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, Huttenen-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, Vrahopolous, Souliotis, Silvestros & Vrotsos, 2002) - this variable was taken into account too (chapter 2, 3, and 4).

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).
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).
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 & Michaelis, 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 & Minichielo, 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.
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 build 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 generizability 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 Catholic 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 generizability 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.

References


Chapter 1. General Introduction


