre-grado encargados del estudio en las clínicas de la Facultad.

Para la traducción de las medidas del cuestionario, se utilizó parcialmente el procedimiento de Geisinger (1994). Las medidas fueron primero traducidas al Español por tres hispano-parlantes de procedencia uruguaya, (dos estudiantes de odontología y una psicóloga). Más tarde, cada miembro trabajó por separado, revisando cuidadosamente las tres versiones de la traducción al español y comparándolas con la versión en inglés. Posterior-

mente, en una reunión grupal, los miembros discutieron las discrepancias y resolvieron las diferencias de la traducción, hasta acordar que el lenguaje del cuestionario sería era fácilmente entendible por los pacientes y que los instrumentos utilizados medirían correctamente los parámetros de ésta población. Al finalizar la traducción, ésta fue chequeada por una traductora pública

MEDIDAS - CUESTIONARIO

Parte general del cuestionario

El cuestionario original incluía 36 ítems agrupados en varias partes, incluyendo unas pocas preguntas demográficas como género, edad, nacionalidad, educación y estado civil. Estas y todas las otras preguntas eran abiertas, de múltiple opción o para ser contestadas en 5 o 7 renglones.

Conducta de higiene oral

La conducta de higiene oral fue medida por el índice de CHO desarrollado por Buunk-Werkhoven, Dijkstra y Van der Schans (2008). Este índice CHO incluye ocho ítems con respecto al cepillado dental, limpieza interdental y limpieza de la lengua. Por ejemplo, el ítem «me lavo los dientes de esta forma»: es seguido por imágenes mostrando diferentes métodos de cepillado, como ser: horizontal, vertical y método de Bass (ver Apéndice I para la versión en Español del Indicador CHO). Luego se le asignaron puntajes a los ítems, y el valor de éstos fue calculado y la suma fue computada. La suma de CHO en este índice pudo situarse en un rango de 0 a 16. Un puntaje alto indica un alto nivel de auto cuidado por el higiene oral.

Variables actitud, normas sociales y conducta de higiene oral central

Las actitudes de los participantes y normas sociales hacia las conductas de higiene oral general (CHO) fue evaluada por un total de 14 ítems. Esta conducta de higiene oral general fue descrita como «Cepille sus dientes a diario 2 veces (de las cuales una de noche antes de acostarse) con pasta de dientes con flúor y un cepillo suave; Cuida al hacerlo de colocar las cerdas del cepillo en los bordes de la encía y cepillar despacio con movimientos de vaivén para desorganizar la placa dental y restos de alimentos; Cepille durante 2 minutos, primero la parte interna y

externa y luego las superficies de masticatorias de todos los dientes y molares y luego utilice palillos de dientes o hilo dental para desorganizar la placa dental y los restos de alimentos de entre los dientes y molares».

Directamente después de la descripción se le preguntó a los pacientes si ellos realizaban su higiene bucal de esta manera, (en «Conducta de Higiene Habitual»)

Este ítem fue puntuado con 1 = si o 0 = no. Y si los pacientes respondieron que si, se les preguntó: «¿Cuánto hace que cuida su dentadura de la manera descrita?».

Actitud

La actitud hacia este comportamiento de higiene oral general fue medida por nueve argumentos escritos en un formato semántico diferencial ($\alpha = .82$). Los participantes indicaron en una escala de 7 como ellos evaluaron este comportamiento, en los parámetros 1 = sin importancia a 7 = importante, 1 = desagradable a 7 = agradable, y también en «sano-no sano», «negativo-positivo», «aburrido-no aburrido», «inútil-útil», «insípido-emocionante», «doloroso-no doloroso» y «estúpido-inteligente». Se hizo una suma del puntaje de la actitud de los participantes agregando los 9 ítems, (abarcando desde 9 a 63). Los puntajes más altos indican una actitud más positiva.

Normas sociales

Para valorar las normas sociales relacionadas, los participantes midieron su opinión acerca del cuidado de sus dientes con la de cinco personas diferentes, por ejemplo: «mi dentista», «mi pareja», «mis amigos», «mis colegas» y «mi familia (padres, hermanos y hermanas)». De este modo, la escala de 7 puntos de normas sociales (NS) fue basada en 5 ítems ($\alpha = .86$) y una suma del puntaje de la escala de NS varió de 5 a 35.

Respuestas sociales percibidas

Las respuestas sociales percibidas (RSP; Buunk-Werkhoven et al., 2008) de tener dientes sanos incluye 6 ítems (Cronbach's $\alpha = .80$). Un ejemplo de esta escala de 5 puntos es: «¿Es importante en los contactos sociales el aliento fresco?» Las respuestas varían desde 1 = muy en desacuerdo a 5 = muy de acuerdo, y se registró la suma de los puntos (abarcando desde 6 a 30).

Al finalizar se les pregunto a los pacientes si creían que la mejoría en su higiene bucal debería

ser señalado por otros. La pregunta «Si yo cuidó mejor mi dentadura los demás en mi entorno lo notarán», varía desde 1 = muy en desacuerdo a 5 = muy de acuerdo.

Análisis estadístico

Los datos fueron analizados para describir estadísticamente los resultados de las variables medidas. La consistencia interna, (confiabilidad) de las escalas usadas fue evaluada por el método de Cronbach's alpha. Las correlaciones de Pearson fueron calculadas por asociaciones univariantes entre las variables, y se realizó un análisis de regresión lineal para identificar las variables que se recolectaron para una proporción significativa de variaciones en el comportamiento de higiene oral. Para esto se utilizó el programa The Statistical Package for Social Sciences (SPSS) 14.0.

RESULTADOS

Características de los pacientes

Un total de 80 participantes fueron entrevistados y llenaron un cuestionario. La muestra incluía 68% mujeres y 32% hombres de nacionalidad Uruguaya (94%), y la edad media era 35.43 años (SD = 13.93; [18 - 68]). Solteros, 44%. El mayor nivel de educación fue nivel universitario (50%) y 43% tenían escuela secundaria. Cinco personas en este grupo (6%) tenían un nivel mas bajo de educación.

En la Tabla 1 se presentan los porcentajes por ítem de la versión en Español del Índice de Comportamiento de Higiene Oral y en la Tabla 2 se presentan los puntajes promedio con las desviaciones estándar y se presenta el rango de valores de las variables principales: conducta de higiene

Tabla 1. La versión en español del Índice de Comportamiento de Higiene Oral: *Porcentaje por ítem. N = 80*

ÍTEMS	ALTERNATIVAS	P
Frecuencia en el cepillado de los dientes (N = 80)	Nunca	3
	una vez por día	19
	dos veces por día	61
	mas de dos veces por día	17
Oportunidad del cepillado de los dientes	de mañana antes del desayuno; (N = 72)	46
	de mañana después del desayuno; (N = 76)	76
	al mediodía; (N = 80)	80
	después de cenar; (N = 71)	61
	antes de irse a dormir; (N = 72)	73
Fuerza empleada al cepillarse los dientes	suave / sin fuerza (1,2,3); (N = 1)	1
	suave / sin fuerza (4,5); (N = 55)	68
	fuerte (6,7); (N = 24)	30
Tiempo empleado en cepillarse los dientes	menos de un minuto; (N = 5)	6
	un minuto; (N = 24)	30
	dos minutos; (N = 30)	38
	tres minutos; (N = 12)	15
	más de tres minutos; (N = 9)	11
Método usado al cepillarse los dientes	método horizontal; (N = 5)	6
	método vertical; (N = 24)	30
	método circular; (N = 8)	10
	método de Bass; (N = 10)	13
	combinación de métodos; (N = 32)	40
Crema dental	crema dental con fluor; (N = 71)	89
	crema dental sin fluor; (N = 6)	8
	no sé; (N = 3)	4
Higiene de la lengua	nunca; (N = 12)	15
	a veces; (N = 33)	41
	siempre; (N = 35)	44
Uso de hilo dental, palillos interdentes, cepillos interdentes	nunca; (N = 11)	14
	a veces; (N = 22)	27
	una o dos veces por día; (N = 47)	59

oral (CHO), actitud (ACT), normas sociales (NS) y respuestas sociales percibidas (RSP), para toda la muestra.

Se puede apreciar que la higiene oral es bien realizada por 51 pacientes (64%) de esta muestra, y que este subgrupo ha realizado esta higiene por un promedio de 12 años, en un rango que va desde 1 a 45 años. Así que del total de la muestra un tercio, (33%) de los pacientes, (edad promedio = 33.46 años, $SD = 14.0$) no realizan auto-cuidados de higiene oral adecuados como los descriptos. Vale la pena notar que casi las tres cuartas partes de los pacientes creen que en el caso que mejoren sus conductas de higiene oral, esto será percibido por otros.

En general los pacientes sienten que tienen un control considerable sobre llevar a cabo conductas de higiene oral (suma $M = 11.41$, $SD = 2.55$). Por ejemplo, los resultados del Índice CHO mostraron que alrededor de la mitad de los pacientes se cepillaban los dientes del modo recomendado por los profesionales, dos minutos (38%), dos veces por día (61%). Además, casi todos, (89%) usaron pastas fluoradas, y alrededor del 40% usaron también elementos auxiliares (principalmente hilo dental) y siempre higienizaban su lengua.

Los pacientes evaluaron el comportamiento de higiene oral descrito en forma extremadamente positiva, comparado con el punto medio de la escala de 36 (ACT; $M = 48.49$, $SD = 6.07$). De cualquier manera, los pacientes expresaron que el

comportamiento de higiene oral recomendado era un poco aburrido. Más aún, dentro de un rango de 5 a 35 manifestaron que existía presión dentro de su ambiente social para realizar procedimientos de higiene oral adecuados (NS; $M = 17.69$, $SD = 8.53$). Vale la pena notar que los pacientes percibieron más presión en ese sentido del odontólogo y de sus familias/parejas que de sus amigos o colegas. Dentro de un rango de 6 a 30 los pacientes otorgaron un alto valor a las respuestas sociales positivas de tener dientes saludables ($M = 25.88$, $SD = 3.98$).

Adicionalmente se llevaron a cabo análisis destinados a establecer la dirección y la magnitud de las asociaciones entre las variables (Tabla 3). Se encontró que las conductas de higiene oral de los pacientes se correlacionaban positivamente y significativamente con la actitud ($r = .28$, $p < .05$), y negativa y significativamente con las normas sociales ($r = .42$, $p < .001$). De cualquier manera, las respuestas sociales percibidas no estuvieron correlacionadas en forma significativa con las conductas de higiene oral, sinón estuvieron asociadas con la actitud ($r = .39$, $p < .001$) y con las normas sociales ($r = .27$, $p < .05$). Esas relaciones van en la dirección esperada. Aparentemente la pregunta: «Si yo cuido mejor mi dentadura, los demás en mi entorno lo notarán» se correlacionó con las normas sociales: ($r = .39$, $p < .001$).

En un análisis de regresión lineal, en el cual las dos variables que estuvieron asociadas en forma

Tabla 2. Cronbach's α , Rango, Promedio y Desviación Standard (SD) de las variables principales

Variables	Cronbach's α	Rango	Promedio (SD)
CHO _a	--	0 - 16	11.41 (2.55)
ACT _b	.82	9 - 63	48.49 (6.07)
NS _c	.86	May-35	17.69 (8.53)
RSP _d	.80	Jun-30	25.88 (3.98)

Nota: En la muestra: ^an = 78. ^bn = 74. ^cn = 65. ^dn = 80.

Tabla 3. Correlación entra las variables principales y el comportamiento acerca de la higiene oral

Variables	1	2	3	4
1. Comportamiento acerca de la higiene oral	—			
2. Actitud	.28*	—		
3. Normas sociales	-.42**	-.13	—	
4. Respuestas sociales percibidas	.16	.39**	-.27*	—

* $p < .05$. ** $p < .001$.

significativa con el comportamiento de higiene oral (actitud y normas sociales) fueron ingresadas a la vez, la predicción del comportamiento de higiene oral probó ser significativo $F(2,58) = 9.34$, $p < .001$, y fue responsable del 21.9 % de la varianza.

Tabla 4. Análisis de regresión lineal del comportamiento acerca de la higiene oral sobre actitud y normas sociales

Variables	CHO β
Actitud	.24*
Normas sociales	-.40**

* $p < .05$. ** $p < .001$.

$R^2 = .22$. $F(2,58) = 9.34$, $p < .001$

DISCUSIÓN

Los hallazgos de esta investigación resultan particularmente importantes desde que se usó un Índice CHO que se corresponde en forma estrecha con lo que los profesionales consideran es una adecuada conducta de higiene oral. La versión en Español del Índice de Comportamiento de Higiene Oral parece ser un método útil para asesorar y evaluar las conductas de higiene oral de los pacientes odontológicos en Uruguay. Es de hacer notar que, mientras muchos pacientes mencionaron el uso del hilo dental, virtualmente ninguno dijo utilizar palillos o cepillos interdetales.

La verdadera prueba de un sistema de medición como el Índice CHO resulta cuando es empleado en relación a la salud oral general. Por eso, esta versión en Español del Índice necesita ser usada en otras poblaciones de Latinoamérica y del exterior.

Mas aún, también fueron determinados los

predictores relacionados con la higiene oral. Los análisis de regresión indicaron que las normas sociales fueron los mejores predictores de CHO y explicaron, tomados en conjunto con la actitud, el 21.8% de la varianza en los comportamientos de higiene oral reportados.

Este estudio presenta algunas limitaciones que necesitarán ser corregidas en futuros estudios. Primero, la gran proporción de participantes femeninos quienes generalmente están mas interesadas en los asuntos de la salud, puede haber sesgado los resultados. Por ser una muestra selectiva de mujeres principalmente adultas, educadas y solteras estos hallazgos no pueden ser considerados representativos de la totalidad de la población. Como se sabe por estudios anteriores, existen diferencias aparentes en las conductas de salud oral entre variables demográficas (género, edad y estilo de vida). Por ejemplo, las mujeres cepillan sus dientes más a menudo que los hombres (Sakki, Knuuttila, y Antilla, 1998; Schou, 2000). Aunque esto no implica que las relaciones entre las variables usadas difieran entre diferentes poblaciones, se recomienda que estos resultados sean replicados en diferentes grupos y en diversos contextos.

El presente estudio presenta varias implicancias y es importante hacer algunas recomendaciones para la práctica clínica basadas en estos hallazgos. Estos sugieren que para incrementar las conductas de higiene oral, las intervenciones deben apuntar a las actitudes, y especialmente a las normas sociales relacionadas. Es importante observar que son las directivas del odontólogo las que tienen mayor efecto en los comportamientos de higiene oral. Por eso, este estudio puede servir de incentivo a los profesionales de la salud que trabajan con pacientes, en lo que Ozcan (2008) se refiere como «la tarea más dignificante» del odontólogo: educar a los pacientes en salud oral y cambiar los hábitos de higiene individuales.

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Apéndice 1. Versión en español del Índice de Comportamiento de Higiene Oral

Las próximas preguntas son acerca de tu higiene oral.

1. ¿Cuántas veces te cepillas tus dientes?

☐ nunca ☐ una vez por día ☐ dos veces por día ☐ más de dos veces por día

2. ¿Cuándo te cepillas tus dientes?

de mañana antes del desayuno	Si <input type="checkbox"/>	No <input type="checkbox"/>
de mañana después del desayuno	Si <input type="checkbox"/>	No <input type="checkbox"/>
al mediodía	Si <input type="checkbox"/>	No <input type="checkbox"/>
después de cenar	Si <input type="checkbox"/>	No <input type="checkbox"/>
antes de irse a dormir	Si <input type="checkbox"/>	No <input type="checkbox"/>

3. ¿Cómo te cepillas tus dientes?

Me cepillo mis dientes

	1	2	3	4	5	6	7	
Suave	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Fuerte

4. ¿Cuánto tiempo te lleva cepillarte tus dientes?

Me cepillo mis dientes

menos que un minuto ☐ un minuto ☐ dos minutos ☐ tres minutos ☐ más de tres minutos ☐

5. Me cepillo mis dientes de la siguiente manera:



Movimiento de atrás a adelante (método horizontal)



Movimiento de arriba a abajo (método vertical)



Movimiento circular (método circular)



Cepillando suave masajeando la encía (método de Bass)

6. ¿Que usas para limpiar tus dientes?

Mas que nada uso:

crema dental **con** fluor ☐ crema dental **sin** fluor ☐ no sé ☐

7. ¿Limpias tu lengua?

nunca ☐ a veces ☐ siempre ☐

8. ¿Cual de los siguientes accesorios utilizas para tu higiene interdental?

	nunca	no todos los días	una vez por día	dos o mas veces por día
hilo dental	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
palillos interdentes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
cepillos interdentes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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6

Oral Health-related Quality of Life among imprisoned Dutch Forensic Psychiatric Patients

This chapter is based on Buunk-Werkhoven, Y.A.B., Dijkstra, A., Schaub, R.M.H., van der Schans, C.P., & Sreen, M. (in press). Oral health-related quality of life among imprisoned Dutch forensic psychiatric patients. *Journal of Forensic Nursing*.

Oral Health-related Quality of Life among imprisoned Dutch Forensic Psychiatric Patients

Abstract

Because dental health and oral pathology may affect forensic psychiatric patients' well-being, it is important to be able to assess oral health related quality of life (OH-QoL) in these patients. Two studies were conducted among Dutch forensic psychiatric male patients to assess the psychometric properties, and some potential predictors of the Oral Health Impact Profile-14 (OHIP-14) as a measure of OH-QoL. Study 1 involved 40 patients that completed the OHIP-14 before receiving professional dental care and were retested 3 months later. The internal consistency was good, the test-retest correlations were fair, and over the three months follow-up no significant changes in OH-QoL were observed. Study 2 consisted of 39 patients who completed an improved version of the original OHIP-14, as well as measures to validate of the OHIP. Dental anxiety and unhealthy dentition jointly explained 26.7% of the variance in OH-QoL, and the better patients performed their oral hygiene behavior, the better their OH-QoL. It is concluded that the Dutch OHIP-14 is a useful instrument, and that nurses, especially in forensic nursing, should pay particularly attention to dental anxiety when stimulating patients to visit oral health professionals and to perform adequate oral hygiene self-care.

Keywords: behavioral sciences; forensic psychiatric patients; quality of life; oral health; validity

Introduction

The practice of good oral hygiene behavior is assumed to be conducted properly, the prevalence of oral disease suggests that this behavior is not always being performed efficiently. The theoretical model of oral health (Locker, 1988) suggests that oral disease can lead to impairments in several dimensions, such as the physical, the psychological and the social spheres. Impairments are described by Locker as any limitation in or lack of ability to perform activities of daily living (Slade and Spencer, 1994) that can lead to a decrease in quality of life. The short form of the Oral Health Impact Profile (OHIP) is a self-reporting instrument aimed at measuring the negative social, psychological and physical consequences of oral health (OH) problems: the more frequent the problems, the lower the quality of life (QoL) (Slade, 1997). The short form of the Oral Health Impact Profile-14 (OHIP-14) is used worldwide, and there is a certain amount of evidence for its validity and reliability (Fernandes, Ruta, Ogden, Pitts & Ogsten, 2006; Oliveira & Nadanovsky, 2005).

A number of studies have shown that oral health and diseases can have negative consequences for OH-QoL (John & Micheelis, 2003; Locker, 2004), and their social impact tends to be more frequent in specific patient groups, namely the elderly and the prison population when compared to the general population (Boyer, Nielsen-Thompson & Hill, 2002; Heidari, Dickinson, Wilson & Fiske, 2007; Mixson, Elpee, Fell, Jones & Rico, 1990; Slade and Spencer, 1994; Wong & McMillan, 2002). Only one study has reported on the prevalence of oral disease and its impact on the quality of life of an older prison population in Hong Kong, China (McGrath, 2002). However, there has been no research examining oral health and its self-reported impact on quality of life in Dutch prison populations.

In the Netherlands, individuals with mental disorders who have also committed serious offenses are imprisoned and treated in special institutions. This highly select population consists of patients who have been convicted of severe criminal acts. After more than four years in

prison, these patients are transferred to a forensic psychiatric institution. To reduce recidivism they receive forced treatment in line with their psychiatric needs. The Dr. S. van Mesdag Forensic Psychiatric Centre is one of these institutions, and the heterogeneous group of diverse mental patients within this centre can be divided into patients with psychotic vulnerability and patients with personality disorders; classified by DSM-IV-TR (First, Frances & Pincus, 2004).

The purpose of this study is to examine whether an existing measurement for OH-QoL could be administered in a valid and reliable way to this group. The present research was conducted among imprisoned Dutch forensic psychiatric patients. This study consisted of two studies. Study 1 was to test the psychometric properties of the Dutch version of the Oral Health Impact Profile-14. Study 2 focuses on the construct validity of the OHIP-14-NL, and on increasing our knowledge on possible determinants and effects of OH-QoL in forensic patients.

Study 1

Method

Participants

The final sample consisted of 40 institutionalized male forensic psychiatric patients, with a mean age of 33.70 ($SD = 6.40$) (ranging from 23 to 49 years). The sample included patients with psychotic vulnerability (40%) and patients with personality disorders (60%). For various reasons (e.g., movement to another center or refusal to receive further dental treatment), only thirty-six of forty patients returned to the dental hygienist after three months in order to fill out the OHIP-14 again.

Procedure

Over a period of seven months (December 2002 – July 2003), forty-nine male forensic psychiatric patients from the Dr. S. van Mesdag Forensic Psychiatric Centre in Groningen were asked if they were willing to participate in the study on a voluntary basis. Ethical approval for this study was obtained from the ethics committee of the institution, and the administration of the OHIP-14-NL was linked to a dental screening in the clinic. This screening was conducted by a dentist and involved an evaluation of the patient's oral health care, gauging their motivation to engage in oral health care, the level of bleeding on probing (BOP) and the need for dental treatment. At the end of the screening, the participants filled out a Dutch version of the short form of the Oral Health Impact Profile (OHIP-14; first measurement). Subsequently, all patients received information about and instruction (skills training) concerning oral health, and received a professional dental clean, which was carried out by a dental hygienist (the first author). Three months after the first OHIP-14 measurement, patients filled out the retest questionnaire (retest measurement). Patients who needed additional dental care between the two measurements received those dental treatments from the dentist during the three-month interval.

Measurement

The OHIP-14 questionnaire is a short-form version of the original 49-item OHIP, and is thought to assess oral health-related quality of life. The original English version of the OHIP-14 was translated into Dutch using the forward-translation technique. This slightly adapted version of the OHIP-14 consists of 14 items organized in seven dimensions (two items for ev-

ery dimension, but the original order is shuffled): function limitation (Q₄, Q₁₄), physical pain (Q₂, Q₅), psychological discomfort (Q₁, Q₉), physical disability (Q₁₂, Q₁₀), psychological disability (Q₁₃, Q₈), social disability (Q₇, Q₃) and handicap (Q₁₁, Q₆). Responses were scored on a 5-point Likert scale ranging from 0 = “never” to 4 = “very often”. Sum scores ranged from 0 to 56, and a high score represents a low OH-QoL (Appendix I).

Statistical testing

The level of statistical significance was set at $p < 0.05$. The present sample size is sufficient to detect at least moderate effect sizes (e.g., $r^2 > .30$) at this level (Cohen, 1988). We tested unweighted and weighted item scores to compose the OHIP-scale (Slade, 1997).

Results

In general, the prevalence of oral disease in the sample was high and most of the patients who participated in this study had bad teeth. In the clinical examination a high level of decay, severe periodontal diseases, and missing and filled teeth were observed. Oral health and oral self-care were generally low.

Little difference was found between unweighted and weighted item scores. Therefore, we only present the results using unweighted scores. One of the fourteen items (“Have you been totally unable to function because of problems with your teeth, mouth or dentures?”) was removed because of a negative item-total correlation. This resulted in increasing the Cronbach’s alpha of the OHIP-scale from .78 to .87. Thus, the Cronbach’s alpha of this thirteen-item OHIP scale at the first measurement was good ($\alpha = 0.87$), and the item-scale correlations varied from 0.19 to 0.72. At baseline the mean OHIP summary score was 10.93 (SD = 7.09; range 0–30).

At retest, Cronbach’s alpha for OHIP scale was 0.81, which also indicates good internal consistency. Furthermore, at retest, the item-scale correlations ranged from 0.18 to 0.71.

At follow-up the mean OHIP summary score was 10.06 (SD = 5.78; range 1–25). Thus, patients evaluated their oral health-related quality of life rather positively at baseline, as well as after three months.

Paired t-tests were used to check whether during the three-month interval between the first and the retest measurements the OHIP scores had significantly changed. However, neither the overall OHIP scores nor the dimension scores differed significantly between either measurements.

Table 1 shows the correlations with the total scale and the test-retest correlation for the six dimensions separately as well as for the single question, “Have you felt that life in general was less satisfying because of problems with your teeth, mouth or dentures?”, from the “handicap” dimension. The test-retest correlation for the OHIP summary score was 0.56 ($p < 0.01$), which could be qualified as low to fairly reliable. Test-retest correlations for three of the seven OHIP dimensions were below 0.45, while the other four were around 0.60. These results showed small fluctuations between poor to fair reliability on the dimension level.

Table 1.			
Item-correlations at T1 and T2 and test-retest correlation of the OHIP			
Correlations			
OHIP dimensions	with total scale T1	with total scale T2	Test-retest
Function limitation	0.56	0.59	0.27
Physical pain	0.50	0.54	0.61**
Psychological discomfort	0.54	0.43	0.41*
Physical disability	0.76	0.34	0.34*
Psychological disability	0.84	0.76	0.63**
Social disability	0.83	0.73	0.69**
Handicap*	0.45	0.64	0.57**
Total scale			0.56**
*This dimension consists of only 1 item.			

Study 2

Method

Participants

In study 2 thirty-nine male forensic psychiatric patients were selected. Their mean age was 37.9 (SD = 9.6) years. Once more, ethical approval for this second study (March – June 2006), was obtained from the ethics committee of the institution.

Procedure

The OHIP-14 measure was further improved. The forward-backward-translation technique was used, followed by the application of the Delphi-method in order to assess the face and content validity of the preliminary translation of the short-form OHIP used in Study 1 and the original English version of the OHIP-14. Three years after Study 1, all departments in the center (180 patients in total) were visited by the first author (the dental hygienist) over a period of two months in order to inform patients about this study of oral self-care behavior. At the end of the consultation a questionnaire was handed out and the participants were invited to voluntarily fill out the questionnaire, which contained the improved, linguistically validated OHIP-14-NL mentioned in Appendix I.

Measures

The questionnaire included a few demographic questions such as age, nationality, education and marital status and the below construct measurements.

Oral health-related quality of life was measured by the improved Dutch OHIP-14, including the item “Have you been totally unable to function because of problems with your teeth, mouth or dentures?” (14 items, Cronbach’s $\alpha = .91$).

Oral Hygiene Behavior was measured by using an index for oral hygiene behavior (OHB) developed by Buunk-Werkhoven, Dijkstra & van der Schans (2009). The index includes 8 items with respect to tooth brushing, interdental cleaning and tongue cleaning. For example, the item “I brush my teeth as follows” was supported by pictures showing different brushing methods such as horizontal, vertical, circular and the Bass-method. After the item scores were assigned

weights, the index values were calculated and a sum score was computed. The OHB sum score on this index could range from 0 to 16. A high sum score indicated a high level of optimal self-care oral hygiene behavior.

Expected social outcomes (ESO; Buunk-Werkhoven et al., 2009) for having healthy teeth were assessed with a scale of six items ($\alpha = .83$). An example of an item is: "In social contacts fresh breath is important." Responses varied from 1 = disagree to 5 = agree, and a sum score was computed by summing up scores on all six items that measured the concept ESO (ranging from 6 to 30).

Dental anxiety was measured by asking questions of the Dental Anxiety Scale (DAS; Corah, Gale & Illig, 1978). This is a four-item self-reporting scale measuring the anxiety about dental appointments (Cronbach's $\alpha = .90$). Items were scored on a scale of 1 to 5, and summed to provide an overall dental anxiety score ranging from 4 ("not anxious at all") to 20 ("extremely anxious"). Scores of 15 and above are generally considered as extremely anxious.

Clinical Dentition Characteristics

If a record of dentition characteristics (healthy dentition, slightly unhealthy dentition, mutilated dentition) was available in a patient's dental dossier, the patient's dentition characteristic was also registered.

Results

The 39 participants evaluated their perceived OH-QoL within a possible range from zero to 56. About 85 % of the patients ranked their perceived OH-QoL extremely positively, with a mean score of 9.31 (SD = 8.71). They reported few if any limitations because of problems with their teeth, mouth or dentures. Furthermore, the patients had a mean DAS score of 7.61 (SD = 3.26), which is considered to be indicative of no dental anxiety (Corah et al., 1978). The patients attached a high value to the positive social outcomes of having healthy teeth ($M = 23.92$, $SD = 5.18$), and they felt that they had considerable control over carrying out oral self-care practices ($M = 10.61$, $SD = 2.32$). For instance, the reported results of the OHB index showed that almost two-thirds of the respondents brushed their teeth as recommended by professionals, two minutes twice a day and used toothpaste with fluoride. In addition, fifty percent of the patients also used interdental cleaning aids and cleaned their tongue. In addition, correlational analyses were carried out to evaluate the construct validity of the OHIP-14, and to establish the direction and magnitude of the associations between the variables (see Table 2). In this sample of 39 forensic psychiatric patients, perceived OH-QoL was found to correlate positively and significantly with dental anxiety: The more anxiety patients reported, the lower their OH-QoL. In a sub-sample of patients whose dentition characteristics were known ($N = 20$), dental pathology correlated positively and significantly with OH-QoL: The worse their dental health, the lower their OH-QoL was. Furthermore, OH-QoL was found to correlate negatively and significantly with oral hygiene behavior: The better patients took care of their oral health, the better their OH-QoL was. Social outcomes were not related significantly to OH-QoL.

Table 2.					
Intercorrelations between the main variables					
Variables	1	2	3	4	5
1. The Dutch OHIP-14 _a	—				
2. Expected Social Outcomes (ESO) _b	.14	—			
3. Dental Anxiety (DAS) _c	.44**	-.08	—		
4. Oral Health Behavior (OHB) _d	-.39*	.21	-.36*	—	
5. Dentition characteristics _e	.54	.17	.10	-.11	—
Note. ^a n = 39, ^b n = 37, ^c n = 38, ^d n = 31, ^e n = 20 ** p < .001. * p < .05.					

Finally, linear regression analysis was performed to examine the multivariate relationships of the variables with OH-QoL. The three variables that had significant univariate relations with OH-QoL were entered at once. This model proved to be significant, $F(3,36) = 5.73$, $p < .001$, and accounted for 26.7% of the variance in OH-QoL, which is a substantial proportion. Only dental pathology ($\alpha = .35$, $p < .05$) and dental anxiety ($\alpha = .29$, $p < .05$) emerged as significant predictors of OH-QoL. Interestingly, in these multivariate analyses, oral hygiene behavior was no longer associated with OH-QoL.

Discussion

The psychometric qualities of the Dutch version of the Oral Health Impact Profile-14 (OHIP-14), as well as the determinants of the OHIP-14, were assessed in two groups of forensic psychiatric patients.

Bases on the first study the following conclusions can be drawn. First, the version of the OHIP (albeit with thirteen items) had a good internal consistency as is apparent from a high coefficient alpha for the total scale. This is especially noteworthy given the relatively small number of items and the substantial variety in the content of the items. Second, the stability of the OHIP was satisfactory as is apparent from the test-retest reliability, although this was not true for all dimensions. It may be that some dimensions change more easily and so a shorter test-retest interval would be recommended for any future administration of the OHIP. Third, the performance of the unweighted thirteen-item OHIP was as good as that of the weighted version. This is in line with the findings of Allen and Locker (1997). Thus, there was no reason to use the weighted version. Moreover, in a study by Allison, Locker and Feine (1997), the OHIP exhibits a reasonable degree of cross-cultural consistency, and it has been shown in other studies that the reliability and validity of the short-form OHIP is comparable to the long-form OHIP (Allen and Locker, 1997; John et al., 2006; Slade, 1997; Van der Meulen, John, Naeije & Lobbezoo, 2008; Wong et al., 2002). Fourth, rather low scores were reported on OHIP scale, suggesting a rather good OH-QoL. It may be that these psychiatric patients disclaimed their own oral health because of other overwhelming problems or because their expectations of oral health were generally low.

Study 2 was designed to estimate the determinants of OH-QoL, because such knowledge may increase our insight into the psychology of OH-QoL and might be utilized to improve the OH-QoL. In the line with an other study of Buunk-Werkhoven, Dijkstra, & van der Schans

(2009) OH-QoL was assessed together with formal measurements of self-reported social outcomes of oral health (the perceived importance of healthy teeth for social functioning), oral hygiene behavior (Buunk-Werkhoven, Dijkstra, van der Wal, Basic, Loomans, van der Schans & van der Meer, 2009), dental anxiety (fear for dental treatment), and patient's clinical dentition characteristics (level of oral health/oral pathology), and concluded the following. First, underlining the construct validity of the OHIP-14, it correlated with the variables of dental anxiety, dentition characteristics (pathology), and oral health behavior, but not with the variable of expected social outcomes: The more fear participants had for dental treatment, the worse they took care of their teeth, and the more dental pathology they had, the lower their OH-QoL was. Dental anxiety is thought to be an important negative determinant of OH-QoL (Mehrestedt et al., 2007; Vermaire et al., 2008). Second, regression analysis indicated that dental anxiety was the best predictor of the OHIP-14 and explained, together with dentition characteristics, 26.7% of the variance in self-reported OH-QoL.

One limitation of the present studies was the small sample sizes. It was small because the imprisoned forensic population is not easy to approach due to all kinds of restrictions and security measures. However, the sample size did have sufficient power to detect moderate effects at the 5% level of significance (Cohen, 1988). Furthermore, although the samples may be small, they can be regarded as representative for the Dutch imprisoned forensic population. In addition, despite the small sample size, study 2 revealed significant relationships among the variables. This means that the significant effects must be relatively large and, therefore, may have more practical meaning.

The knowledge gathered in the present studies may contribute to the practice of forensic nursing in several ways. One premise is that in no matter what field nursing is applied, it always takes into account the interplay of physical, social and psychological factors. One task in forensic nursing is to monitor patients' psychological and psychiatric state for diagnostic reasons or for early detection and, subsequent, adequate treatment (Dashiff, 1988). Within this task, one important aspect to focus on is the subjective experience of the patient; "How does he feel". The present studies suggest that one possible cause of feeling bad might be low OH-QoL. Thus, certainly in the case of dental pathology, the patients' psychological state (e.g., mood, negative emotions, and well-being) may be influenced by his dental health. For the right diagnosis and applying the right treatment, it is important to acknowledge this. A core aspect of nursing and, thus, also of forensic nursing is to support patients' self-care (Denyes, Orem & Bekel, 2001). Firstly, oral health care is a form of universal self-care and in nursing this self-care can be stimulated by providing information on why and how to practice (preventive) oral health care (Buunk-Werkhoven, Dijkstra-le Clercq, de Jong & Spreen, 2009). Secondly, in the case of dental pathology, the patient should adapt his behavior to this situation, for example, by complying with a prescribed treatment. This is called health deviation self-care, and this kind of self-care also needs nursing support. Thus, in forensic nursing, oral care, oral pathology, and OH-QoL are relevant because, from a holistic perspective, they do influence patients' biological, psychological and social functioning.

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Appendix I

Slightly adapted version of the Oral Health Impact Profile -14.

This questionnaire contains questions regarding the condition of your teeth in the past 4 weeks. To answer each question put a circle around one of the following possible answers

	0	1	2	3	4
Q1. Have you been <i>self-conscious</i> because of your teeth, mouth or dentures?	never	sometimes	regularly	often	very often
Q2. Have you had <i>painful aching</i> in your mouth?	never	sometimes	regularly	often	very often
Q3. Have you had <i>difficulty doing your usual jobs</i> because of problems with your teeth, mouth or dentures?	never	sometimes	regularly	often	very often
Q4. Have you had <i>trouble pronouncing any words</i> because of problems with your teeth, mouth or dentures?	never	sometimes	regularly	often	very often
Q5. Have you found it <i>uncomfortable to eat any foods</i> because of problems with your teeth, mouth or dentures?	never	sometimes	regularly	often	very often
Q6. Have you been <i>totally unable to function</i> because of problems with your teeth, mouth or dentures?	never	sometimes	regularly	often	very often
Q7. Have you been a bit <i>irritable with other people</i> because of problems with your teeth, mouth or dentures?	never	sometimes	regularly	often	very often
Q8. Have you been a bit <i>embarrassed</i> because of problems with your teeth, mouth or dentures?	never	sometimes	regularly	often	very often
Q9. Have you <i>felt tense</i> because of problems with your teeth, mouth or dentures?	never	sometimes	regularly	often	very often
Q10. Have you had to <i>interrupt meals</i> because of problems with your teeth, mouth or dentures?	never	sometimes	regularly	often	very often
Q11. Have you felt that life in general was <i>less satisfying</i> because of problems with your teeth, mouth or dentures?	never	sometimes	regularly	often	very often
Q12. Has your diet been <i>unsatisfactory</i> because of problems with your teeth, mouth or dentures?	never	sometimes	regularly	often	very often
Q13. Have you found it <i>difficult to relax</i> because of problems with your teeth, mouth or dentures?	never	sometimes	regularly	often	very often
Q14. Have you felt that your <i>sense of taste</i> has worsened because of problems with your teeth, mouth or dentures?	never	sometimes	regularly	often	very often



Oral Health-Quality of Life Predictors depend on Population

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Oral Health-Quality of Life Predictors Depend on Population

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Abstract In the framework of the development and evaluation of oral health interventions that take into account people's oral health-related quality of life (OH-QoL), it is important to know what determinants and effects of OH-QoL are. Because the processes involved in the experience of OH-QoL may differ for different populations, this study mapped the relations of general health perception, social factors, dental anxiety and oral hygiene behavior on the one hand with OH-QoL on the other hand, in two different samples that mainly differed on the experience they had with dental care and dental pathology: In 112 patients of the Center for Dentistry and Oral Hygiene and in 339 first year psychology students. The relations of three of the four variables with OH-QoL differed in both samples. Although not all relations could be interpreted unequivocally in this cross-sectional design, the data illustrate that the main difference between both samples (i.e., patients indicated for oral treatment versus students outside treatment) influenced the psychological processes involved in OH-QoL. This implicates that oral health interventions directed at increasing OH-QoL may have to be adapted to populations.

Keywords Oral health-related quality of life · Oral hygiene behavior · General health perception · Expected social outcomes · Dental anxiety

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Introduction

The theoretical model of oral health (Locker 1988) suggests that oral disease can lead to impairments on several dimensions, such as physical, psychological and social. Impairments are described by Locker as any limitation in or lack of ability to perform activities of daily living (Slade and Spencer 1994) that can lead to a decrease in quality of life. This model is supported by results from a number of studies that show that oral disorders have a negative impact on physical, psychological and social well-being (Locker 2004, 1988; Locker and Matear 2000), and on oral health-related quality of life (OH-QoL; Locker and Allen 2007).

For modern oral health care interventions to be acceptable, they should take into account these experiential effects (Allen 2003). The awareness of quality of life as one possible outcome of medical-technical oral health interventions, assigns responsibility for this outcome to those who develop and execute the intervention. Therefore, it is of great importance to understand what the determinants are of self-perceived OH-QoL. That is, according to the state-of-the-art models of intervention development, effective interventions should aim at the determinants of the desired outcome (Bartholomew et al. 2001; Buunk and Van Vugt 2008; Green and Kreuter 1999). Thus, effective interventions aimed at increasing OH-QoL should target the causes of OH-QoL. In addition, these models also stress the possibility of side-effects of trying to reach the desired outcome. That is, as a psychological state, OH-QoL may have subsequent desired but also undesired effects. For example, a good OH-QoL may lower one's motivation to take preventive actions, for example, to regularly visit a dental hygienist or a dentist. Thus, to understand the process involved in shaping individual's OH-QoL and to be able to carefully design interventions to influence OH-QoL for the good, insight into the causes and effects of OH-QoL is essential. The present study aims to increase our knowledge of whether and how a set of potential causes and effects of OH-QoL are related to OH-QoL.

In addition, dental care interventions targeting different groups may need to be adapted to the specific causes and effects of OH-QoL in different groups. Therefore, on the basis of the principle of target group segmentation (Ahmad 2003) the causes and effects of OH-QoL must be studied in each segment that will be targeted (Baker 2007). In the present study, we present analyses within two samples of participants that differ in one essential aspect related to dental care: The experience with dental pathology and dental care. Experiences shape perceptions of reality and subsequent experiences through a process of enactive learning. Enactive learning is the most powerful source of interpretations of events and accomplishments (Bandura 1986). People with substantial experience with dental care may have developed specific perceptions of dental care and dental health on the basis of their experience. Therefore, in the present study we compare the causes and effects of OH-QoL in two samples: A sample with substantial experience with dental care and dental pathology and a sample with less experience with dental care and dental pathology.

Besides the above referred to oral disorders or pathology, socio-psychological factors may be related to OH-QoL as causes or effects. In the present research, four such factors were assessed: dental anxiety, oral hygiene behavior, expected social outcomes of having healthy teeth, and general health perception. The rationales for including these factors were the following.

Dental anxiety was included because it is a very common negative emotion related to oral health care. According to Woodmansey (2005), the average patient has low to mild anxiety but up to 15% of people report to avoid dental because of anxiety (see De Jongh et al. 1995). It is thought to be an important negative determinant of OH-QoL (Mehrestedt et al. 2007; Vermaire et al. 2008). Dental anxiety not only manifests as anticipatory worry about dental treatment and fear during treatment, but also in avoidance behaviors (e.g., not adhering to treatments or cancelling appointments), that may increase dental pathology. Therefore, especially in people with substantial experience with dental care and pathology (i.e., a history of dental treatment) we expect that the more dental anxiety they report, the lower their OH-QoL will be. However, in people with little experience with dental care and pathology, dental anxiety may not have developed and, therefore, not be related to OH-QoL.

Oral hygiene behavior refers to the preventive actions people engage in to take care of their teeth and oral health, such as brushing and flossing teeth (Buink-Werkhoven et al. in press). These behaviors can have different relations with OH-QoL. People with substantial experience with dental care and pathology—which may manifest in a lowered OH-QoL—may be more motivated to engage in actions to cope with or to avoid reoccurring dental pathology. Thus, the lower their OH-QoL, the better they are expected to practice oral hygiene behaviors. In contrast, when people have little experience with dental care and pathology, their dental health state and related OH-QoL have no motivational property: They do not motivate people to improve something. However, their oral hygiene behavior might determine OH-QoL, through objective oral health. Thus, the worst they take care of their oral hygiene, the lower their OH-QoL may be.

Social factors may also be related to OH-QoL. That is, unhealthy teeth may affect a person's social interactions negatively, as facial attractiveness has been found to affect social attitudes and actions (Onsterhaven et al. 1989). When people recognize and value these social effects, they become integrated in the psychological domain of oral health as perceived social outcomes of their oral health. When people have substantial experience with dental care and pathology, they may more often have encountered painful negative social outcomes. From the perspective of Regulatory Focus Theory (Higgins 1997), this may have instated a prevention focus: The motivation to specifically avoid negative outcomes. Thus, the worse their OH-QoL is, the more they are anxiously focused on the importance of social outcomes. In contrast, people with little experience with dental care and pathology have not (yet) experienced negative social outcomes. This means that they are not confronted with the strong importance of social outcomes. Therefore, those with little experience may still perceive social outcomes from a promotion focus (Higgins 1997): The motivation to approach positive outcomes. As a result, when their oral health status is better, as indicated by a higher OH-QoL, they may anticipate and experience more positive social outcomes.

General health perception refers to the evaluation of one's health in general, taking into account all relevant domains (Marino et al. 2008; Mason et al. 2006). General health perception is thought to be partly determined by OH-QoL. That is, when people are asked to evaluate their health in general, they can be expected to take into account optimal and non-optimal functioning in different domains,

including the oral domain (Kieffer and Hoogstraten 2008). Therefore, we expect that the higher OH-QoL is, the more positive the general health perception will be. Although the experience with dental care and pathology may influence the strength of the relation, we have no rational to expect opposite relations for people with and without substantial experience.

In sum, the relations of OH-QoL with the four above factors—dental anxiety, oral hygiene behavior, social outcomes and general health perceptions—are thought to be relevant for understanding the processes involved in shaping OH-QoL. Whether the above four factors will be related to OH-QoL and what the directions of the relations will be, depends on other psychological factors or on contextual factors. In the present study, we assume that experience with dental care and dental pathology is a relevant contextual factor.

Overview Present Research

The aim of this research was to assess a number of factors associated with the OH-QoL (assessed with OHIP-14-NL) that may have direct or indirect implications for the effectiveness of public health interventions in the contexts of promoting OH-QoL. It was expected that the associations would depend on the experience with dental care and dental pathology. Therefore, the associations were tested in two sample that clearly differed in this experience: clinical *patients* and *students*. Whereas students mostly have few dental problems and a short dental history, patients visiting a center for dentistry and oral hygiene have substantial experience with dental care and dental pathology.

Methods

Participants and Procedure

The participants were patients who visit the Center for Dentistry and Oral Hygiene, University Medical Center of Groningen (*patients* sample), and first year students of the faculty of Psychology, University of Groningen (*students* sample). Ethical approval for this study was obtained from the ethics committee of both departments. The patients answered a paper-and-pencil-questionnaire in the waiting room before the screening/dental examination in the clinic. This screening was conducted by a dental professional and involved an evaluation of the patient's oral health care, gauging their motivation to engage in oral health care, the oral status and the need for dental treatment. In the clinical sample also the impact of patient's clinical oral health status was examined. For the *students*, the administration of a computerized version of questionnaire was completed.

Measurements

The questionnaire included 45 items divided into several parts, including a few demographic questions on matters such as age, nationality, marital status, and education. Level of education was categorised as low, medium or high. In the

Netherlands, low educational level refers to vocational training, medium level to advanced vocational training, and high level to college/university training.

OHIP-14-NL is a measure of OH-QoL which is linguistically validated in Dutch (Buunk-Werkhoven et al. in press; Werkhoven et al. 2004). This scale, a short form version of the OHIP-NL (Van der Meulen et al. 2008), includes 14 items organized in seven dimensions: function limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability and handicap (Cronbach's $\alpha = .94$ in the *patients* sample, and $\alpha = .92$ in the *students* sample). Responses were scored on a 5-point Likert scale ranging from "never" to "very often". Sum scores ranged from 0 to 56, and a higher score represents a lower OH-QoL.

The *Dental Anxiety Scale* is a four-item self-report scale measuring fear for dental treatment at the day before, in the waiting room, waiting to be drilled and waiting to be cleaned (DAS; Corah et al. 1978). Items can be scored on a scale from 1 to 5, and summed to provide an overall dental anxiety score ranging from 4 ("not anxious at all") to 20 ("extremely anxious"). In the *patients* sample, Cronbach's $\alpha = .94$. In the *student* sample $\alpha = .84$. The higher the score, the stronger the dental anxiety.

Oral hygiene behavior (OHB) is a measure of the extent to which people engage in optimal oral care, as defined by professional standards (Buunk-Werkhoven et al. 2009a, b). The index includes eight items with respect to tooth brushing, interdental cleaning and tongue cleaning. For example, the item "I brush my teeth as follows" was supported by pictures showing different brushing methods. The OHB sum score on this index could range from 0 to 16. A higher sum score indicates a higher level of oral self-care.

Expected Social Outcomes (ESO; Buunk-Werkhoven et al. 2009a, b) of having healthy teeth is a measure of the importance and salience of good oral health for social functioning and social acceptance. The scale included six items ($\alpha = .76$ in both samples). An example of this five-point scale is: "In social contacts fresh breath is important." Responses varied from 1 = *disagree* to 5 = *agree*, and a sum score was computed by summing up scores on all items (ranging from 6 to 30). The higher the score, the more important and salient people find the social outcomes of good oral health.

General Health Perception (GHP) is a measure of perceived general physical health. It was measured by using a sub-scale of the RAND 36-Item Health Survey (Aaronson et al. 1998). The sum score of these items, ranges from 5 to 25 ($\alpha = .68$ in the *patients* sample and $\alpha = .77$ in the *students* sample), e.g., "In general, would you say your health is..." which was answered with on a five-point ordinal scale ranging from "excellent" to "poor", or "I expect my health to get worse," with the endpoints 1 = *absolutely wrong* to 5 = *absolutely right*. Higher scores indicate a better perceived general health.

Clinical Oral Health Status in Patients Sample

Only in the patients sample a record of dentition characteristics was registered (Category I = healthy dentition, Category II = slightly unhealthy dentition, Category III = mutilated dentition, Category IV = pre-edentulous, and Category V = edentulous).

Statistical Analyses

A one-way analysis of variance was performed to determine whether any significant differences in mean scores of the variables existed between the patients and students. Linear regression analyses were performed to identify the multivariate relations of dental anxiety, social outcomes, oral hygiene behavior and general health perception with OH-QoL.

Results

Characteristics of Participants

Patients and Dentition Characteristics

The patients sample included 112 patients (52% male), and their mean (SD) age was 49 (17) years. Almost all patients were of Dutch nationality (94%) and 58% was married. Nineteen percent of the patients had a low level of education; 49% had a medium level, and 28% had a high level. Table 1 shows that just 20% of the patients had healthy teeth and almost one quarter had slightly unhealthy dentition (24%). One-third of the patients had mutilated dentition (including five patients who were pre-edentulous), and 23% in this patients sample were edentulous.

Moreover, it can be seen that the patients evaluated their OH-QoL positively, and patients' mean sum score on the DAS suggests little dental anxiety. However, frequency scores of the DAS showed that 9% of the patients reported to have anxiety and 13% extremely dental anxiety (Corah et al. 1978). Furthermore, patients felt that they had considerable control over carrying out the oral self-care practices, and they attached a high value to the positive social outcomes of having healthy teeth. Indeed, patients' general health perception was moderately good.

Patients with healthy dentition (Category I) reported less limitations because of problems with their teeth, mouth or dentures. The patients who had mutilated dentition and those who were edentulous evaluated their perceived

Table 1 Frequencies of the clinical oral health status of the patients, means and standard deviation (SD) for the main variables for the patients and the students

Measures	Patients				Students	
	Cat. I	Cat. II	Cat. III-IV	Cat. V	Total sample all	Total sample none
Dentition Characteristics	N=22 (20%)	N=27 (24%)	N=37 (33%)	N=26 (23%)		
OHIP-14-NL (a, b)	4.20 (5.11)	8.92 (9.11)	15.85 (13.56)	12.14 (10.20)	10.93 (11.20)	4.30 (5.88)
DAS (a, c)					8.92 (4.23)	8.23 (2.67)
OHB (d, e)					9.32 (2.22)	10.95 (1.69)
ESO (a, f)	21.74 (3.03)	24.19 (4.51)	25.74 (3.73)	24.44 (4.73)	24.32 (4.16)	23.58 (3.94)
GHP (a, g)					19.0 (3.65)	18.56 (3.10)

In total sample: (a) n=339, (b) n=103, (c) n=98, (d) n=278, (e) n=105, (f) n=79, (g) n=102

OH-QoL worse in comparison with the patients who had slightly unhealthy dentition. All differences in OHIP-14 sum scores between the categories of dentition characteristics were significant, $F(1,93)=5.80$, $p<.001$. Patients who had unhealthy teeth (Category II, III-IV, and V, respectively), attached a higher value to the positive social outcomes of having healthy teeth compared to patients with healthy teeth (Category I). Differences between patients with unhealthy teeth versus patients with healthy teeth and the experienced differences in perceived social consequences related to their oral health status were significant, $F(1,101)=4.18$, $p<.001$.

Psychology Students

339 Students (25% male); their mean (SD) age was 21 (6) years completed the online questionnaire. Table 1 shows that the students evaluated their OH-QoL positive. The students' mean score on the DAS suggests no dental anxiety, but the frequency scores of the DAS scale showed that 7% and 3% of the students reported to have moderate and extreme dental anxiety, respectively (Corah et al. 1978). Furthermore, they felt that they had considerable control over carrying out the oral self-care practices, and they attached a high value to the positive social outcomes of having healthy teeth. The students' general health perception was good.

Comparing Patients and Students

Patients indicated that they experienced a more negative impact of their OH-QoL than the students, $F(1,438)=61.77$, $p<.001$, and more dental anxiety, $F(1,434)=3.77$, $p=.05$. Descriptive item scores of the OHB index showed that students felt more control over carrying out their oral self-care practices in comparison with the patients, but this difference was not significant.

Differential Prediction of OH-QoL in Patients and Students

To examine whether the various predictors played a different role of in the two samples, a regression analysis was performed in the combined sample with sample as the moderator. The interactions between each of the four predictors on the one hand and sample on the other hand were entered in a linear regression analysis. The interaction terms added significant amount of variance (7.6%), $F(9,333)=10.97$, $p<.001$ to variance explained by the main effects. Three of the four variables had significant interaction effects with sample: for GHP ($\beta=.51$, $p<.05$), ESO ($\beta=-1.70$, $p<.001$), and DAS ($\beta=-.41$, $p<.05$). Thus, the findings underline that these three determinants had different relation with self-perceived OH-QoL in the *patients* sample than in the *students* sample.

Predicting OH-QoL in Patients

Two linear regression analyses were performed in the patients sample (see Table 2). In the first analysis the same four predictors were included as in the total

Table 2 Linear regression of perceived oral health-related quality of life for all variables

Determinants	OH-QoL <i>students</i>	OH-QoL <i>patients</i>	OH-QoL <i>patients</i>
	β	β	β
General health perception	-.17**	.19 <i>ns</i>	.03 <i>ns</i>
Expected social outcomes	-.12*	.47**	.29*
Dental anxiety	.09 <i>ns</i>	.26*	.26*
Oral hygiene behavior	.02 <i>ns</i>	.00 <i>ns</i>	.08 <i>ns</i>
Dentition characteristics			.79**

Students: $R^2 = 5.0$ $F(4,273) = 4.65$, $p < .001$

Patients: $R^2 = 26.9$ $F(4,61) = 7.00$, $p < .001$

$R^2 = 35.9$ $F(5,60) = 8.27$, $p < .001$

** $p < .001$, * $p < .05$

sample. The model proved to be significant, $F(4,61) = 7.00$, $p < .001$, and accounted for 26.9% of the variance, which is a substantial proportion for self-perceived OH-QoL. Not only expected social outcomes ($\beta = .47$, $p < .001$), but also dental anxiety ($\beta = .26$, $p < .05$) emerged as significant predictors of OH-QoL. In the second regression analysis, in which dentition characteristics was entered with the other variables, this model proved to be significant too, $F(5,60) = 8.27$, $p < .001$, and accounted for 35.9% of the variance, which is more than in the first model. Now, dentition characteristics ($\beta = .39$, $p < .001$), expected social outcomes ($\beta = .29$, $p < .05$), and dental anxiety ($\beta = .26$, $p < .05$) emerged as significant predictors of OH-QoL.

Predicting OH-QoL in Students

The linear regression model with four predictors was significant, $F(4,273) = 4.65$, $p < .001$, and accounted for only 5% of the variance, which is much lower than in the patients sample. Only general health perception ($\beta = -.17$, $p < .001$) and expected social outcomes ($\beta = -.12$, $p < .05$) emerged as significant predictors of OH-QoL (see Table 2).

Discussion

The results show that the relations of general health perception, expected social outcomes, and dental anxiety with OH-QoL differed in the two samples. This suggests that the relations are moderated by psychological or contextual characteristics of the samples. We assumed that the main difference between the samples was their experience with dental care and dental pathology. Although the samples were only rough proxies of the extent of their experience, participants in the sample of patients reported a lower OH-QoL and higher dental anxiety compared to participants in the sample of students. This is what

might be expected in people who have repeatedly been exposed to dental treatment because of dental pathology. Although future research is needed to further test experience as a relevant moderator, the message of the present results is clear: The psychology of oral health-related quality of life differed for the two samples and may differ for other samples as well. This means that in the development of oral health interventions that attempt to influence OH-QoL, these differences must be taken into account: We can no longer guarantee that different populations are adequately served with the same intervention.

The differential interpretation of the relations in both samples may shed some light on the moderating characteristics of the samples. First of all, in the patient sample general health perception was not associated with OH-QoL, while in the student sample it was. The latter relation confirmed our expectation that when people estimate their general health, they take into account their oral health and the outcomes of their oral health (as assessed with the OHIP-14-NL). However, in patients this was not the case. One way or another, their OH-QoL was not relevant for their perceived general health. On the other hand, in both samples the beta was only small and the statistical power in the smaller patient sample may not have been sufficient to reveal such a small effect.

The second difference between the samples was that in the patient sample social outcomes were associated with a lower OH-QoL, whereas in the student sample they were associated with a higher OH-QoL. These results are in line with the notion that more experience with dental care and pathology changed the perception of social outcomes from a promotion perspective into a prevention perspective. In the promotion perspective, social outcomes are something positive people can strive for. In the prevention perspective, negative social outcomes become salient because they are feared and must be avoided. The experience with dental care and dental may have "traumatized" or "sensitized" these people for social outcomes.

The third difference between the samples was that only in patients dental anxiety was related to OH-QoL. Our interpretation is that the experience patients have with dental care and pathology indicates experience with aversive dental treatments because of oral health problems. This experience may have lead to levels of dental anxiety that are so inconvenient that they are taken into account in estimating their OH-QoL. In line with this interpretation is that the patients scored higher on dental anxiety than the students.

Besides the differences between the samples, two other observations are relevant. Firstly, oral hygiene behavior was not related to OH-QoL in both samples. This suggests that both possible explanations—inadequate oral hygiene behavior indirectly lowers OH-QoL and a low OH-QoL is a motivator of oral hygiene behavior—were not supported. Secondly, the relation in the patient sample, between dentition characteristics and OH-QoL is in line with OH-QoL being only partly determined by the objective dental health status and underscores the psychological and experiential nature of quality of life.

In conclusion, although not all relations can be interpreted unequivocally in this cross-sectional design, the data illustrate that the main difference between both samples (i.e., patients with substantial dental history and students with less history) influence the psychological processes involved in OH-QoL. This means

that in the development of oral health interventions that attempt to influence OH-QoL, these differences must be taken into account. For example, when in a population the perceived social outcomes are not a determinant of OH-QoL, they do not have to be specifically targeted by an intervention and resources can be used to influence other determinants. This principle is in line with the notion that interventions need to be directed at segments of a population to be effective (Ahmad 2003). In practice, at least the following global phases can be distinguished in designing effective interventions (Bartholomew et al. 2001; Buunk and Van Vugt 2008; Green and Kreuter 1999). Firstly, the potential target population should be defined. Secondly, a broad set of determinants of OH-QoL should be assessed and analyzed. Thirdly, the intervention aimed at increasing OH-QoL should specifically target the population-specific determinants of OH-QoL. The ultimate aim of such meaningful segmentation of large populations is to increase the effectiveness of OH-QoL interventions.

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Halitosis and Oral health-related Quality of Life: A Case Report

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Halitosis and Oral Health-related Quality of Life: A Case Report

Abstract

Objectives: This is a clinical case of a 36-year-old Dutch male, patient in the Dr. S. van Mesdag Forensic Psychiatric Centre in Groningen. It demonstrates a short-time ‘effect’ of a tailored oral hygiene self-care intervention in three sessions over a period of three months on halitosis and a patient’s oral health-related quality of life (OH-QoL).

Methods: Besides dental screening and professional oral hygiene care, an in-depth semi-structured interview was conducted by the dental hygienist, and questionnaires were administered including the Dutch version of the Oral Health Impact Profile-14 (OHIP-14-NL; used as a measurement of OH-QoL), and scales for expected social outcomes for having healthy teeth, attitudes towards oral hygiene behavior (OHB), and dental anxiety. **Results:** Clinical observations showed an improvement in patient’s OHB, while the extreme foetor-ore was reduced to an acceptable level. A retrospective assessment showed that patient’s attitude toward the recommended OHB together with his self-perceived OH-QoL had moved in a more positive direction. **Conclusions:** This case highlights the value of professional individual oral hygiene instructions performed by a dental hygienist, and illustrates that a patient’s effective OHB may play an important role in the reduction of halitosis, and in self-perceived OH-QoL. Finally, the retrospective version of the OHIP-14-NL may be an adequate method to assess self-perceived OH-QoL within a relative short period of time.

Introduction

Oral health can be defined as “a standard of health of the oral and related tissues which enables an individual to speak and socialize without active disease, discomfort or embarrassment and which contributes to general well-being” (1, p. 8). Oral disease can lead to impairments on several dimensions in the physical, the psychological and the social domain (2). For instance, large cavities or severe gingival diseases (periodontitis) can make the extraction of teeth necessary. Tooth loss may lead to problems with biting, chewing, swallowing, speaking, smiling, and appearance, which may lead to feelings of shame or decreased self-esteem.

An additional possible effect of oral disease is halitosis, i.e., a bad breath odor. At least 50 per cent of the population suffers from halitosis (3), and around 25 per cent of these individuals experience such a severe problem that it affects their social functioning. For example, individuals may feel nervous and embarrassed in the presence of other people and may avoid social contacts and intimate relationships (3-4). Thus, halitosis is what Locker refers to as impairment that can lead to a decrease in the quality of life (5-7).

The present case report concerned a patient in a forensic psychiatric institution, the Dr. S. van Mesdag Forensic Psychiatric Centre. In the Netherlands, highly select populations of individuals with mental disorders who have committed serious offenses (i.e., murder -including serial-, rape or pedophilia) are imprisoned in specific institutions, and to reduce recidivism they receive forced treatment appropriate to their psychiatric needs.

Recently, two studies on the oral health and its self-reported impact on quality of life in Dutch forensic psychiatric population (8-9) showed that this population is characterized by a low level of awareness of one’s own oral hygiene and of the consequences this may have for one’s oral health and well-being. The findings underline the importance of dental screening and professional dental care in this population, and suggest that attention to structural

individual oral hygiene instruction, as part of patients' general personal care, may improve patients' oral health status (10–12). Therefore, the aim of this clinical case study was to demonstrate that an OHB intervention tailored to the individual may reduce halitosis and benefit patient's OH-QoL.

Method

Overview

Over a period of three months, a 36-year-old Dutch unmarried male forensic psychiatric patient, Mr. X., from the Dr. S. van Mesdag Forensic Psychiatric Centre in Groningen participated in this case report. It was stressed that participation was voluntary. Ethical approval for this case report was obtained from the ethics committee of the institution.

The patient

The patient, Mr. X., came from a Dutch family, and was the youngest of four children. He lost his father when he was almost 12 years old. He had a significant medical history: since he was 3 years old, he visited regularly hospitals for obesity. He suffered from deafness till the age of 4 (tinnitus), which was successfully treated with surgery, but he kept having speech problems, i.e., lisping. There was family history of obesity, and his mother was pre-diabetic. His mental health history included a diagnosis of educationally subnormal impression (weakly mentally retarded). His highest level of education was secondary special education. By the age of 3 or 4 years Mr. X. went to the dentist for the first time, and his parents brushed his teeth twice a day till he was about 6 years. As far as he remembered, he had a bad oral condition.

Procedure and treatment

A dental screening was conducted by a dentist and the diagnosis was 'pre-edentulous', implying an aggressive process of periodontitis to a point where extraction of all teeth would become necessary. A full denture was evidently the next step, but this was complicated because of Mr. X.'s very complex oral condition; the maxilla was in an extreme Class II occlusion. In the meanwhile, it became clear that, because of his extremely foetor-ex-ore (very strong distasteful smell of breath), the co-residents and the staff avoided Mr. X. or kept him on a distance in social contacts. Therefore, a visit to the dental hygienist (the first author) was considered urgent.

The first session with the dental hygienist (three months after the dental screening), included an assessment of Mr. X.'s oral hygiene self-care with the index for OHB (13). This measure includes 8 items with respect to tooth brushing, interdental cleaning and tongue cleaning (Appendix I). Mr. X. reported to have sometimes a toothache or a broken teeth, regular gingiva bleeding, often mobility of his teeth, and a very often strong distasteful smell of breath. Mr. X.'s daily OHB included twice a day (after breakfast and before going to sleep) manual tooth brushing (horizontal/circular method) with fluoridated toothpaste, and mouth-washing several times a day. He did not use any interdental cleaning methods or tongue cleaning.

In addition, Mr. X. was educated about his clinical oral condition, and received individual oral hygiene instruction and skills training for optimal OHB which included the Bass-method. In addition to tooth brushing, daily interdental cleaning, (in this case, the use of interdental brushes), tongue cleaning, and mouthwash were also recommended (9, 13–16).

Immediately after this instruction only a professional dental polishing treatment was carried out by the dental hygienist.

Three weeks later in the second session, the dental hygienist assessed if Mr. X.'s performed the recommended oral hygiene behavior effectively. While Mr. X.'s oral health was assessed directly, a simple visual inspection. This suggested a reduction of plaque in general; the color of the gingiva was rose instead of dark red; there was less swelling of the gingiva, and the very strong distasteful smell of the breath was reduced. The difference between the observations of session 1 and 2 was presented to Mr. X. visually with a hand mirror.

In-depth semi-structured interview

Directly after the second session, Mr. X. was interviewed by the dental hygienist to explore his family background, his dental history and his feelings about himself. The main focus in this interview were the factors that might have played a role in his behavioral change (e.g., a change in attitudes towards oral hygiene self-care, and the influence of specific important individuals on Mr. X.'s oral health behavior). The interview took place in a separate room at Mr. X.'s department, and lasted for about 45 minutes. A checklist was used to make sure that all relevant topics were covered.

Measures

First, Mr. X. answered a few demographic questions and questions about his dental history, for instance, the age of his first dental visit, his perceived oral condition (i.e., condition affecting structure of the mouth such as teeth, gums, lips, tongue and cheeks), and his dental health status, including the judgement made by the dentist.

OHIP-14-NL (OH-QoL)

Next, Mr. X.'s indicated his perceived OH-QoL with an adapted version of the OHIP-14-NL, a validated Dutch short version of the OHIP-NL (8–9, 17), that includes 14 items organized in seven dimensions: function limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability and handicap. Responses varied from “never” to “very often. Higher sum scores (ranging from 0 to 56) represent a lower OH-QoL (18).

Expected social outcomes (ESO)

Furthermore, Mr. X. filled out a six-item scale on the expected social outcomes for having healthy teeth (ESO; 9, 13–15), with items such as “In social contacts fresh breath is important.” Responses varied from 1 = disagree to 5 = agree. A higher sum score (ranging from 6 to 30) indicates a higher importance of the social outcomes of good oral health.

Dental Anxiety Scale (DAS)

Mr. X also filled out the four-item Dental Anxiety Scale, a self-report scale measuring fear for dental treatment (DAS; 19). Items were scored on a scale of 1 to 5, and higher sum scores (ranging from 4 to 20) indicate more dental anxiety.

Finally, to measure the attitude, i.e., the feelings about OHB, Mr. X. indicated on nine dimensions, how he 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 (ranging from 9 to 63) indicate a more positive attitude towards an optimal OHB.

Modified OHIP-14-NL

Two months after the second session, during the third session, the dental hygienist checked-up the maintenance of Mr. X.'s optimal OHB, and used a modified OHIP-14-NL scale to assess retrospectively the perceived improvement after the intervention. The original items were preceded by the introduction "in comparison to the period before the intervention (three months ago) by the dental hygienist", and the responses of the participant were scored "fewer" to "more", resulting in a sum score potentially ranging from 1 (no improvement at all) to 56 (much improvement), and 28 means no changes. Similarly, patient's perceived change in attitudes and opinions towards OHB were assessed.

Oral hygiene treatment

Finally, the dental hygienist performed a professional dental treatment, including a simple SRP and polishing. Because of insurance does not cover more extensive oral health care in this type of centre for imprisoned forensic patients, the focus of dental and oral hygiene treatment was mainly on reducing pain and other oral discontent.

Results

At the first session, the dental hygienist noted that Mr. X. was extremely obese, with a BMI over 40 kg/m², and with a physically unhealthy and slightly neglected appearance. He was sloppily dressed and had a particular strong distasteful smell around him, which was hard to describe. However, he was calm and didn't show anxiety or other obvious emotions. He had positive experiences with his dental visits (twice a year), and had five different dentists till now. Mr. X.'s sum score of 4 on the Dental Anxiety Scale is indicative of no dental anxiety. While he had - without success - tried to use orthodontic removable night braces in childhood, during adolescence he was no longer motivated for orthodontic treatment. Mr. X. reported to have sometimes a toothache or a broken teeth, regular gingiva bleeding, often mobility of his teeth, and a very often strong distasteful smell of breath. Mr. X.'s daily OHB included twice a day (after breakfast and before going to sleep) manual tooth brushing (horizontal/circular method) with fluoridated toothpaste, and mouth-washing several times a day. He did not use any interdental cleaning methods or tongue cleaning. When Mr. X. was educated about his clinical oral condition to increase his knowledge and awareness regarding his oral health, and was given oral hygiene instructions and demonstrations, he was sincerely motivated and willing to change his own daily oral hygiene activities as recommended.

At the second session, Mr. X. general appearance had changed, he was cheerful and he was wearing a new T-shirt and well dressed trousers. His OHB was well performed and his self-perceived oral (gingival) condition had been improved. His teeth were clean, he reported less gingival bleeding, and the breath odor was reduced to an acceptable level. The dental hygienist complimented Mr. X. on his regular oral hygiene self-care, and also reinforced that he could attain sustainable oral health benefits. Mr. X. admitted that he felt relieved and that his clinical oral condition felt better than it had 3 weeks earlier. In addition, he was very motivated to maintain the newly learned OHB, even though it cost him about 30-45 minutes per brushing moment. Mr. X. daily cleaned his tongue, brushed his teeth 4 times a day, used interdental brushes before he went to sleep, and he still used the mouthwash several times a day. In the interview directly after the second session, Mr. X. evaluated his perceived OH-QoL very

positively; he had never eating problems or pain (OHIP-14-NL; sum score = 5). Sometimes he had trouble speaking because of the lisping. He indicated that he experienced some psychological discomfort, and that he now avoided being in a near distance of other people because of his foetor-ex-ore. Most of all, when he noted reluctant behavior of others, he tended to withdraw socially and to experience some increased tension. Eventually he admitted feeling 'very ashamed' of his bad breath odor. He attached a high value to the positive social outcomes of having healthy teeth (ESO; sum score = 25), and wondered if others would notice it that he had improved his OHB.

The patient valued the newly learned OHB very positively (attitude; sum score = 50), he found the recommended OHB extremely boring, a little bit annoying, and between painful-painless. In answer to the final question why he had changed his oral hygiene behavior, Mr. X. answered: "Because now at last I know what I should do and how".

Three months after the intervention the dental hygienist assessed the maintenance of Mr. X.'s oral hygiene behavior. Mr. X. still was motivated and willing to maintain his newly learned daily oral hygiene activities. Furthermore, Mr. X. evaluated his perceived OH-QoL in comparison to the period before the intervention more positively; he reported much improvement on several items of the OHIP 14-NL (sum score = 38). He experienced less social-psychological discomfort; felt much more secure, reported less tension, and felt less ashamed. Moreover, he felt that he was able to function more normally and that life in general was more satisfying. Mr. X.'s attitudes and opinions toward oral hygiene self-care were also changed in a much more positive direction.

Discussion

The present case study concerned a forensic psychiatric patient, Mr. X, with serious halitosis that was negatively affecting his oral health related quality of life, and was interfering with his social interactions. A tailored oral hygiene self-care intervention by a dental hygienist of three sessions over a period of three months showed a substantial decrease in halitosis, an increase in the patient's self-reported OH-QoL, and an obvious improvement in OHB. Indeed, a retrospective assessment showed that the patient's attitude toward OHB as well as his self-perceived OH-QoL had moved in a more positive direction. These effects are particularly noteworthy as forensic psychiatric patients tend to have a low awareness of their own OHB, and of the consequences such behavior may have for their oral health and well-being (8-9). In general, individuals with a psychiatric diagnosis tend to experience more problems with their oral health, and the present study illustrates how such individuals may be assisted to improve their oral health by a dental hygienist (20).

While it is not completely clear why the intervention was successful, we assume that the combination of personal attention and very specific behavioral instructions may have accounted for the effects. Moreover, the patient was very motivated to change his behavior as he daily experienced the negative social consequences of his bad breath. In part the fact that he was cognitively challenged and imprisoned may have affected his motivation to change his behavior. While, of course, this case study concerns a specific patient in a quite specific setting, we feel that it underlines the importance of interventions provided by a dental hygienist tailored to individual needs (11-12, 21).

This study may assist all oral health professionals working with specific patient categories in what are referred to be "the most dignified tasks" of these professionals, i.e., educating these

persons in oral health and changing their oral hygiene behavior (22). In addition, as dentists are at times not primarily focussed on educating patients in effective oral hygiene behavior, preferring to treat rather than prevent oral diseases (23), dental hygienists may play a central role in promoting desired oral hygiene behavior by effective professional communication (24). Finally, this study suggests that questionnaires with which patients are asked to indicate changes in their attitudes and oral health-related quality of life (25) after a treatment may support the daily practice of dental hygienists, by assisting them in evaluating the effects of their interventions, and thus by providing information to foster reflection on their work.

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Appendix I

Index for oral hygiene behavior (OHB)

The following questions are about your oral hygiene self-care practices.

1. How often do you brush your teeth?

- ☐ not every day
- ☐ once a day
- ☐ twice a day
- ☐ more than twice a day

2. When do you brush your teeth?

- | | | |
|-----------------------------|------------------------------|-----------------------------|
| morning before breakfast | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| morning after breakfast | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| noon | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| after dinner in the evening | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| before going to sleep | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

3. How do you brush your teeth?

I brush my teeth

- | | | | | | | | | |
|--------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
| gently | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | forcefully |

4. How much time do you spend on brushing your teeth?

I brush my teeth for

- ☐ less than one minute
- ☐ one minute
- ☐ two minutes
- ☐ three minutes
- ☐ more than three minutes

5. I brush my teeth as follows:

- ☐ back-and-forth movement ('horizontal' method)
- ☐ up-and-down movement ('vertical' method)
- ☐ circular movement ('circular' method)
- ☐ brushing gently, massaging the gum ('Bass' method)

6. What do you use to clean your teeth?

Mostly I use:

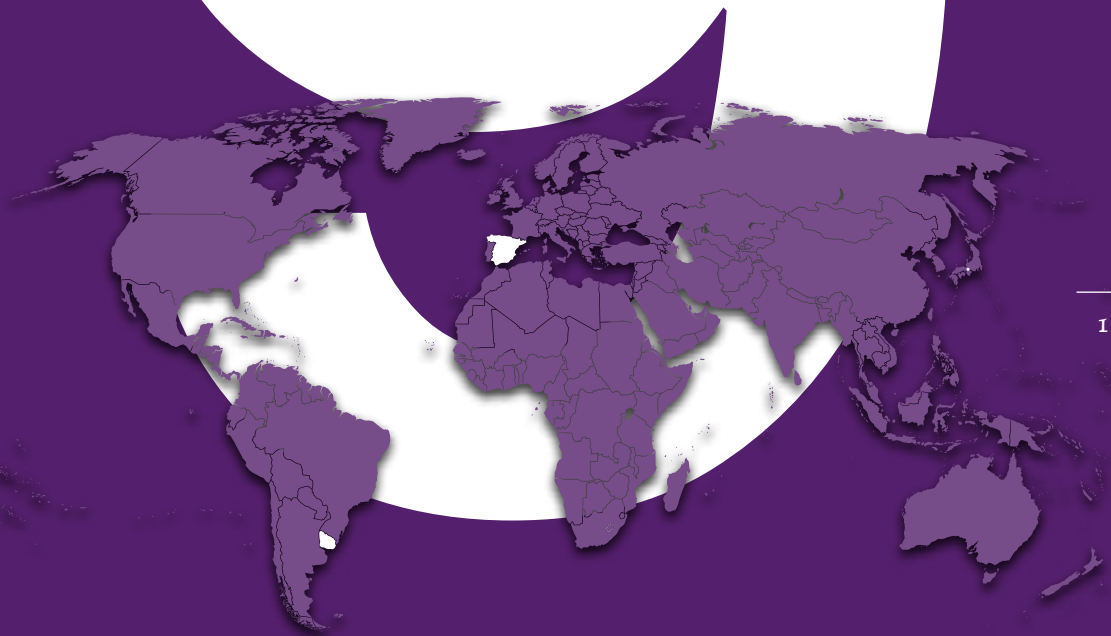
- ☐ toothpaste with fluoride
- ☐ toothpaste without fluoride
- ☐ I don't know

7. *Do you clean your tongue?*

- ☐ never
- ☐ sometimes
- ☐ every day

8. *Which of the following interdental tools do you use?*

	never	not every day	once a day	twice or more times a day
dental floss	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
dental sticks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
interdental brushes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



Persuasive oral hygiene communications
in Uruguay and Spain.

Persuasiva comunicación de la higiene
bucal en Uruguay y España.

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'Persuasive oral hygiene communications in Uruguay and Spain' 'Persuasiva comunicación de la higiene bucal en Uruguay y España'

Abstract

This experimental intervention study examined the extent to which the persuasive effects of positively and negatively framed messages designed to promote oral hygiene behavior, were moderated by individual differences. Firstly, two measure of regulatory focus (i.e., promotion and prevention focus) were tested as moderators. Secondly, two contextual individual differences (i.e, level of education and country) were tested as moderators. In total 155 dental patients who visited a dental faculty in Montevideo (Uruguay) and a dental faculty in Valencia (Spain) participated in this study. They were at each faculty randomly assigned to the positive or the negative frame condition and completed a multiple culturally adapted questionnaire. The results showed that regulatory focus and level of education moderated the persuasive effects of both message frames, but that the direction of the moderation depended on country. This study illustrates that message framing effects in a naturalistic setting, just before the examination or treatment started, can have differential effects depending on the individual's regulatory focus, the level of education and the country in which it is applied. Although not all results patterns could be explained satisfactorily, the patterns strongly suggest that messages tailored to individual differences may be more effective than a so called 'one size fits all'-approach.

Key words: Quasi-experiment, regulatory focus, message framing, persuasive communication, oral hygiene, contextual differences

Resumen

Esta investigación de intervención experimental examina si los efectos persuasivos de mensajes positivos y negativos diseñados para promover conductas de higiene bucal, están moderados por las diferencias individuales. En primer lugar, se pusieron a prueba como moderadores dos medidas de enfoque regulador (enfoque de promoción y de prevención). En segundo lugar, se pusieron a prueba como moderadores dos diferencias individuales contextuales (nivel de educación y país). En este estudio participaron 155 pacientes dentales que acudieron a la Facultad de Odontología de Montevideo (Uruguay) y a la Facultad de Odontología de Valencia (España). En cada facultad, los pacientes fueron asignados aleatoriamente a una de las dos condiciones experimentales (mensajes de salud bucal enmarcados positiva o negativamente) y completaron un cuestionario culturalmente adaptado. Los resultados mostraron que el enfoque regulador y el nivel de educación moderaron los efectos persuasivos de ambos mensajes, pero la dirección de la moderación depende del país. Este estudio ilustra que los efectos de la elaboración de mensajes en un ambiente natural, justo antes del examen o del inicio del tratamiento, pueden tener efectos diferentes en función de enfoque regulador del individuo, el nivel de educación y el país en el que se aplica. Aunque no todos los patrones de resultados podrían explicarse de manera satisfactoria, los patrones sugieren claramente que los mensajes adaptados a las diferencias individuales pueden ser más eficaces que los denominados 'de talla única'.

Palabras clave. Cuasi-experimento, enfoque regulador, tramas del mensaje, comunicación persuasiva, higiene bucal, diferencias contextuales.

Introduction

Although adequate daily home oral care and regular visits to a dental hygienist or dentist are the best guarantee for maintaining oral health, many people fail to adequately take care of their teeth (Syrjälä, Knuuttila, and Syrjälä, 1992a, b): Non-compliance with oral self-care recommendations is a major problem in preventive dentistry (Sniehotta, Araújo Soares, and Dombrowski, 2007). One of the first steps in the promotion of oral health is the use of oral health messages aiming to persuade individuals to change their unhealthy oral habits or their inadequate oral hygiene behavior.

Persuasive messages mostly include outcomes of adequate oral self-care, and overall, these outcomes can be presented in two distinct ways: They may either emphasize the negative consequences of poor oral self-care, or emphasize the positive consequences of adequate oral self-care. A positively framed message emphasizes the benefits of engaging in a specific behavior, whereas a negatively framed message emphasizes the costs of failing to engage in a specific behavior. For example, individuals with adequate oral hygiene self-care have a better oral health, which means healthy gum, a fresh breath odor et cetera, and whereas individuals with inadequate oral hygiene self-care have a poor oral health, which means unhealthy gum, a bad breath odor et cetera. (Donovan and Jalleh, 2000; Dijkstra, Schakenraad, Menninga, Buunk, and Siero, 2009; Mann, Sherman, and Updegraff, 2004; O'Keefe and Jensen, 2007; Rothmann and Salovey, 1997). There is evidence that, in general, positively framed messages are, more so than negatively framed messages, effective in promoting oral hygiene prevention behaviors, such as using mouth rinse or floss (Mann et al., 2004; Rothmann, Martino, Bedell, Detweiler, and Salovey, 1999; Sherman, Updegraff, and Mann, 2008; Uskul and Oysermann, 2009). However, recent developments in the field of message framing show that framing effects may depend on individual differences (for recent research see e.g., Dijkstra, et al., 2009; Mann et al., 2004; Sherman et al., 2008; Updegraff et al., 2007; Uskul and Oysermann, 2009; Uskul et al., 2009). The goal of the present experiment is to explore the persuasive effect of positively and negatively framed messages in changing oral hygiene behavior, with the focus on the moderating effects of individual differences.

Regulatory Focus in the domain of health

One individual difference that is conceptually related to positive and negative framing is the person's regulatory focus. Based on the motivational principle that individuals generally approach pleasure and avoid pain, Regulatory Focus Theory (Higgins, 1997, 1998) distinguishes between two distinct personal goal orientations, i.e., a focus on aspirations and accomplishment (i.e., promotion focus) and a focus on responsibilities and safety (i.e., prevention focus). A person who is basically promotion focused is more interested in obtaining positive outcomes, for instance a bright smile and white teeth.

A person who is basically prevention focused is more inclined to avoid negative outcomes, for instance cavities and bad smell (Higgins and Spiegel, 2004; Lee and Aaker, 2004).

Extending the idea that individuals can pursue these two different kinds of regulatory goals, Lockwood, Jordan, and Kunda (2002) demonstrated that individuals are motivated by role models who encourage strategies that fit their regulatory concerns. Promotion focused individuals are most inspired by positive role models or positive outcomes. That is, they are focused on strategies for achieving success, promotion strategies. In contrast, prevention focused individuals are most motivated by negative role models or negative outcomes.

That is, they are focused on strategies for avoiding failure, prevention strategies. In sum, individuals are sensitive for information that fits their dominant regulatory focus (i.e., promotion or prevention), and they show enhanced motivation and performance when they are encouraged to pursue strategies that match their regulatory concerns (Higgins, 2000). With regard to persuasion, it can be expected that because promotion focused individuals are more sensitive to positive outcomes as these positive outcome more strongly fulfil their need (to approach these outcomes), they will be more persuaded by a message in which the outcomes are framed positively. Similarly, because prevention focused individuals are more sensitive to negative outcomes as these negative outcome more strongly fulfil their need (to avoid these outcomes), they will be more persuaded by a message in which the outcomes are framed negatively. Thus, a match between the person's goals orientation or focus and the message frame is thought to lead to more persuasion. Such a match may be due to the experience of "feeling right" while processing the message. "Feeling right" is a non-affective subjective experience caused by reading a message that fits one's regulatory focus. This experience can be a source of information in the process of evaluation of a message. When a person experiences such a regulatory fit, the goal pursuit activity (the reading) 'feels right', and in turn, this feeling could positively inform the evaluation process, thereby increasing persuasion (Cesario, Grant, and Higgins, 2004; Cesario, Higgins, and Scholer, 2008).

Contextual differences

The same mechanism of "feeling right" might be involved when a message matches cultural or socio-economic individual differences. A match between message content and such salient contextual themes may also lead to a subjective experience of "feeling right," thereby influencing the evaluation process and persuasion. Relevant cultural or socio-economic difference might be related to regions, countries, and ethnic groups.

There are profound differences in oral health behavior across regions, countries, and ethnic groups (Davidson, Rams, and Andersen, 1997; Ronis, Antonakos, and Lang, 1996; Sakki, Knuuttila, and Antilla, 1998; Schou, 2000). Such differences may influence the relationship between psychological factors on the one hand and oral health behavior on the other hand. For example, Buunk-Werkhoven, Dijkstra, Bink, Van Zanten, and Van der Schans (2009) show that predictors of oral health behavior differed for people in Nepal compared to people in the Caribbean (Aruba and Bonaire). To the extent that different factors are associated with oral health behavior in diverse contexts, the persuasive effectiveness of oral health messages in promoting oral hygiene behavior may also differ between these contexts. Indeed, according to Uskul et al. (2009), white British individuals with a strong promotion focus were more persuaded (i.e., had more positive attitudes and stronger intention to floss) when given the gain-framed message, whereas East-Asian individuals with a stronger prevention focus were more persuaded (i.e., had more positive attitudes and stronger intention to floss) when given the loss-framed message. Moreover, in another study of Uskul and Oysermann (2009) about cultural context on persuasive communication, there is evidence that health messages matched to salient cultural frames increase the persuasiveness. For instance, culturally relevant messages are more persuasive when the participants were reminded of their chronically relevant cultural-orientation. In the present study we use country, Uruguay versus Spain, as indicator of an individual cultural and socio-economic state.

Education

Not only regulatory focus and the cultural context, but also the educational level of people may affect the persuasiveness of oral health related messages. Results from earlier reports have shown that oral hygiene habits are related to the level of education (Lin, Wong, Wang, and Lo, 2001; Syrjälä et al., 1992a, b). Partly as a result of this, the recipient's level of education may influence the information processing of messages on oral hygiene. Based on the Elaboration Likelihood Model of persuasion, individual's beliefs or attitudes are formed or changed by a persuasive message through either a central or peripheral route (ELM; Petty and Cacioppo, 1986). The route depends upon the degree to which the person is both motivated and able to think about, consider or elaborate on the message. Level of education may be related to both determinants of message processing, to the motivation and to the ability to process and elaborate on the information. Lower educated people can be expected to be less motivated and less capable to process health messages (Jones, Lee, and Rozier, 2007; Rudd and Horowitz, 2005). The low motivation and the low ability represent low involvement in the topic of the message, thereby leading to more peripheral and less central processing. Thus, lower level of education might be related to more peripheral and less central processing. At least three studies show that low involvement was related to stronger persuasive effects of positive compared to negative outcome frames (Maheswaran & Meyers-Levy, 1990; Martin and Marshall, 1997; Donovan and Jalleh, 2000). Therefore, low educated recipients may be more persuaded by the positive frame. When we assume that higher educated people are more motivated and more capable to process messages, they may be expected to be more involved. Two studies show that higher involvement is related to stronger persuasive effects of a negative frame (Maheswaran and Meyers-Levy, 1990; Martin and Marshall, 1999). Although the above reasoning provides some directions for expectations on the relation between level of education and framing effects, the theory is weak and indirect (as level of education can only be a rough indicator of involvement) and we do not know any studies that already tested the relation. Therefore, we present the present analyses concerning framing and level of education as exploratory.

The current study

While prior research, for example Uskul et al. (2009ab), has examined effects of matching messages to individuals within different backgrounds of culture, we examined if the messages had similar or different effects in two different cultural and socioeconomic populations, i.e., Uruguay and Spain. These countries with predominantly Caucasian populations are both Spanish speaking, using high context messages in routine communication (Hall and Reed Hall, 1990).

The countries could be categorized as non-Western and Western, respectively, and they differ in their historical background, in population (about 3.5 million in Uruguay versus about 45 million in Spain), and in the gross national income per capita (PPP international \$ about 9,940 versus about 28,200, respectively). The general life expectancy at birth is 72/79 years (M/F) in Uruguay, and 78/84 years (M/F) in Spain, whereas in 2003 the healthy life expectancy at birth was 63/69 years (M/F) and 70/75 years (M/F), respectively. The total expenditure on health per capita in 2006 was \$989 in Uruguay and \$2,388 in Spain (WHO, 2009). Here again, we did not have specific hypotheses for a moderating effect of country; however, as most research on health messages is conducted in affluent Western countries, we felt it was

important to examine if the messages were as effective in both countries, with more focus on generalization aspects than on cultural differences.

Finally, according to a meta-analytic review of O'Keefe and Jensen (2007) a limitation of most extant studies on persuasive communication with respect to oral hygiene behavior is that, according to professional oral hygiene standards, the recommended oral hygiene behavior is usually too simple or quite incomplete (e.g., only mouth rinse, brushing or flossing). In line with *evidence-based dentistry*, optimal self-care oral hygiene behavior is not simply a matter of daily removal of dental plaque by 'just tooth brushing and flossing' (Tedesco, Keffer, and Fleck-Kandath, 1991). Although the notion that flossing results in the detection and prevention of gum diseases is not supported by scientific evidence, interdental cleaning is an important complementary aspect of oral self-care (Berchier, Slot, Haps, and Van der Weijden, 2008; Galgut, 1991; Hoenderdos, Slot, Paraskevas, and Van der Weijden, 2008; Slot, Dörfer, and Van der Weijden, 2008). Therefore, in our message an elaborate set of oral hygiene behaviors was recommended.

Method

Recruitment, Procedure, and design

The 155 participants in this experimental study were dental patients who visited a dental faculty, 'La facultad de Odontología de la Universidad Católica del Uruguay' in Montevideo (Uruguay sample), and patients who visited a dental faculty, 'La Universitat de València' in Spain (Spain sample). Ethical approval for this study was obtained from the ethics committee of the two departments. The dental patients were invited to take part in this international study on oral hygiene behavior, and after providing informed consent they answered voluntarily a multiple culturally adapted paper-and-pencil-questionnaire in the dental chair in the clinic just before the screening/dental examination or dental treatment. Participants were randomly assigned to complete either the questionnaire, in which the positively framed or the negatively framed oral health message was presented. The persuasive oral health message focused on the positive or negative effects on the Intention to perform Oral Hygiene Behavior (OHB). Before all participants read the oral health message, they filled out the self-regulatory health specific focus (promotion/ prevention) measure, and a measure of the extent to which they engaged in optimal oral care, as defined by professional standards (Buunk-Werkhoven, Dijkstra, and Van der Schans, 2009a, b; Buunk-Werkhoven, Dijkstra, Van der Wal, Basic, Loomans, Van der Schans, and Van der Meer, 2009). After reading the oral health message, all participants completed a set of evaluation questions concerning the message framing; the positive or negative arguments and their opinion. In addition, they filled out a measure assessing their intentions to perform the recommended OHB. Finally, the screening or dental treatment was conducted by dental students.

For the translation of measures in the questionnaire from Dutch into the national language Spanish as its mother tongue, the procedure of Geisinger (1994) was partly used. The measures were first translated into Spanish by three native Spanish speakers of Uruguayan decent (two dental students and a psychologist). Then, each member, working separately, carefully reviewed their three versions of the Spanish translations, and compared it against the English version. In a group meeting the members discussed discrepancies and reconciled all differences and concerns with the translation, until they reached agreement that the language was clear and understandable for the Uruguayan dental patients, and that the instruments

tapped the intended construct in this Latino-American subgroup. In the end of the translation process, a formal Uruguayan translator checked the final questionnaire. For the sample in Valencia, the Uruguayan version of the questionnaire was checked and translated into Spanish as its mother tongue by a native Spanish speaker of Spanish decent (a dentist in the dental faculty).

Oral Health Message

The present study employed an oral health message which focused exclusively on intention to perform oral hygiene behavior (OHB). The oral health message included facts about oral health and outlined physical, psychological and social consequences of performing (or not performing) OHB. The outcomes of the message were framed in two mirrored versions, each of about 400 words, including 25 examples of outcomes. Both versions (i.e., completed texts with mirrored arguments) were educational in tone, and the information about the impact of self-care oral hygiene on oral health differed in how it was presented. The positively framed message emphasized the benefits of engaging in an adequate OHB. For example, individuals with an optimal OHB have a better oral health, which means healthy gum, a fresh breath, younger appearance, more self-esteem, more positive reactions in interpersonal relationships, and they have a lower chance of undesirable outcomes, such as cavities or pain, feelings of shame or rejection, stress and disappointment by others. The negatively framed message emphasized the costs of failing to engage in an adequate OHB. For example, individuals without optimal OHB have a bad oral health, which means bad and unhealthy teeth, being viewed as less intelligent, weaker, and they have lower chance of desirable outcomes, such as healthy gum, no pain, et cetera. At the end of both messages, the description of an adequate OHB was presented: “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 two minutes; 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 the tooth brushing, daily interdental cleaning (i.e., use of floss, tooth sticks, or interdental brushes) and tongue cleaning was also recommended” (American Dental Associations, 2007; Buunk-Werkhoven et al., 2009a, b; Buunk-Werkhoven et al., 2009).

Measures

The questionnaire was divided into several parts, and a few demographic questions. Level of education was categorized as low, medium or high. In both countries, a low educational level refers to vocational training, medium level to advanced vocational training, and high level to college/university training.

Regulatory Focus in the domain of health was measured by using 8 items. The promotion focus scale consisted of 4 items (example item: “In general, I am focused on promoting a good general health”) (Cronbach’s $\alpha = 0.69$ in Uruguay, and $\alpha = 0.67$ in Spain). The prevention focus scale also consisted of 4 items (example item: “In general, I am focused on preventing a bad general health”) (Cronbach’s $\alpha = 0.68$ in Uruguay, and $\alpha = 0.78$ in Spain). Participants rated on 5-point-Likert scale their agreement to the items (1 = strongly disagree to 5 = strongly agree), and a sum score was computed by summing up scores on the 4 items per scale (ranging from 4 to 20). The higher the score per scale, the more promotion-focused or prevention-focused the

individuals tend to be.

Oral Hygiene Behavior is a measure of the extent to which people engage in optimal oral care, as defined by professional standards (Buunk-Werkhoven et al., 2009a, b; Buunk-Werkhoven et al., 2009). A culturally adapted version of this OHB index, including 8 items with respect to tooth brushing, interdental cleaning and tongue cleaning. For example, the item “I brush my teeth as follows” was supported by pictures showing different brushing methods. The OHB sum score on this index could range from 0 to 16. A higher sum score indicates a higher level of oral self-care.

Text evaluation was assessed by asking participants for their opinion of the oral health message. Participants were asked “To what extent do you think this message was reporting positive arguments on the consequences of OHB?”, “To what extent do you think this message was reporting negative arguments on the consequences of OHB?”, and “To what extent do you think that the text gave you a negative or positive feeling on the consequences of OHB?” These three items were to be answered on 7-points bi-polar adjective rating scales. After recoding the second item, an index for the perceived positive versus negative message framing was constructed by adding these three items. The text evaluation sum score could range from 3 to 21. A higher sum score indicates a more positive and a less negative reception of the message.

Intention to perform adequate oral hygiene behavior was measured using a sum score constructed from 3 items (Uruguay: $\alpha = 0.96$; Spain: $\alpha = 0.94$), e.g., “Do you intend to perform optimal oral hygiene behavior as described, within one year?”, and “Do you intend to ..., within the next six months?” which were answered with endpoints 1 = *absolutely not* to 7 = *absolutely yes*, and “Is it likely that you will start to perform optimal oral hygiene behavior as described, within the next six months?” with the endpoints 1 = *totally unlikely* to 7 = *totally likely*. The intention sum score could range from 3 to 21. A higher sum score indicates a higher intention to perform oral hygiene self-care.

Results

Characteristics of participants

In total 80 Uruguayan participants (67.5 % female) were exposed to the framed messages and completed our measures. Their mean age was 35 (14) years (range 18–68). In Valencia the number of participants was 75 (77.3 % female). Their age was 43 (10) years (range 18–74), and they were around eight years older than the participants in the Uruguayan sample, $F(1,154) = 14.44, p < .001$. Less than a half of the participants in Uruguay (44%) and 79% of the participants in Spain were married, $F(1,150) = 3.51, p = .06$. In Uruguay, only 6.3% of the participants had a low level of education, 43% had a medium level, and 50% had a high level of education, whereas the level of education in the Spanish sample varied from low (40%), medium (40%) to a high level (20%), $F(1,153) = 33.82, p < .001$.

In general, in Uruguay as well as in Spain patients reported a reasonably high level of OHB ($M = 11.41, SD = 2.55$ and $M = 11.29, SD = 1.96$, respectively). For instance, the findings of the OHB index showed that 79% of the Uruguayan participants and 88% of the Spanish participants brushed their teeth as recommended, twice a day. In addition, three-quarter of the Uruguayan participants, and 60% of the Spanish participants brushed their teeth in the morning and before they go to sleep for two minutes each time. In Uruguay, 44% of the participants cleaned their tongue daily and 41% sometimes, and in Spain 55% of the participants cleaned

their tongue daily and just 13% sometimes. None of the Spanish participants and 14% of the Uruguayan participants reported to not use interdental cleaning methods. In both countries, 88% used fluoride containing toothpaste.

In the following set of analyses (ANOVA), main effects and interactions between the independent variable (Message Framing) and the moderators (Promotion focus, Prevention focus and Education) on Intention to perform Oral Hygiene Behavior are reported. To examine the direction of the differences in the effects of Message Framing related to Promotion-/Prevention focus, and Level of Education, the contrasts and simple slopes were tested separately in the Uruguayan and Spanish samples.

Manipulation checks

To check if the manipulation of the message framing was perceived as intended in both countries, an ANOVA on the total scores of the three text evaluation items was performed, with Country (Uruguay/ Spain), Message Framing (Positive/ Negative), and Country X Message Framing interaction as factors. The analysis revealed the expected main effect of message framing, $F(1,151) = 4.21, p = .042$, indicating that the positive message was perceived as more positive ($M = 6.16, SD = .85$), than the negative message ($M = 5.85, SD = 1.06$). The ANOVA did neither show a main effect of country, $F(1,151) = .526, p = .469$ nor was the interaction between country and message framing, $F(1,151) = .063, p = .802$ significant. To conclude, these data indicate that the positive and negative message perceptions differed not by country.

The omnibus moderation test

To examine the role of the three moderators (Promotion focus, Prevention focus and Education), in a first analysis a saturated model (using ANOVA) was tested with three 3-way interactions as highest order independent variables and intention to perform OHB as the dependent variable. The three 3-way interactions were:

- a) 2 (Country) X 2 (Message Framing) X Promotion focus,
- b) 2 (Country) X 2 (Message Framing) X Prevention focus,
- c) 2 (Country) X 2 (Message Framing) X (Education).

Interestingly, this saturated model showed that of the three 3-way interactions, two were significant and one approached significance. With regard to self-regulatory focus moderation, there was a significant Country by Message Framing by Promotion focus interaction, $F(1,137) = 3.94, p = .049$, and a marginally significant Country by Message Framing by Prevention focus interaction, $F(1,137) = 2.85, p = .093$. This suggests that the effect of message framing on intention to perform OHB depends on regulatory focus (uniquely for promotion focus and for prevention focus) in Uruguay and Spain (Figure 1 and 2). In addition, with regard to education as a moderator, this saturated model revealed a strongly significant Country by Message Framing by Education interaction, $F(1,137) = 9.99, p = .002$. This indicates that the effect of message framing depends on the level of education, and that this relation depended on country (Figure 3).

In order to explore the 3-way interaction effects further, the effects of Message Framing, the three moderators (Promotion focus, Prevention focus and Education), and their interactions were performed for Uruguay and Spain separately. To find the meaning of the above-mentioned significant interactions, a “low” and a “high” group regarding the three moderators

were computed. For the moderators promotion focus and prevention focus the complete data set was used to model participants scoring low or high on the specific moderator by respectively subtracting one standard deviation (1 SD below the mean) from the standardized scores, and adding one standard deviation to the standardized scores (1 SD above the mean), using the procedure outlined by Cohen, Cohen, West, and Aiken (2003). Thus a *low promotion (or prevention) focus* represents the participants who relatively less strongly endorse a promotion (or prevention) focus, and a *high promotion (or prevention) focus* represents the participants who relatively more strongly endorse a promotion (or prevention) focus. To test the moderating effects of level of education, this variable was recoded because in the Uruguayan sample only 6.3% reported to have low education: This variable was dichotomized into “low” or “high”. Thus a low level of education represent the participants who has a secondary school to advanced vocational training level of education, and a high level of education represent the participants who has a college/university level of education.

Promotion focus as moderator

Uruguay

Within the Uruguayan sample, a 2 (Message Framing) X 2 (Promotion-focus) ANOVA on intention to perform OHB neither showed a main effect of Message Framing [$F(1, 75) = 1.70, p = .20, ns$] nor of Promotion-focus [$F(1, 75) = .27, p = .61, ns$] nor was the interaction between Message Framing and Promotion focus significant [$F(1, 75) = 2.29, p = .13, ns$]. Although there was no significant Message Framing by Promotion focus interaction; the planned contrast was conducted to find the meaning of the 3-way interaction in the saturated model. Therefore, a “low” and a “high” promotion focus group were modeled by using the procedure outlined above. As shown in Figure 1, Uruguayan participants with a *high promotion focus* were significantly more persuaded when given the positively framed message ($M = 6.65$) than when given the negative framed message ($M = 6.35$), $F(1, 75) = 4.00, p = .049$.

Spain

Within the Spanish sample, a 2 (Message Framing) X (Promotion focus) ANOVA on intention to perform OHB showed a significant Message Framing by Promotion focus interaction [$F(1, 71) = 5.86, p = .018$]. This model neither revealed a main effect of Message Framing [$F(1, 71) = .59, p = .45, ns$] nor of Promotion focus [$F(1, 71) = 2.25, p = .14, ns$]. Using the same procedure outlined above, Figure 1 showed that Spanish participants with a *low promotion focus* were significantly more persuaded when given the positively framed message ($M = 7.33$) than when given the negative framed message ($M = 6.12$), $F(1, 71) = 5.25, p = .025$. We also examined if the effects remained the same when controlling for education and prevention focus, and that appeared indeed to be the case.

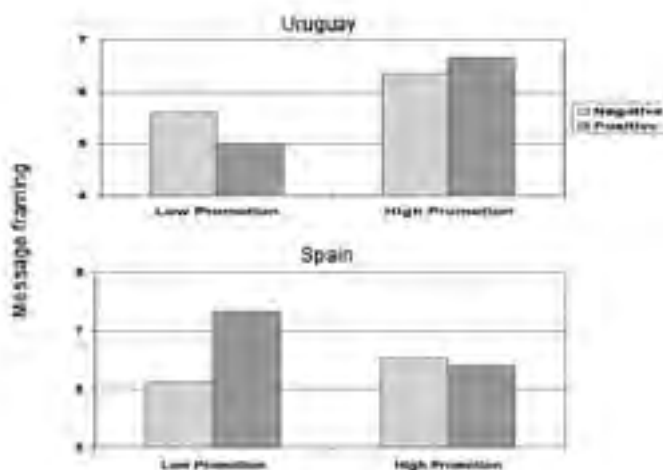


FIGURE 1. The effect of Message Framing and Promotion on Intention to perform OHB

Prevention focus as moderator

Uruguay

Within the Uruguayan sample, a 2 (Message Framing) X 2 (Prevention focus) ANOVA on intention to perform OHB revealed a marginally significant main effect of Prevention focus [$F(1, 75) = 3.44, p = .067$], indicating that the participants who were higher prevention focused tend to have significantly higher intention to perform oral hygiene self practices. This model did neither show a main effect of Message Framing [$F(1, 75) = 1.77, p = .19, ns$] nor was the interaction between Message Framing and Prevention focus significant [$F(1, 75) = .01, p = .93, ns$]. After a “low” and a “high” prevention focus group were modeled by using the procedure outlined earlier, Figure 2 showed that none of the contrasts were significant.

Spain

Within the Spanish sample, a 2 (Message Framing) X (Prevention-focus) ANOVA on intention to perform OHB revealed a strongly significant Message Framing by Prevention-focus interaction [$F(1, 71) = 9.12, p = .004$]. This model did neither show a main effect of Message Framing [$F(1, 71) = 1.10, p = .30, ns$] nor of Prevention [$F(1, 71) = 2.69, p = .11, ns$]. Using the same procedure outlined earlier, Figure 2 showed that Spanish participants with a low prevention focus were significantly more persuaded when given the positively message ($M = 7.28$) than when given the negative message ($M = 5.94$), $F(1, 71) = 8.49, p = .005$. For participants with a high prevention focus there was no significant difference in message framing on intention to perform OHB [$F(1, 71) = 1.68, p = .20, ns$]. Again, we also examined if the effects remained the same when controlling for education and prevention focus, and that appeared indeed to be the case.

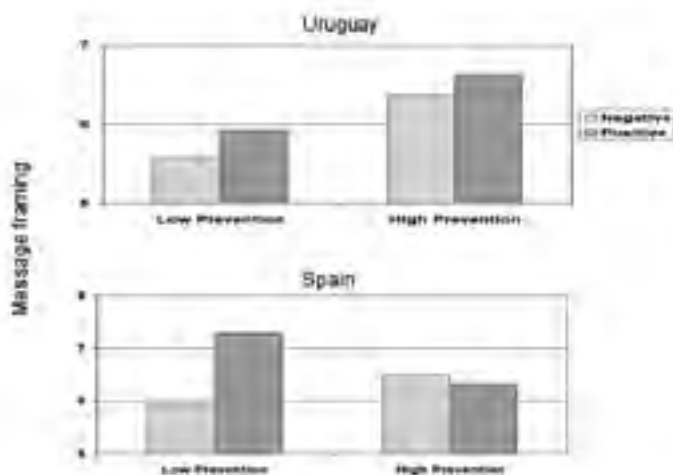


FIGURE 3 The effect of Message Framing and Prevention on intention to perform OHB

Education as moderator

Uruguay

Within the Uruguayan sample, a 2 (Message Framing) X (Education) ANOVA on intention to perform OHB revealed a strongly significant Message Framing by Education interaction [$F(1, 74) = 8.19, p = .005$]. This model neither showed a main effect of Message Framing [$F(1, 74) = 1.33, p = .25$ ns] nor of Education [$F(1, 74) = .37, p = .55$, ns]. Again, the planned contrast was conducted to find the meaning of the 3-way interaction in the saturated model. Therefore, in the following analysis a new created measure of education, as described earlier, was used. As shown in Figure 3, T-tests revealed that Uruguayan participants with a high level of education were significantly more persuaded when given the positively message ($M = 6.71, SD = .73$) than when given the negative message [$(M = 5.57, SD = 1.92); t = 2.44, p = .02$]. For participants with a low level of education there was no contrast of message framing on intention to perform OHB [$(M = 6.08, SD = 1.16$ vs. $M = 6.54, SD = .61$); $t = -1.51, p = .14$, ns].

Spain

Within the Spanish sample, a 2 (Message Framing) X (Education) ANOVA on intention to perform OHB revealed a marginally significantly main effect of Message Framing [$F(1, 71) = 3.59, p = .06$]. The main effect of Message Framing was qualified by a significant Message Framing by Education interaction [$F(1, 71) = 3.99, p = .05$]. There was no main effect of Education [$F(1, 71) = .52, p = .47$, ns].

As shown in Figure 3, T-tests revealed that Spanish participants with a low level of education were significantly more persuaded when given the positively message ($M = 6.71, SD = .49$) than when given the negative message ($M = 6.14, SD = 1.38$); $t = 2.12, p = .04$]. For the participants with a high level of education ($N = 15$) there was no contrast of message framing on intention to perform OHB [$(M = 5.79, SD = 2.04$ vs. $M = 6.57, SD = .88$); $t = -.94, p = .37$, ns].

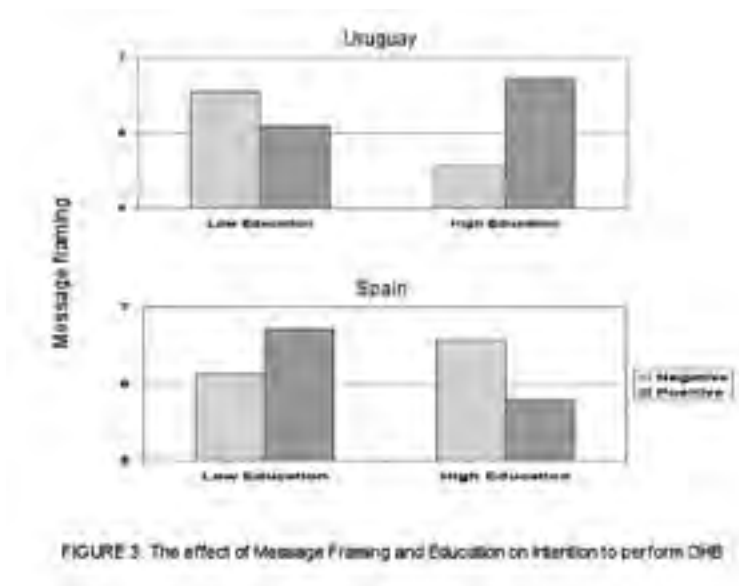


FIGURE 3: The effect of Message Framing and Education on intention to perform OHB

Discussion

The present study aimed to explore the persuasive effects of positively and negatively framed messages in promoting OHB, taking into account possible moderators: promotion focus and prevention focus, level of education and country (Uruguay and in Spain).

The manipulation check revealed that the positively framed message and the negatively framed message were successfully formulated: The positive message was perceived as more positive than the negative message, and these message perceptions differed not by country (Uruguay versus Spain). Thus, there was a basic agreement between participants in both countries about the valence of the messages.

With regard to persuasion, the expected matching effects related to regulatory focus were only found in Uruguay with regard to promotion focus. In Spain and with regard to prevention focus no matching effects could be detected. With regard to level of education, only the finding that low educated (supposedly low involved) participants in Spain were most persuaded by the positive frame was in line with our theorizing on level of processing.

In addition, country showed to be a relevant moderator of framing effects: There were significant differences in message framing effects between the Uruguayan and Spanish samples. First, the positively framed message was more effective among Uruguayan participants with a high promotion focus, but among Spanish participants with a low promotion focus. Second, while in both countries the effect of message framing on intention to perform OHB depended on promotion focus, only in Spain the effect also depended on prevention focus in that among participants low in prevention focus, the positively framed message was more effective.

Third, Uruguayan participants with a high level of education, and in contrast, Spanish participants with a low level of education were more persuaded by the oral health message, when given the positively framed message than when given the negatively framed message.

One relevant observation is that in Uruguay, promotion nor prevention focus significantly moderated the effects of framing, as indicated by the lack of significant two-way interactions between regulatory focus and framing. In contrast, in Spain both regulatory focus dimensions did significantly moderate the framing effects. With regard to level of education, the two-way

interaction in both countries was significant. Thus, the state of mind of promotion or prevention seemed to have more complex effects in Spain.

The results also show that for Spanish participants with a strong focus on either promotion or prevention, the type of framing of the message did not matter. It seems that these participants, who are already oriented towards taking care of their oral health one way or another, do not need a particular message to convince them of the importance of oral hygiene self-care practice. Only Spanish participants who were low in either a promotion or prevention focus seemed to be sensitive to the type of framing in persuasive messages. They responded less favourably to the negatively framed message than to the positively framed message. A possible explanation is that both health-specific measures of regulatory focus are parameters of involvement in health issues. Thus, these Spanish participants may have been less involved in oral health and have fewer goals to attain or maintain a good oral health. This could explain why they were more persuaded by a positively framed text: These Spanish participants might have engaged in more peripheral processing of the persuasive messages (Petty and Cacioppo, 1986) and the positivity of the message may have worked as a peripheral cue (Dijkstra et al., 2009; Maheswaran and Meyers-Levy, 1990; Martin and Marshall, 1999). The finding that, only in Spain, low educated participants were also more persuaded by the positive frame might be explained in a similar way, by assuming that they were low involved and, therefore, processed the messages peripherally.

All taken together, the findings cannot easily be explained and several assumption must be made about the level of processing and to the extent that our measures of regulatory focus and level of education are indices of the level of processing. However, at the least it is safe to conclude that both measures of regulatory focus, level of education, and country are involved in determining what message frame is the most effective.

Because oral health behavior is a so called “preventive behavior” (Rothman and Salovey, 1997), on the basis of Prospect Theory it might be expected that, overall, the positive framing would be more effective. However, the overall main effect of framing was not significant. But when a significant difference between the positively and the negatively framed message was present, in all cases the positively framed message was more effective in changing the intention to perform OHB than the negatively framed message. Thus, the underlying idea that when people are exposed to a promise of positive outcomes, they will “play on safe” was only true under certain conditions.

One particular feature of the present study was that, unlike most research in the oral health area (Mann et al., 2004; Rothmann et al., 1999; Sherman et al., Uskul and Oysermann, 2009), a message promoting an extensive set of OHB as recommended by dental professionals was used (Buunk-Werkhoven, Dijkstra, Van der Schans, Jaso, Acevedo, and Parodi Estellano, 2008). Such behavior includes tooth brushing (with respect to details like frequency, time of brushing, measures of force, duration in minutes, method, and use of fluoride toothpaste), interdental cleaning (the use of floss, tooth sticks, interdental brushes), and tongue cleaning. Because this behavior is more difficult to practice than the isolated oral behaviors that mostly have been studied (e.g., only flossing), the effects may differ. For example, with regard to the effects of negatively framed outcomes, stronger resistance to the message might be expected when the task is perceived as more difficult (Van’t Riet, Ruiters, Werrij and De Vries, in press). This study has some limitations. An important theoretical framework was the Regulatory Focus Theory (Higgins, 1997, 1998). However, the positively framed message contained gains as

well as non-losses, while the negatively framed message contained losses as well as non-gains. Thus, similar to Uskul et al., (2009a), our messages were especially framed according to the valence of the outcomes (positive versus negative) and not so much according to the type of the outcome (gain versus loss). This operationalization is not entirely in line with Regulatory Focus Theory. However, because of this way of framing, the messages were highly naturalistic, presenting actual outcomes in a natural way.

Another limitation is related to country as a moderator. In the context of this study on persuasion it is not clear how country (Uruguay and Spain) would moderate effects of framing. Country must have been a rough indicator of some psychological state or mechanisms that had moderating power with regard to framing. The differences between Uruguay and Spain are probably related to the differences in national income, expenditure on health and dental health. These contextual differences are mainly related to poverty and richness, indicating that a low income may be related to less health care facilities, which occurred in Uruguay more than in Spain (WHO, 2009). In addition, these structural environments may shape different cultures that should explain psychological differences in the processing of framed messages.

To conclude, although the precise reasons for the differences between Uruguay and Spain and the other moderators need further investigation, the findings of the present study highlight the fact that the effect of message framing may strongly depend in contextual characteristics. This was illustrated in a naturalistic setting. The current findings not only pose a theoretical challenge, but also support the well-established fact that tailored oral hygiene self-care intervention including exhaustive framed messages may be more effective than a so called ‘one size fits all’-approach.

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Summary and Discussion

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Introduction

In the present thesis the first theme concerned the determinants of oral hygiene behavior (OHB) in different samples in diverse contexts. Firstly, the study in chapter 2 was designed to develop an index for OHB and to do a first assessment of how OHB can be predicted on the basis of the Theory of Planned Behavior (TPB). Based on the findings of this study, the studies presented in the chapters 3, 4, and 5 were designed to examine OHB by using the TPB in diverse contexts, including recruits in the Dutch Army, dental care seekers in the Caribbean and in Nepal, and dental patients in Uruguay. In order to increase oral hygiene self-care behavior, interventions should target the determined predictors of OHB. As a central theme of these four cross-sectional studies, this part of the thesis explored whether the determinants of OHB were the same or different in various contexts. The second theme of the present thesis – dealt with in chapters 6 and 7 – concerned the psychological factors related to Oral Health-related Quality of Life (OH-QoL) as assessed by the Dutch version of the Oral Health Impact Profile-14 (OHIP-14-NL) in different contexts, including imprisoned forensic psychiatric patients, students with relatively little experience with dental care, and dental patients with substantial experience with dental care or with dental pathology. The third theme of the present thesis concerned the effects of interventions aimed at improving OHB. In the first study of chapter 6, the effect of oral health care in a forensic psychiatric clinic was examined. The case report in chapter 8 demonstrated a short-time ‘effect’ of a tailored oral hygiene self-care intervention on a imprisoned forensic psychiatric patient’s OH-QoL. The experimental study in chapter 9 was set up to examine the effect of two different persuasive oral health messages in promoting OHB.

Following the PATH (Problem-Analysis-Test-Help) model (Buunk & Van Vugt, 2008) presented in chapter 1, this concluding chapter summarizes the results from the *Test Phase* by discussing the empirical findings in the light of the problem described in the *Problem Phase*, and the health psychological models and theories on health behavior mentioned in the *Analysis Phase*. Next, it presents the empirical findings of the current research in relation to the *Help Phase*, i.e. the practical implications for the development of tailored oral hygiene self-care interventions. The chapter ends with some recommendations for future research followed by a final conclusion.

Empirical findings and Theoretical implications

Oral hygiene behavior (OHB) and the Theory of Planned Behavior (TPB)

On the basis of a Delphi method, the first step in the study presented in chapter 2 entailed the development of a new oral hygiene behavior index (OHB index). Besides developing of the OHB index as a specific health outcome, the second step in this cross-sectional study included determining the predictors and the predictive power of the TPB (i.e., attitude, social norms, and perceived behavioral control), and two other variables, expected social outcomes (ESO) and oral health knowledge related to OHB (OHK). Participants were asked to fill out an Internet questionnaire. The results suggest that the OHB index is a useful method for assessing and evaluating actual oral hygiene self-care behavior of individuals. This index may be used in more theoretical research on the factors determining oral hygiene behavior, as well as in applied research in various contexts to assess the level of oral hygiene behavior.

Moreover, this OHB index maybe useful in clinical settings to assess and monitor the oral hygiene behavior of individual patients (chapter 8).

The validity of the OHB index was supported in chapter 2 by its correlations with all variables of the model of TPB as well as with expected social outcomes and oral health knowledge.

Overall, perceived behavioral control (PBC) was the best predictor, explaining - together with the other four predictors - a substantial amount of the variance (32,3%) in self-reported OHB.

This suggests that the most important factor underlying ineffective OHB, at least in the Dutch sample, is the feeling that one has little control over performing OHB adequately.

In sum, the findings are consistent with the findings of meta-analyses that PBC is a major determinant of a wide range of health behaviors, including oral hygiene self-care behavior (Armitage & Conner, 2001; Defranc, Van den Broucke, Leroy, Hoppenbrouwer, Lesaffre, Martens, Debyser & Declerck, 2008; Godin & Kok, 1996; McCaul, Glasgow & Gustafson, 1985; McCaul, O'Neill & Glasgow, 1988; McCaul, Sandgren, O'Neill & Hinsz, 1993; Renz, Ide, Newton, Robinson & Smith, 2007).

The expanded TPB determinants of OHB were examined in a number of contexts in the Netherlands and abroad. The study reported in chapter 3 showed that among the recruits in Dutch Army ground forces the intention to perform OHB was predicted independently by PBC and attitude. For actual OHB, attitude was the only significant predictor. In the studies reported in chapter 4, OHB of dental care seekers appeared to be determined by attitude and social norms (SN) in the Caribbean (Aruba and Bonaire), and by PBC and ESO in Nepal.

Furthermore, the results of chapter 5 showed that OHB among Uruguayan dental patients was, like in the Caribbean, determined by attitude and SN. Thus, in most contexts, attitudes toward adequate OHB and oral hygiene self-care as well as the perceived norms of relevant others toward such behaviors may be considered as important determinants of OHB. However, while the TPB thus seemed a useful approach to study OHB, the relative importance of the various determinants in predicting OHB strongly diverged between contexts. Especially noteworthy is the finding that in Nepal, attitude en social norms were not related to OHB. This may suggest that in developmental countries rational decision making with respect to OHB, and maybe with respect to health behavior in general, is less pronounced than in developed countries.

The fact that not all three TPB variables, contributed in all contexts to the prediction of OHB, does not imply a lack of the TBP model. An explanation could be that the determinants of the model have a differential impact on the intention to perform OHB depending on the stage in the behavioral change phase of the individuals in the diverse contexts (Prochaska & DiClemente, 1992). Specifically, it may be that people in Nepal are still in the pre-contemplation or may be in the contemplation phase in which it is first important to enhance the knowledge about adequate OHB, and to give instructions on how to perform adequate OHB. It seems likely that attitudes and social norms become only important once a certain level of knowledge about oral hygiene, and about how to improve it, is attained. In addition, in Uruguay the effect of social norms of the dentist and the family was especially strong. This may be due to a more hierarchal structure and collectivistic nature of this society. These findings suggest that in Uruguay, and probably in other countries too, it may be recommendable to incorporate the social influence exerted by dental professionals and the family may in interventions aimed at improving patients OHB (Adair, Pine, Burnside, Nicoll, Gillett & Anwar, 2004; Parodi, 2008).

The addition of two psychological variables to the TPB – OHK and ESO – proved useful: They were relevant determinants of OHB as well (chapter 2 and 4). This underlines that an open approach of researchers to the possibility of adding constructs to an existing model is necessary, certainly when the criterion behavior is studied in different contexts. To get insight into the variables that may be important in a given context, it is recommendable, before carrying out studies on determinants on OHB, to pay attention to possibly relevant values and practices related to the behavior under consideration. People with different cultural backgrounds may have quite different values and practices. For example, for the Nepalese, tooth brushing is part of their bath ritual and has primarily a symbolic meaning in the sense of fostering purity. Therefore, individuals in this culture may not be inclined to practice OHB as defined in this study when they do not feel able to do so (Godin, Maticka-Tyndale, Adrien, Manson-Singer, Willms & Cappon, 1996). Therefore, the methods and measures need to be made appropriate for diverse contexts, including populations not used to regular Western research methods (chapter 4 and 5).

Oral Health-related Quality of Life (OH-QoL)

The second theme in the present dissertation concerned the psychological factors related to OH-QoL. These determinants are important for the development and evaluation of oral health interventions as the individual's OH-QoL is often considered a relevant target of such interventions. Therefore, the psychological causes and effects of OH-QoL, as assessed with the Dutch Oral Health Impact Profile-14 (OHIP-14-NL) were examined in three different contexts.

The results of the first study in chapter 6 showed in a test-retest analysis that the psychometric qualities of the OHIP-14-NL scale were satisfactory. In addition, the results of the second study in the same chapter showed that self-perceived OH-QoL among forensic psychiatric patients was predicted jointly by dental anxiety and unhealthy dentition. Individuals with a high level of anxiety for dental treatment, and, independent thereof, a poor dentition, reported a lower OH-QoL. The studies reported in chapter 7 mapped the relations of general health perception, social factors, dental anxiety and oral hygiene behavior on the one hand with OH-QoL on the other hand. In the patient sample, the clinical variable dentition characteristic was added. The results showed that self-perceived OH-QoL among dental patients was predicted by dentition characteristics, ESO, and dental anxiety, whereas self-perceived OH-QoL among students was determined only by general health perception together with ESO. Thus, as was the case among forensic psychiatric patients, among dental patients dental anxiety was an important determinant of a low OH-QoL. Remarkably, among both dental patients and students, ESO was a relevant predictor of OH-QoL. However, among dental patients ESO were associated with a lower OH-QoL, whereas among students ESO were associated with a higher OH-QoL. Although not all relations could be interpreted unequivocally, the pattern of findings from chapters 6 and 7 illustrated that differences between the samples (forensic, experience with dental treatment and oral disease or not) influenced the psychological processes involved in OH-QoL. The case report described in chapter 8 showed that a Dutch forensic psychiatric patient's adequate OHB may have played an important role in the reduction of halitosis and in increased OH-QoL. Moreover, this study suggested that the retrospective version of the OHIP-14-NL may be an adequate method to assess self-perceived OH-QoL within a relative short period of time. In sum, the

relations of different variables with OH-QoL differed between samples. Thus, oral health interventions directed at increasing OH-QoL have to be adapted to populations in diverse contexts.

Although OH-QoL was predicted by a number of variables, it must be noted that the amount of explained variance (7.6%) was small, and that some of the seemingly relevant variables were hardly related to OH-QoL. In particular, OHB was not related to OH-QoL. Both possible explanations - inadequate oral hygiene behavior indirectly lowers OH-QoL and a low OH-QoL is a motivator of oral hygiene behavior - were not supported by the data. Despite the fact that the studies were conducted in a realistic setting, answers for these findings are not available yet, and these processes are still not well understood.

Moreover, the range in scores of OH-QoL was quite limited, and overall, individuals had a high level of OH-QoL (chapter 7). This suggests that the OHIP-14-NL measure may not be optimal for assessing OH-QoL. This measure seems to assess primarily if one is satisfied with one's teeth. In addition, one may wonder if quality of life (QoL) is a very relevant concept in the context of oral health care and whether the experiential aspects of oral health are not better understood through explicit measures of, for example, dental pain and dental anxiety. In addition, people are in general not very aware of their OH-QoL; moreover, they may often adapt to dental limitations, handicaps and impairments, and may not notice these any longer. It is therefore not yet completely clear how relevant this measure is for the clinical practice.

Persuasive health communication and OHB

The third, and final, theme of the present thesis concerned the effects of interventions aimed at improving OHB. In chapter 6, the effect of oral health care in a forensic psychiatric clinic was examined. Although the study did not include a control group, the findings did suggest that oral health care in this context may improve the perceived OH-QoL among imprisoned forensic psychiatric patients. In addition, a case report of the effects of an oral hygiene self-care intervention with one patient (chapter 8), suggested that such an intervention may be quite effective in reducing halitosis, and in improving OHB. These results were only descriptive. The study reported in chapter 9 was set up to examine in a more controlled way the effects of oral health care interventions. Specifically, this study assessed the extent to which the persuasive effects of positively and negatively framed messages designed to promote OHB, were moderated by two individual difference measures (regulatory focus and level of education) and a contextual difference (country). The results showed that regulatory focus and level of education moderated the persuasive effects of both message frames in a naturalistic setting; in the dental clinic of the dental school. A positively framed message was especially persuasive among individuals with a promotion focus, strongly oriented toward the benefits of a good health in general. This effect was more pronounced in Uruguay than in Spain. Although not all results patterns could be explained satisfactorily, the patterns strongly suggest that messages tailored to individual differences and contexts may be particularly effective.

Moreover, the results suggest that, if one would have to use a single approach, the preferred default option would be to emphasize the benefits of having healthy teeth rather than emphasizing the costs and possible negative outcomes of unhealthy teeth, for instance cavities and bad smell. This is in line with the evidence that, in general, gain-framed

messages produced greater increases in attitude, intentions, and behaviors than loss-framed messages (Fink, 2008; Rothmann, Martino, Bedell, Detweiler & Salovey, 1999; Sherman, Updegraff & Mann, 2008).

Limitations

The studies reported in the present thesis, have several limitations concerning design, population selection, contextual issues, self-reported OHB, and generalizability. While most studies in social psychology are experimental, most real life settings and field studies in this thesis contain cross-sectional data (self-report indicators are related to OHB and OH-QoL as measured by self-report questionnaires). This implies that the resultant correlations between the variables may not indicate a causal association, whereby one variable causes another. However, as the main aim of this thesis was to explore and test the psychological factors related to OHB and OH-QoL, the cross-sectional character of most studies serves this purpose rather well.

Other limitations refer to the representativeness of the samples, especially in terms of gender, age, marital status, and level of education. The large proportion of female participants (more than two-third of the samples) in the samples presented in chapter 2, 7, and 9, and the predominantly male participants (92% to 100%) in the samples presented in chapter 3 and 6 may have biased some of the results. Other characteristics among the different samples were diverse too, indicating that the findings in, for example, a selective sample of mainly relatively young, high-educated, unmarried women (chapter 2 and 7) versus a selective sample of mainly relatively older, low-educated, imprisoned men (chapter 6), cannot, by definition, be considered representative of the different populations they were recruited from. Although the Uruguayan sample (chapter 5) seemed quite representative regarding various socio-demographic variables, the fact that they were relatively highly educated compared with the general population living in the country side, may have influenced the results of the persuasive health communication research (chapter 9). Finally, the qualitative and descriptive nature of the case report presented in chapter 8 must be appreciated as a clinical sample focusing on the psychological and behavioral aspects of OHB and OH-QoL. Nevertheless, despite the above limitations, the data gathered in this thesis were appropriate to explore the sample differences in the context of future development of tailored OHB interventions, adapted to the specific populations in diverse contexts.

Practical implications

The results of the present thesis may have several practical implications. First, the expanded TPB model and the conceptual model of OH-QoL included in the process model may be helpful perspectives to guide practice in OHB and related QoL. Moreover, with the help of the valid and reliable produced questionnaires used in this thesis to measure the concepts featured in the models, the determinants of OHB and OH-QoL can be identified and targeted for preventive interventions among populations in diverse contexts. The specific associations of the determinants of OHB and OH-QoL should be considered when designing practical recommendations for improving OHB and OH-QoL in developing and underdeveloped countries. Given the fact that most individuals, the young ones as well as the elderly, take care of their teeth and pay attention to their oral hygiene self-care practices based on their own knowledge and skill's, the present thesis may help to examine and understand why

determinant-analyses are important to get insight in the motivation to perform adequate OHB. In general, the results suggest that, in order to increase oral hygiene self-care behavior, interventions should in some populations or in some contexts target not only the well-known determinants from the TPB and OHK, but especially the target individual's ESO of having healthy teeth.

In addition, the findings can be used to develop specific strategies or tailored oral hygiene self-care interventions. For oral health professionals it may be fruitful to evaluate if a person is promotion or prevention focused. Before screening or during intake the individual may complete the *promotion-prevention focus* scale used in this thesis. After the dental hygienist or dentist determine the individual's motivation and focus, the information can be framed accordingly. The information could emphasize either the positive outcomes of OHB or the negative outcomes, tailored to the individuals' preference and focus. In addition, feedback about oral hygiene self-care to motivate individuals can be given by using the internet to stimulate and monitor their personal oral hygiene.

Recommendations for future research

The results of the studies suggest recommendations for future research with respect to the design. Future studies should take us one step further, using longitudinal and experimental studies in diverse populations. Especially, it seems important to examine whether the determinants found in several studies are actual causes of OHB and OH-QoL in the specific target group. In addition, the provided insights ask for future investigation that should address whether the identified psychological factors and the specified message framing for OHB advices in the different populations in diverse contexts do actually increase populations' OHB and OH-QoL. For example, potential target groups such as youth, adolescents, adults, elderly or disabled people ask for specific approaches which fit their preferences and needs. After all, OHB and OH-QoL are highly individualized concepts, the perception of which are affected by individuals' cultural background and socio-economical status. In addition, on the basis of the principle of target group segmentation (Ahmad, 2003) not only the causes and effects of OH-QoL, but also of OHB must be studied in each segment that will be targeted (Baker, 2007). Moreover, it would not only be interesting, but also important for future research to examine the persuasive communication effects among various groups in diverse contexts (Sherman et al., 2008).

The Final Perspective

The type of research reported in this thesis is only one form of applied research in the field of social psychology. Typically, it addressed a real-life topic (oral health), it focused on relevant outcomes (OHB and OH-QoL), in other populations than only academic students. The research in the present thesis must be understood against the background of the state-of-the-art in the scientific and practical psychology of oral health behavior: Although our scientific knowledge on, for example, dental fear is substantial, the scientific knowledge on especially the psychological determinants of OHB is rather poor. Moreover, the practice of the development of oral health promotion interventions needs input on the important issue of target group segmentation or tailoring. The research in this thesis aimed to provide scientific knowledge to inspire further scientific research on the psychology of oral health as well as to inspire the practice of oral health promotion. As most chapters have been published, or

will be published soon, it can be expected that at least a part of the knowledge gathered in this thesis will find its way to scientists and practitioners.

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Nederlandse samenvatting
(Summary in Dutch)

“Het juiste poetsgedrag is een behoorlijk complexe activiteit, waarbij je nooit weet of je het goed doet.”

Bram Buunk ('Wij zijn geen Neanderthalers'. In: *Nederlands Tijdschrift voor Mondhygiëne*, 2007 nr. 8 p. 28)

Nederlandse samenvatting

Achtergrond

Er zijn verschillende definities van het begrip mondgezondheid bekend. In dit proefschrift is mondgezondheid gedefinieerd als “de mate van gezondheid van orale en omringende weefsels, waarmee het individu zonder actieve ziekten, ongemak of schaamte kan spreken en zich kan voortbewegen in de sociale context, en dat bovendien bijdraagt aan een algemeen welbevinden” (Kay en Locker, 1997, p. 8). Volgens Locker is mondgezondheid een essentieel aspect van de algemene gezondheid, en draagt om die reden dan ook essentieel bij aan iemands eigen waargenomen kwaliteit van leven.

In recente rapporten wordt het belang van de algemene gezondheid en persoonlijke verzorging, en in het bijzonder van mondgezondheid en mondhygiëne, wereldwijd onderkend. Echter, diverse programma's en interventies van gezondheidsorganisaties, verenigingen en centra die zich richten op preventie en voorlichting op het gebied van mondgezondheid lijken minder effectief te zijn dan aanvankelijk gedacht. Preventie activiteiten en voorlichtingscampagnes lijken bij te dragen aan het verlagen van de prevalentie van mondgerelateerde ziekten, maar blijken niet alle doelgroepen te bereiken. Cariës is nog steeds het grootste probleem in geïndustrialiseerde landen, vooral onder kinderen (60%-90%) en onder een behoorlijk deel van de volwassenen. Hoewel het verliezen van tanden en kiezen vaak wordt beschouwd als een natuurlijk proces behorende bij het ouder worden, is het percentage tandenloze personen ouder dan 65 jaar relatief hoog in sommige landen.

Er is de laatste jaren sprake van een heroriëntatie van bestaande mondgezondheidsprogramma's; van een vooral curatieve benadering naar een meer toegepaste 'evidence-based' benadering voor het bevorderen van mondgezondheid en voor preventie op het gebied van de persoonlijke mondverzorging. Om deze doelgerichte en effectieve interventies te kunnen ontwikkelen is specifieke informatie nodig over het mondhygiënegedrag en de determinanten van mondhygiënische zelfzorg in de diverse contexten.

Algemeen Overzicht

Dit proefschrift bevat drie thema's, waarbij hoofdstuk 1 een uiteenzetting geeft van de aanleiding om een toegepaste 'evidence-based' benadering vanuit sociaal-psychologisch perspectief te hanteren voor de ontwikkeling van effectieve mondhygiëne interventies. Voor het oplossen van het 'mondzorg-probleem' door middel van gedragbeïnvloeding is in dit proefschrift een stapsgewijze PATH methode (Problem-Analyse-Test-Hulp) gebruikt. Deze methode bestaat uit vier fundamentele stappen: 1) het formuleren van een probleemstelling; 2) de selectie voor theoretisch gefundeerde verklaringen voor het probleem; 3) empirische toetsing van een procesmodel en 4) het ontwikkelen van een interventieprogramma.

De hoofdstukken in dit proefschrift zijn gecentreerd rond drie thema's. Thema 1 betreft de determinanten van mondhygiënegedrag in de diverse contexten. De studies in dit proefschrift over dit thema zijn gebaseerd op het model van beredeneerd gedrag. Dit model richt

zich primair op gedragingen waarvoor het individu een keuze kan maken, inclusief de attitude (houding), de sociale normen (sociale druk) de en de waargenomen gedragscontrole (eigen effectiviteitsverwachting), die op hun beurt de intentie om tot een gedrag over te gaan bepalen. Hoofdstuk 2 beschrijft de ontwikkeling van een index voor mondhygiënegedrag en de toetsing ervan met het model van beredeneerd gedrag. De hoofdstukken 3, 4 en 5 behandelen respectievelijk de determinanten-studie van mondhygiënegedrag in diverse contexten, te weten bij Nederlandse militairen, mondzorg cliënten/patiënten op Aruba en Bonaire en in Nepal en in Uruguay.

Thema 2 in dit proefschrift betreft de psychologische factoren (gedragsmatige determinanten) van mondgezondheid in relatie tot kwaliteit van leven. De studies in dit proefschrift over dit thema zijn gebaseerd op een model dat veronderstelt dat mondgerelateerde ziekten kunnen leiden tot allerlei beperkingen op verschillende dimensies, en als gevolg daarvan kunnen resulteren in een lagere kwaliteit van leven. De hoofdstukken 6 en 7 beschrijven respectievelijk de kwaliteit van leven gerelateerd aan mondgezondheid van forensische psychiatrische patiënten, van eerstejaars psychologie studenten en van mondzorg patiënten.

Thema 3 betreft de effecten van interventies die gericht zijn op verbetering van de mondhygiëne. Het eerste deel van hoofdstuk 6 (studie 1) beschrijft het effect van een mondhygiëne interventie bij forensische psychiatrische patiënten. Hoofdstuk 8 beschrijft een casus van een forensische psychiatrische patiënt en hoofdstuk 9 beschrijft het effect van twee verschillende overredende voorlichtingsboodschappen ter bevordering van het mondhygiënegedrag.

De data voor de 12 studies zijn verzameld door middel van schriftelijke vragenlijsten, waarbij enkele semi-gestructureerde mondelinge interviews zijn uitgevoerd.

Determinanten van mondhygiënegedrag: een studie gebaseerd op het model van beredeneerd gedrag.

Hoofdstuk 2 beschrijft de ontwikkeling van de index van mondhygiënegedrag en verschaft inzicht in de determinanten van dit gedrag middels een cross-sectionele kwantitatieve studie. Het doel van deze studie was tweeledig: Ten eerste het ontwikkelen van een index voor mondhygiënegedrag door middel van het toepassen van een consensus methodiek. Deze index bevat allerlei details van het tandenpoetsen, inclusief het gebruik van interdentale hulpmiddelen en tongpoetsen. Ten tweede het onderzoeken van de determinanten van het mondhygiënegedrag met behulp van het model van beredeneerd gedrag. 487 mannen en vrouwen vulden een vragenlijst in over hun attitude, sociale normen, en waargenomen gedragscontrole. Ook werd gevraagd naar hun kennis gerelateerd aan mondverzorging en hun verwachte sociale uitkomsten van het hebben van een goed gebit; deze twee aanvullende metingen zijn meegenomen in de toetsing. Positieve houding ten aanzien van mondhygiënegedrag, sociale druk om een goede mondhygiëne uit te voeren, waargenomen gedragscontrole en kennis over de mondverzorging waren de belangrijkste voorspellers van het uitvoeren van een persoonlijke adequate mondhygiëne. Het model van beredeneerd gedrag samen met kennis verklaarde ruim 32% van de geobserveerde variantie van het actuele mondhygiënegedrag. Op basis van deze resultaten kan geconcludeerd worden dat de nieuwe index een bruikbare methode is voor het meten en evalueren van iemands persoonlijke mondhygiëne. Bovendien blijkt een sociaal-cognitief gedragsmodel, in dit geval het model van beredeneerd gedrag, een eenvoudige methode om mondhygiënegedrag te voorspellen.

Promotie van mondhygiënegedrag van Nederlandse militairen.

In hoofdstuk 3 wordt een determinanten-studie gerapporteerd die is uitgevoerd onder 216 landmachtrekruten van het Nederlandse ministerie van Defensie. De meetinstrumenten voor deze studie zijn dezelfde als in het onderzoek in hoofdstuk 2. Gedurende een vaccinatieprogramma vulden de militairen een vragenlijst in. Positieve houding ten aanzien van mondhygiënegedrag en waargenomen gedragscontrole waren de belangrijkste voorspellers van de intentie om een adequate mondhygiëne uit te willen voeren. Het model van beredeneerd gedrag verklaarde ruim 37% van de geobserveerde variantie in de intentie. Het actuele mondhygiënegedrag werd alleen voorspeld door een positieve houding en verklaarde slechts 7% van de variantie van het feitelijke gedrag. Voor het ontwikkelen van een interventie om de mondhygiëne te verbeteren kan het volgende worden geconcludeerd: In hoeverre de rekruten zichzelf inschatten in staat te zijn om het gewenste mondhygiënegedrag uit te kunnen voeren, verklaart 30% van de geobserveerde variantie in de intentie tot mondhygiënegedrag. Dit betekent dat binnen een interventie het vooral belangrijk is om te focussen op het bevorderen van waargenomen gedragscontrole, opdat de militairen een adequate mondhygiëne kunnen uitvoeren. Bovendien draagt het bevorderen van een positieve houding van de militairen tegenover mondhygiëne ook bij aan de gewenste gedragsverandering.

Determinanten en promotie van mondhygiënegedrag in het Caribische gebied en in Nepal.

Hoofdstuk 4 beschrijft twee determinanten-studies die uitgevoerd zijn in twee verschillende culturele contexten, te weten, in het Caribische gebied (op Aruba en Bonaire) en in Nepal. Om te onderzoeken of het model van beredeneerd gedrag ook toegepast kan worden in niet-westerse landen, is de gebruikte methode afgestemd en in overeenstemming gebracht met oppervlakkige of perifere cultuur kenmerken. Op Aruba en Bonaire vulden in totaal 112 cliënten de vragenlijst voorafgaand aan de behandeling in de wachtkamer in. Voor het veldonderzoek in Nepal is de vragenlijst naar het Nepalees vertaald en zijn bij 39 Nepalese deelnemers semi-gestructureerde interviews afgenomen. Tijdens een tandheelkundig kamp werden de vragenlijsten voorafgaand aan de screening door 69 deelnemers zelfstandig ingevuld. In het Caribische gebied waren een positieve houding ten aanzien van mondhygiënegedrag en de sociale norm, dus de sociale druk om het gebit beter te verzorgen de belangrijkste voorspellers. In Nepal werd het actuele mondhygiënegedrag voorspeld door de waargenomen gedragscontrole en de verwachte sociale uitkomsten van het hebben van een goed gebit. Op basis van deze resultaten kan geconcludeerd worden dat voor deze twee contexten verschillende interventies dienen te worden ontwikkeld. Daarnaast demonstreert dit onderzoek hoe het model van beredeneerd gedrag kan worden toegepast in niet-westerse landen, waarbij is aangetoond dat het model in een ontwikkelingsland ook als een sociaal-cognitief basismodel een toepassingsmogelijkheid heeft.

Evaluatie en promotie van mondhygiënegedrag van patiënten in Uruguay.

In hoofdstuk 5 is het model van beredeneerd gedrag voor de determinanten-studie toegepast zonder de meting van de waargenomen gedragscontrole. Het onderzoek is uitgevoerd onder 80 cliënten van de tandheelkunde faculteit aan de Katholieke Universiteit in Montevideo, Uruguay. Voor dit onderzoek is de methode afgestemd en in overeenstemming gebracht

met de voor Uruguay geldende cultuur kenmerken en is de vragenlijst in het Spaans vertaald. De vragenlijst werd door cliënten voorafgaand aan de behandeling door de studenten ingevuld. De belangrijkste gedragsdeterminanten die een rol spelen in de verandering van het mondhygiënegedrag zijn een positieve houding ten aanzien van de persoonlijke mondhygiëne en de normen om het gebit beter te verzorgen en sociale steun van de tandarts en de familie. Samen werd bijna 22% van de geobserveerde variantie van het actuele mondhygiënegedrag verklaard. De resultaten suggereren dat in deze populatie een interventie ontwikkeling om de mondhygiëne te verbeteren dient te focussen op iemands attitude, en dit vooral te laten benadrukken door mondzorg professionals en de familie.

Kwaliteit van leven gerelateerd aan mondgezondheid van forensische psychiatrische patiënten.

Studie 1 in hoofdstuk 6 had tot doel om te onderzoeken of professionele mondzorg van invloed is op de beleving van patiënten, waarbij het eigen gebit als een goed en als een belangrijk onderdeel van de algemene gezondheid zal worden ervaren. Zal door extra aandacht voor mondverzorging en een professionele gebitsbehandeling het gebitsbewustzijn van forensische psychiatrische patiënten toenemen en het zelfzorggedrag verbeteren? Het onderzoek verschaft inzicht in hoeverre een mondhygiënische behandeling leidt tot een verbeterde kwaliteit van leven gerelateerd aan mondgezondheid, dat wil zeggen tot minder fysieke, sociale en psychologische beperkingen ten gevolge van de toestand van het gebit. 40 mannelijke patiënten in het forensisch psychiatrisch centrum Dr. S. van Mesdag te Groningen hebben tweemaal een Nederlandse vertaling van de Oral Health Impact Profile-14 (OHIP-14) vragenlijst ingevuld; voorafgaand aan de professionele behandeling en 3 maanden later.

Hoewel de interne betrouwbaarheid en de test-hertest correlaties van de OHIP-14 goed waren, lieten de resultaten geen significante verbeteringen zien. Echter, een algehele klinische observatie door de mondhygiënist suggereerde dat bij deze specifieke doelgroep aandacht voor mondverzorging en professionele gebitsbehandeling een positieve bijdrage kan leveren aan de kwaliteit van leven en het welbevinden. In studie 2 in hoofdstuk 6 vulden 39 mannelijke forensische psychiatrische patiënten een verbeterde OHIP-14-NL en andere vragenlijsten in. De belangrijkste determinanten van kwaliteit van leven gerelateerd aan mondgezondheid waren angst voor tandheelkundige behandelingen en een ongezonde mondsituatie. Samen werd bijna 28% van de geobserveerde variantie in kwaliteit van leven gerelateerd aan mondgezondheid verklaard. Op basis van deze resultaten kan geconcludeerd worden dat de OHIP-14-NL een bruikbaar instrument is voor het meten en evalueren van iemands kwaliteit van leven gerelateerd aan mondgezondheid. Verpleegkundigen binnen de forensische psychiatrie dienen bij het stimuleren van professionele mondzorg bezoek en bij het motiveren van de persoonlijke mondhygiëne, vooral aandacht te hebben voor angst voor tandheelkundige behandelingen.

Gedragsdeterminanten van kwaliteit van leven gerelateerd aan mondgezondheid hangt af van de populatie.

Hoofdstuk 7 richt zich op de determinanten en de effecten van kwaliteit van leven gerelateerd aan mondgezondheid. Processen die van invloed zijn op iemands welbevinden kunnen verschillen, afhankelijk van de context waarin iemand zich bevindt. Dit onderzoek beschrijft

de relaties tussen de algemene gezondheidsbeleving, sociale uitkomsten en verwachtingen, angst voor tandheelkundige behandelingen en het persoonlijke mondhygiënegedrag enerzijds en kwaliteit van leven gerelateerd aan mondgezondheid anderzijds. De data zijn verzameld door middel van het invullen van vragenlijsten in twee steekproeven: 1) eerstejaars psychologie studenten van de RUG, die relatief weinig ervaring hebben met tandheelkundige zorg en mondgerelateerde ziekten; 2) cliënten die in verhouding meer ervaring hebben en voor hun mondzorg naar het UMCG-Centrum Tandheelkunde en Mondzorgkunde kwamen. De resultaten lieten zien dat drie van de vier relaties verschillend waren voor de beide groepen. Angst voor tandheelkundige behandelingen was bijvoorbeeld in de cliënten steekproef wel een significante voorspeller van kwaliteit van leven gerelateerd aan mondgezondheid, maar in de studenten steekproef niet. Hoewel niet alle relaties eenduidig te interpreteren waren in dit cross-sectionele onderzoeksontwerp, zijn de bevindingen wel illustratief voor het belangrijkste verschil tussen de steekproeven. Namelijk het wel of geen ervaring hebben met tandheelkundige zorg en mondgerelateerde ziekten is van invloed op de psychologische processen gerelateerd aan kwaliteit van leven in relatie tot mondgezondheid. Geconcludeerd kan worden dat verschillende interventies ter verbetering van kwaliteit van leven gerelateerd aan mondgezondheid zodanig dienen te worden ontwikkeld, dat ze goed afgestemd zijn op de doelgroepen.

Halitose en kwaliteit van leven gerelateerd aan mondgezondheid: een casusbeschrijving.

Hoofdstuk 8 is een klinische casusbeschrijving van een 36-jarige mannelijke patiënt (meneer X.) in het forensisch psychiatrisch centrum Dr. S. van Mesdag. Het demonstreert een korte termijn effect van een afgestemde mondhygiëne interventie op halitose (een onfrisse adem) en op kwaliteit van leven gerelateerd aan mondgezondheid in drie sessies gedurende een periode van drie maanden. Een professionele mondhygiëne behandeling en een diepte-semi-structureerd interview werden door de mondhygiënist uitgevoerd. Hierbij werd gebruik gemaakt van diverse meetinstrumenten, zoals de OHIP-14-NL en de index van mondhygiënegedrag, de attitude ten aanzien van het mondhygiënegedrag en de verwachte sociale uitkomsten van het hebben van een goed gebit. Uit de procesevaluatie, inclusief een klinische observatie, komt naar voren dat meneer X. een verbeterde mondhygiëne had en de halitose was gereduceerd naar een sociaal aanvaardbaar niveau. Retrospectieve resultaten lieten zien dat de houding van meneer X. ten aanzien van de persoonlijke mondhygiëne en zijn kwaliteit van leven gerelateerd aan mondgezondheid waren verschoven in een positieve richting. Geconcludeerd kan worden dat deze casusbeschrijving de waarde van een professionele behandeling door de mondhygiënist benadrukt. Bovendien illustreert dit rapport dat een effectief uitgevoerde persoonlijke mondhygiëne een belangrijke rol speelt bij de reductie van halitose en in de waargenomen kwaliteit van leven in relatie tot mondgezondheid. Dit resultaat demonstreert dat de retrospectieve versie van de OHIP-14-NL een bruikbare methode is voor het meten en evalueren van iemands kwaliteit van leven gerelateerd aan mondgezondheid binnen een relatief korte periode.

Overredende communicatie ter bevordering van het mondhygiënegedrag in Uruguay en in Spanje.

Hoofdstuk 9 beschrijft een experimenteel interventieonderzoek, waarbij onderzocht is in hoeverre de overredende invloed van een positief of een negatief geformuleerde voorlichtingstekst over mondhygiëne verschilt onder cliënten in Uruguay en Spanje. Overredende voorlichtingsboodschappen hebben als doel om mensen te overtuigen hun mondhygiënegedrag te veranderen door professionele adviezen voor effectieve mondverzorging uit te voeren. In dit onderzoek werd de rol van individuele verschillen in promotie of preventie gerichtheid onderzocht. Tevens werd gekeken of verschillen tussen de landen en het opleidingsniveau van invloed zijn op de voorkeur voor een positief of een negatief geformuleerde voorlichtingstekst als overredende communicatie stijl. 155 deelnemers vulden een cultureel sensitieve vragenlijst met of een positief of een negatief geformuleerde voorlichtingstekst over mondhygiëne in; 80 cliënten van de tandheelkunde faculteit aan de Katholieke Universiteit in Montevideo, Uruguay en 75 cliënten van de tandheelkunde faculteit aan de Universiteit in Valencia, Spanje. De resultaten lieten zien dat promotie of preventie gerichtheid en het opleidingsniveau van invloed zijn op het overredende effect van de voorlichtingsboodschap en dat de richting per land verschillend is. Dit onderzoek suggereert dat, hoewel verklaringen voor het verschil niet eenduidig te geven zijn, overredende voorlichtingsteksten goed op de doelgroepen afgestemd dienen te worden. Concluderend kan worden gesteld dat een zogenaamde “one size fits all”- benadering niet effectief is voor een gewenste mondhygiënegedragverandering in diverse contexten.

Samenvatting en discussie

Het proefschrift sluit af met een samenvatting en een discussie, inclusief een algemene conclusie (hoofdstuk 10). Om vanuit sociaal-psychologisch perspectief een meer toegepaste ‘evidence-based’ benadering voor het bevorderen van mondgezondheid en preventie op het gebied van de persoonlijke mondverzorging te hanteren, is de stapsgewijze PATH methode een hanteerbare en goede methode om planmatig effectieve mondhygiëne interventies te ontwikkelen. De uitgevoerde onderzoeken laten zien dat het model van beredeneerd gedrag en de index van mondhygiënegedrag inzicht geven in de determinanten van dit gedrag in uiteenlopende contexten. Ook het model van mondgezondheid in relatie tot kwaliteit van leven is een bruikbaar model om inzicht te krijgen in de iemands beleving van mondgerelateerde ziekten, mondgezondheid en de mogelijke daarmee samenhangende consequenties. Samen met de verworven inzichten met betrekking tot overredende communicatie verschaft dit proefschrift informatie om op een systematische wijze belangrijke factoren te identificeren, die nodig zijn voor het ontwikkelen van doelgerichte en effectieve mondhygiëne interventies ter bevordering van mondhygiënegedrag en kwaliteit van leven gerelateerd aan mondgezondheid. Tot slot, preventie is de basis van mondhygiënische zorg. Een centrale positie van de mondhygiënist, die dé deskundige is op het gebied van preventie, communicatie en gedragsbeïnvloeding, is dan ook van essentieel belang binnen de gehele mondzorg.

Curriculum Vitae

Yvonne Andrea Bernadette Buunk-Werkhoven werd geboren op 27 januari 1967 te Gieten. Zij behaalde haar bewijs van bevoegdheid van mondhygiënist in 1989 aan de Akademie voor Mondhygiëne te Utrecht. Daarna werkte zij een aantal jaren in de parodontologie en in de algemene praktijk. In de periode 1995–2009 is zij als hogeschooldocent werkzaam geweest aan de Opleiding (Mondhygiëne) Mondzorgkunde (MZK) van de Hanzehogeschool Groningen (HG). Ook heeft zij als mondhygiënist in de polikliniek van het Centrum Tandheelkunde en Mondzorgkunde (UMCG) gewerkt en was zij van 2003 tot 2009 gedetacheerd naar het Forensisch Psychiatrisch Centrum Dr. S. van Mesdag te Groningen. Tijdens haar deeltijd-studie Psychologie was zij als docent/trainer betrokken bij de onderwijsactiviteit Studenten-rechtbank (Rechtenfaculteit/RUG) en haar afstudeeronderzoek ‘Tanden & Kiezen voor mijzelf en anderen’ ging over mondgezondheid, subjectief welbevinden en sociaal gedrag bij TBS patiënten. In februari 2005 is zij afgestudeerd in de Sociale Psychologie (nevenrichting Klinische Psychologie en vrije studie-onderdelen Rechtsgeleerdheid) aan de Rijksuniversiteit Groningen (RUG). Met een subsidie van ‘Zestor, arbeidsmarkt- en opleidingsfonds hbo’ (voorheen Stichting Mobiliteitsfonds hbo) heeft zij van 2005–2009 vanuit het Lectoraat Transparante Zorgverlening (HG) in samenwerking met de vakgroep Sociale Psychologie (RUG) een parttime promotie onderzoek uitgevoerd naar determinanten van mondhygiëne-gedrag in Nepal, Uruguay, Spanje en de Antillen, en in Nederland bij onder meer TBS patiënten en bij rekruten van de landmacht. In 2006 ontving zij de wetenschappelijke prijs van de VMTI. De afgelopen 5 jaar was zij niet alleen als promovenda lid van de kern- en onderzoeksgroep van het Lectoraat Transparante Zorgverlening, maar ook coördinator voor (inter)nationale stages binnen de opleiding MZK. Sinds januari 2010 doceert zij als psycholoog (coach/begeleider) binnen de opleiding Toegepaste Psychologie (HG). Zij zit in de redactieraad van het NTvM en is als kandidaat bestuurslid zeer betrokken bij de Nederlandse Vereniging van Mondhygiënisten (NVM). Vanaf eind 2007 participeert zij als NVM-commissielid in de projectgroep I: Onderzoek, voor het programma ‘Kies voor Gaaf!’ (een initiatief van de Nederlandse Maatschappij tot bevordering der Tandheelkunde, NMT).

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From a behavioral and social scientific perspective, the present thesis examined the determinants of oral hygiene behavior among different populations and in diverse contexts. In accordance with health psychological models and theories on health behavior, the findings suggest that for the promotion of oral hygiene behavior tailored oral hygiene self-care intervention may be more effective than a so called *“one size fits all”* - approach.

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