Development and Validation of an Oral Health Values Scale

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Development and Validation of an Oral Health Values Scale

Cierra B. Edwards

Thesis submitted
to the Eberly College of Arts and Sciences
at West Virginia University

in partial fulfillment of the requirement of the degree of

Master of Science in
Psychology

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Abstract

Development and Validation of an Oral Health Values Scale

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Oral health values, the degree to which one demonstrates investment in improving or maintaining one’s dental status, are believed to vary across individuals. Oral health values may contribute to dental treatment utilization. By assessing differences in oral health values, researchers may be better able to explain differences in dental care treatment-seeking patterns. There is limited research, however, on measuring and evaluating oral health values. This study developed and validated a new Oral Health Values Scale (OHVS) that may be used in future research efforts to understand psychosocial barriers to treatment. The study provided evidence of content validity by having experts review item content related to relevance, representativeness, specificity, and clarity to the construct oral health values. Data from a developmental sample was used to further refine item content. The scale exhibited a four factor structure with high internal consistency. The psychometric properties of the final scale were confirmed in a second sample, although evidence for the OHVS’s four factor structure was mixed. Overall, the OHVS was consistently related to other oral health constructs in anticipated ways, providing evidence for convergent validity.
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Development and Validation of an Oral Health Values Scale

Oral health values can be defined as the extent to which one views dental status as important or meaningful, by dedication to improving or maintaining one’s teeth, gingiva (gums), and other aspects of orofacial functioning. Oral health values have been theorized to contribute to treatment-seeking behavior, with those with greater oral health values being more likely to attend dental appointments (Fisher-Owens et al., 2007; Patrick et al., 2006). A greater understanding of variation in oral health values may help explain differences in treatment utilization. In addition, oral health values may impact the extent to which an individual brushes, flosses, and maintains a healthy diet. Currently, only a handful of measures have been designed that measure patients’ perceptions toward dental care (Abrahamsson, Berggren, Hakeberg, & Carlsson, 2003; Moore, Berggren, & Carlsson, 2006), and they suffer from psychometric limitations. To understand oral health values, related constructs are first considered. Oral health, values, attitudes, oral health-related quality of life (OHRQoL), oral health locus of control, oral health literacy, and dental treatment utilization are each examined in turn. The current study aimed to develop an instrument to measure an individual’s perceptions about oral health and oral health-related behavior.

Oral Health

There is not a universal definition of oral health; however, most dental care professionals agree that there is a need to objectively define oral health and that this definition may include the presence or absence of oral disease and the impacts of oral disease on overall functioning (Glick & Meyer, 2014). In the past, health as applied to dentistry has been quite focused on the presence or absence of oral disease (Locker, 1988). Yewe-Dwyer (1993) defined oral health as “a state of the mouth and associated structures where disease is contained, future disease is inhibited, the
occlusion is sufficient to masticate food, and the teeth are of a socially acceptable appearance” (p. 245). This definition is largely based on a medical approach to oral health and does not account for all of the personal and social ramifications of poor oral health. A broader model that encompasses clinical aspects of health as well as biophysical and socio-medical concepts may be most useful when assessing oral disease and its consequences. Concepts of disease, impairment, functional limitation, discomfort, disability, handicap, and even death can be examined to form a more comprehensive framework of oral health (Locker, 1988; Locker, 1997). Such a model incorporates the functional impacts oral health has on an individual’s life, indicating that in oral health, as in overall health, improving a patient’s well-being and quality of life is an important goal (Hobdell, Petersen, Clarkson, & Johnson, 2003; Petersen, 2003).

Given the focus of defining oral health based on a biomedical model, it is not surprising that previous measures of oral health status primarily focused on objective measures of dental decay. For example, the Decayed, Missing, and Filled Teeth (DMFT) index was and continues to be a commonly used measure of oral health status (Namal, Vehid, & Sheiham, 2005). While these sorts of measures provide valuable information about the quality of an individual’s dentition, they do not provide sufficient information about the status of the overall functioning of the oral cavity or allow for the interpretation of subjective experiences of oral health (e.g. discomfort, aesthetics). In short, these more direct measures of oral health status are not applicable to the consequences of poor oral health and cannot be used as indicators of well-being and quality of life. More recently, behavioral dentistry research has focused on behavioral and individual level characteristics that lead to positive treatment outcomes. Many of these instruments have focused on the physical and psychosocial impacts of oral health and factors that contribute to treatment utilization.
Values, Attitudes, and Beliefs

In psychology, values, attitudes, and beliefs are distinct from one another. An attitude “is a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor” (Eagly & Chaiken, 1993, p. 1). Values are hypothetical dispositions ascribed to individuals that provide standards for how to behave to reach long-term goals (Rokeach, 1973). Values are considered a subset of attitudes toward “relatively abstract goals or end states of human existence” such as one’s health or freedom (Eagly & Chaiken, 1993, p. 5). Similarly, beliefs are the evaluative “thoughts that people have about attitude objects” (Eagly & Chaiken, 1993, p. 11). There is some degree of overlap among these three constructs; these terms are frequently used interchangeably outside of the field of psychology. The Oral Health Values Scale developed in the current study includes items related to oral health attitudes broadly, values toward the goal of having good oral health, and behavioral intention. Given the focus in behavioral dentistry on oral health values as a social determinant of oral health (Patrick et al., 2006), the term oral health values is used to describe the items and scale structure in the current study. In addition, literature on values measurement was primarily reviewed when making decisions about scale development and item content.

Values can be described as preferences for action or the use of resources (e.g., money, time) toward an overarching goal based on the perceived importance or utility of an object, behavior, or situation (Arrow, 2012). A variety of values individuals may hold about overall ideals were identified by Rokeach (1973) and examined in a value survey. Participants rank 18 terminal values in the Rokeach Value Survey in terms of their importance or meaning. The items from this scale are equality, health, a world of beauty, an exciting life, a sense of accomplishment, a comfortable life, a world at peace, family security, freedom, inner harmony,
mature love, national security, pleasure, salvation, self-respect, social recognition, true friendship, and wisdom. The Rokeach Value Survey has been used to measure health values (Norman & Bennett, 1996). Considering health values, it is possible that individuals rank some aspects of health as more valuable than others. For example, many individuals might rank physical mobility as more valuable than the retention of natural, healthy teeth. As a subset of attitudes, values may be indicative of preferences. There might be more variability in whether individuals prefer to have an annual dental cleaning and exam compared to an annual eye exam. Someone who values oral health more highly may be more likely to prefer the annual dentist cleaning.

Many measures of health values have been developed, and there are differences in the relative values individuals attach to different health states (Dolan, Guides, Kind, & Williams, 1996). The most commonly used methods of measuring health values are the standard gamble, time trade-off, and rating scales methods. When measuring health values, these instruments assess quality adjusted life years (QALYs) based on the relative weight assigned to different health statuses (Bennett & Torrance, 1996; Bleichrodt & Johannesson, 1997). With the standard gamble method, respondents are asked to decide between an undesired health state for a certain period of time and a gamble (Froberg & Kane, 1989; Llewellyn-Thomas et al., 1981). In the gamble, a person has the chance of either living in perfect health for the same amount of time as specified for the undesired health state or immediate death (Torrance, 1986). Utility scores are derived from how much percent risk of death respondents are willing to accept to have the option of being in perfect health instead of the undesired health state (Sharma et al., 2002). Standard gamble techniques have been used to measure the value people place on living with oral cancer and on different levels of tooth quality (Downer, Jullien, & Speight, 1997; Fyffe & Kay, 1992).
Time trade-off (TTO) techniques are also commonly used to assess health state utility or an individual’s preference for a specific health outcome. In TTO methods, respondents are asked questions to determine how much time they would be willing to spend in less desirable health states compared to good health. TTO methods have been used extensively to determine health state utility for a variety of illnesses and health outcomes, including: organ transplants, cancer, and older adults’ perspectives on life after falls and hip fractures (Laupacis et al., 1996; Salkeld et al., 2000; Stiggelbout et al., 1994). For oral health states, a modified TTO scale was developed by Fyffe and colleagues (1999) in which respondents were asked how much time they spent taking care of their oral health, how much free time they had available to them, and how much free time they would be willing to spend on additional oral care to improve their health.

Rating scales are frequently used to measure individuals’ health values. Rating scales of health value include Likert-type scales, semantic differential scales (i.e., binary ratings of opposite health states), and visual analogues scales. In rating scales, respondents may simply rank which health states they most prefer and then order their preferences. Other rating scales of health values consist solely of Likert scale items. Lau, Hardman, and Ware (1986) designed a brief 4-item 7-point Likert-type scale of health values and found a significant association between health values on this scale and beliefs in self-control over health, suggesting that positive health values are related to preventive behaviors (Lau et al., 1986). Health values scales like the one developed by Lau and colleagues (1986) may be useful in predicting preventive health behaviors (Conner & Norman, 2005; DiMatteo, Haskard, & Williams, 2007). In addition, semantic-differential rating scales of health attitudes have been developed to aid in predicting and understanding health behaviors. In a sample of college students, participants who rated their attitudes towards health behaviors more favorably were more likely to engage in corresponding
health behaviors, and perceived control over health behavior was also related to self-reported health behavior frequency (Ajzen & Timko, 1986).

As a type of rating scale, visual analogue scales of health utility involve individuals placing undesired health states (e.g., blindness, cancer, edentulism) on a continuum from the worst health state imaginable (i.e., death) to perfect health (Torrance, 1986). Stiggelbout et al. (1996) found that a visual analogue scale provided an equivalent assessment of health values as a TTO measurement among a sample of cancer patients. A comparison study of different methods of assessing health values found that rating scales were a more reliable method of evaluating health values than standard gamble and TTO techniques (Krabbe, Essink-Bot, & Bonsel, 1997). In addition, willingness-to-pay and paired comparison methods had low reliability (Krabbe et al., 1997). Others have found that paired comparisons have a high degree of consistency and are able to effectively differentiate health values between different populations (Salomon et al., 2013). Some valuation methods are difficult to understand and produce inconsistent results (Krabbe et al., 1997). Given its ease of administration and scoring, a Likert-type rating scale was chosen for the current study of oral health values.

**Oral Health-Related Quality of Life**

Disease-related indicators of oral health provide insufficient insight into how oral conditions impact a person’s functioning. Underlying the construct health-related quality of life is that complications from health conditions result in a significant impact on behavior and functioning (Guyatt, Feeny, & Patrick, 1993). Health factors may impact physical, mental, and social functioning (Wilson & Cleary, 1995). Similarly, the construct OHRQoL includes the impact of oral diseases on functioning and psychosocial and general well-being (Locker, Clarke, & Payne, 2000). Conditions related to the mouth and oral cavity have broad implications on
behavior (e.g., eating, drinking, talking), social functioning (e.g., aesthetics, self-consciousness, irritability), physical functioning (e.g., pain, discomfort), and other areas of overall functioning. If a person’s functioning is impacted by oral conditions, quality of life and life satisfaction may be negatively impacted by poor oral health. However, such consequences need not be the result; that is, poor oral health may not be perceived as indicative of a poor life depending on how much an individual values his or her oral health. OHRQoL is related to oral health values in that both involve perceptions of dental conditions and dental-related concepts (Locker, 1997; Sischo & Broder, 2011). However, OHRQoL addresses the impact of oral health status on functioning and not the nature of values attached to oral health (i.e., whether or not oral health is important) specifically (Locker & Allen, 2007).

OHRQoL has gained attention in recent years as an important part of psychosocial aspects of oral health and its consequences (Locker, 2008). Previously, oral health measures placed more emphasis on clinical indicators of oral health while the impact of oral disease on physical, social, and psychological functioning generated less attention. OHRQoL instruments are based on a biopsychosocial model of health rather than a biomedical model. Slade (1997) conceptualizes OHRQoL as the extent to which oral disease and impairment affects a person’s well-being. Sischo and Broder (2011) define OHRQoL as a “multidimensional construct that includes a subjective evaluation of the individual’s oral health, functional well-being, emotional wellbeing, expectations and satisfaction with care, and sense of self” (p. 1264). Based on this definition, OHRQoL includes the following dimensions of oral health: functional limitations, treatment expectations, environmental factors, and social/emotional facets. Sischo and Broder (2011) also identify OHRQoL as being an important outcome variable when evaluating oral health care.
There are several crucial limitations with current OHRQoL research, including lack of clear definitions of the constructs of oral health and OHRQoL, lack of agreement about what constructs refer to within the field, exclusion of positive oral health in extant research on OHRQoL, and an epidemiological approach to assessment. Locker (2008) argues that there is no consensus on the definition of the concepts being used in OHRQoL research and that current measures should be refined to address the theoretical framework underlying these concepts. “The assumption on which current measures are based is that oral impacts, whether negative or positive, inevitably affect quality of life in negative or positive ways. However, this reflects the personal and professional values of those conducting ‘OHRQoL’ research; values that may or not be shared by those who complete these measures.” (Locker, 2008, p. 131). Essentially, OHRQoL instruments measure the impact of oral disease on functioning and equate more impacts with lower quality of life. However, OHRQoL does not examine whether these impacts are perceived as positive or negative. If impacts from oral diseases are not perceived as negative, then they may not affect quality of life. To address how negatively or positively oral impairments are perceived by patients, it is necessary to examine differences in oral health values.

**Oral Health Locus of Control**

The construct locus of control can be defined as the extent to which people believe they are in control of what happens to them in their lives (Rotter, 1954). Health locus of control examines the degree to which individuals believe that health is controlled by their own behaviors (e.g., preventive care) or by external factors (e.g., financial access, health care professionals). Measures of health locus of control have focused on the internal reinforcement for health-related behaviors and their predictive value for health behavior change (Wallston, Wallston, & DeVellis, 1978). Oral health locus of control can be defined as the extent to which a person believes his or
her oral health depends on his or her own efforts or the actions of someone else (Klages, Bruckner, Guld, & Zentner, 2005). An individual’s locus of control falls somewhere on a continuum from internal to external (Rotter, 1966). For example, patients may view control over their oral health as something that mostly resides within them, or they may believe that outside forces exert more control over their oral health. If patients’ oral health locus of control is viewed from more of an external perspective, they may think they are not capable of influencing their oral health.

When a person has more of an internal oral health locus of control, he or she is more likely to take responsibility for the impact his or her behaviors have on oral health (Regis, Macgregor, & Balding, 1994). In a study that examined whether an oral health education intervention impacted oral health behaviors, higher internal oral health locus of control was associated with less plaque build-up and gingivitis following the intervention (Stenstrom et al., 2009). Others have also found a relationship between an internal oral health locus of control and more frequent dental attendance and lower levels of plaque, decay, and caries (Kneckt, Syrjala, & Knuuttila, 1999). Thus, having the belief that one is mostly in control of one’s own oral health appears to be related to preventive behaviors and may even predict oral health outcomes. While the construct dental health locus of control clearly involves belief systems, it describes how individuals operate within their environment rather than specific attitudes about oral health. Therefore, while there may be some shared variance among oral health values and oral health locus of control, the two are believed to be separate constructs.

**Oral Health Literacy**

Oral health literacy is the ability to obtain, process, and understand information related to oral health and dental treatment for the purpose of making sound decisions about oral health
DEVELOPING AN ORAL HEALTH VALUES SCALE

care. The construct includes the ability to read and understand information related to oral health (e.g., labels on dental supplies and medications, pamphlets given by the dentist), writing skills necessary to navigate oral health care experiences (e.g., completing an enrollment form at the dentist), and the ability to listen and communicate about oral health (e.g., to understand a dental hygienist’s instructions during visits and recommendations for care). In addition, the concept of oral health literacy encompasses the capacity to make informed oral health-related decisions (e.g., deciding which treatment would be best in conjunction with a dentist’s recommendations).

In many respects, oral health literacy is a skill. A lack or deficit in this skill could potentially result in decreased treatment seeking behavior and the maintenance of negative beliefs or values attached to oral health.

Low health literacy has been implicated in a variety of negative health outcomes, including poorer health status, higher risk of mortality, patient dissatisfaction, lower treatment compliance, and higher hospitalization rates (Parker, Ratzan, & Lurie, 2003; Sudore et al., 2006; Shea et al., 2007). As with the broader aims of identifying health literacy levels, examining oral health literacy may help policy-makers and dental care providers better implement interventions at a population and individual level. Oral health is an indicator of overall health status, and oral diseases contribute to poorer health outcomes and quality of life (WHO, 1994). By assessing oral health literacy, researchers have hoped to gain a better understanding of the mechanisms that maintain oral health disparities and implement policies that improve population and individual oral health.

Like OHRQoL, oral health literacy has become a prominent area of measurement development in the area of behavioral dentistry. Individual differences in oral health literacy are believed to impact treatment utilization and adherence (Dickson-Swift, Kenny, Farmer, Gussy, &
Larkins, 2014). There are many measures that have targeted health literacy as a construct with varying degrees of breadth. Many of these health literacy instruments have been criticized for seemingly only assessing word pronunciation and word recognition of health-related content (Mancuso, 2009). Early attempts to develop instruments of oral health literacy focused on assessing the ability to pronounce and recognize words used in dental care (Dickson-Swift et al., 2014). Most of these instruments do not measure the full extent of the construct oral health literacy and are time-consuming to administer and score. In the past, these instruments have primarily been used in research to measure population levels of oral health literacy. Understanding patients’ perceptions of multiple aspects of oral health literacy abilities, such as the ability to communicate with one’s provider and the ability to find information online, is crucial to identifying individuals with low oral health literacy in a clinically useful way.

**Oral Health Treatment-Seeking Behavior**

Individuals who receive professional dental treatment at least once a year are generally considered to be regular dental attenders. Those who regularly receive dental treatment are less likely to have oral disease (Murray, 1996). Regular dental visits for cleanings and checkups help individuals prevent and manage oral diseases. Determining which psychosocial factors influence dental treatment attendance is crucial because there are significant global, national, and regional oral health disparities. That is, some groups and populations are at a much higher risk for oral diseases, such as caries, periodontal disease, and edentulism, than others. For instance, oral diseases are more common among the elderly, socioeconomically disadvantaged persons, rural populations, and racial/ethnic minorities (Petersen, Bourgeois, Ogawa, Estupinan-Day, & Ndiaye, 2005).
Oral health values may help predict whether an individual will seek regular dental care. Several conceptual models have begun incorporating oral health values into explanations for treatment seeking patterns (Fisher-Owens et al., 2007). In a life-span developmental model of influences on oral health and disparities, Patrick et al. (2006) identified the importance placed on oral health as a sociocultural determinant of oral health that contributes to the perpetuation of oral health disparities at an intermediate or community level. Oral health values likely influence oral health on an interpersonal and individual level as well, such that an individual’s specific attitudes about oral health set the stage for healthy or unhealthy oral health behaviors including dental treatment utilization.

There is a strong relationship between preventive daily oral health behaviors and seeking dental treatment for cleanings (Riley, Gilbert, & Heft, 2006). In addition, patients with more positive oral health attitudes have fewer oral diseases compared to patients with less positive views of oral health (Levin & Shenkman, 2004; Riley et al., 2006). Oral health values may mediate the relation between routine, daily oral health behaviors and dental treatment utilization, such that oral health values predict whether or not individuals will engage in oral health behaviors and who will regularly seek professional dental care. In the Netherlands, regular dental attendance was associated with the preference for preservation of teeth and preventive oral health behaviors (Schuurs, Duivenvoorden, Velzen, & Verhage, 1984). Once reliable and valid measures of oral health values have been derived, future research may examine for whom oral health values are predictive of oral health behaviors and whether oral health values are an underlying mechanism for dental treatment utilization.

Other psychosocial determinants of dental treatment avoidance, such as dental fear and pain, have been studied at length (McNeil, Vargovich, Sorrell, & Vowles, 2014). Little
information is available about the relations among oral health values, dental fear, and dental treatment utilization. Positive oral health values may act as a buffer for individuals who are at risk for dental treatment avoidance due to fear of pain or dental anxiety. A recent study found that those who had negative beliefs about orthodontic treatment were more likely to experience increased pain during treatment (Kadu, Chopra, Jayan, & Kochar, 2015). Some evidence supports that less positive attitudes toward oral health behaviors are associated with lower treatment compliance. Patients receiving supportive periodontal treatment with unfavorable attitudes toward oral health exhibited lower compliance with treatment procedures and personal oral care recommendations (Ojima et al., 2005). Thus, it appears oral health values are related to fear of pain, dental anxiety, preventive care, and treatment adherence. It is not clear to what extent oral health values differ between dentally fearful and non-fearful patients or between those who are more or less sensitive to dental pain.

The extent to which oral health values serve as a barrier to dental treatment utilization is only beginning to be studied (McNeil & Randall, 2014). Existing measures of oral health values are quite basic and have not consistently demonstrated reliability and validity. Few measures have directly examined the relationship between oral health attitudes and oral health behaviors (Riley et al., 2006 is a notable exception). Therefore, it is essential that a measure of oral health values with strong psychometric properties be developed for use in research examining psychosocial and cultural determinants of oral health and oral health behaviors like dental treatment utilization.

Statement of the problem

Previous reviews of dental avoidance have suggested a link between oral health values and treatment-seeking behavior (McNeil & Randall, 2014). There is limited research, however,
on assessing oral health values as a construct. There are many measures of hypothetical constructs that seem to partially measure oral health values as a construct, including assessments of OHRQoL, dental fear, dental neglect, and oral health literacy, among others. Nonetheless, these instruments all fail to fully measure people’s perceptions of the overall importance of oral health. Rather, these other scales measure the impact that oral health has on psychosocial functioning, avoidance of dental treatment, personal maintenance of oral health, and understanding of oral care. This project developed and validated a new measure of oral health values, the Oral Health Values Scale (OHVS). In addition, the relations among oral health values and other oral health constructs were examined.

Oral health values are considered a psychosocial determinant of oral health (Fisher-Owens et al., 2007; Patrick et al., 2006). Oral health values seem to be related to a number of oral health-related constructs. The proposed instrument aims to assess an individual’s degree of perceived importance of good oral health and healthy dental behaviors. OHRQoL considers individuals’ perceptions of the impact of oral health on functioning. Thus, it is anticipated that more positive oral health values should be related to more positive perceptions of the impact of oral health on functioning. Dental neglect evaluates an individual’s oral hygiene behaviors and attitudes toward oral hygiene. Similarly, dental indifference is the extent to which an individual lacks concern about oral health. Positive oral health values ought to have a negative relationship with dental neglect, dental indifference, and unfavorable attitudes toward dentists and other oral health care professionals. Furthermore, individuals who perceive oral health as important may be more likely to engage in preventive care. It seems likely that positive oral health values would have a negative association with irregular dental attendance and dental avoidance. It is expected that individuals who place greater value on oral health would also have more positive attitudes
toward seeking oral health information and more skills necessary to make oral health related decisions. It is anticipated that higher oral health values will be positively related to frequency of toothbrushing and flossing. In addition, it is expected that those who place greater value in their oral health will be more likely to regularly attend dental appointments and spend less time between dental visits.

The aim of this project was to develop a new measurement of oral health values using classical test theory which is commonly used in behavioral dentistry and psychology more generally. Scale development followed the standard course for tests developed using classical test theory (as outlined in DeVellis, 2003; Furr & Bacarach, 2014). Steps included determining and defining the construct to be measured, generating an initial item pool, determining the format for the measure, having item content rated by experts, administering items to a developmental sample, evaluating item content, and determining a final, optimal scale length. Correlations between scores on the OHVS were compared to measures of related oral health constructs to provide evidence for convergent validity.

In Study 1, items were developed and content validity was examined based on responses from a small panel of experts in the field. In Study 2, the structure of the OHVS was reviewed with data from a large, developmental sample. Evidence for the validity of the scale’s structure was provided in Study 3 based on data from a validation sample.

**Study 1**

The purpose of this study was to develop items for a reliable and valid measure of oral health values. The initial item pool was developed in conjunction with the Anxiety, Psychophysiology, and Pain (APP) research laboratory (approximately 10 researchers) at West Virginia University (WVU). Approximately 95 items were proposed by members of the APP
laboratory. The item pool was reduced to be 45 items\(^1\) and items were revised and reworded to increase clarity. The item pool reflected several thematic areas of oral health values and attitudes, including keeping natural teeth, appearance, professional dental treatment, daily care, and orthodontics and prosthodontics. Another aim of this study was to assess the content validity of the items, to determine if they accurately represented the construct as defined by the research team. In order to assess content validity, a panel of oral health experts in the fields of dentistry, dental hygiene, clinical psychology, behavioral medicine, and public health rated items on their representativeness and relevance to the construct oral health values. Items were rated for their specificity and clarity (Haynes, Richard, & Kubany, 1995). Institutional Review Board (IRB) approval for this study is on file (protocol #: 1605115368) with WVU.

**Method**

**Participants**

Participants were 12 (4 women) expert raters in various oral health professions, including dentists, hygienists, clinical psychologists, and researchers in public health and behavioral dentistry. Age ranged from 25 to 70 (\(M = 47.67, SD = 13.90\)). The average number of years spent in dental care and/or dental research ranged from 4 to 43 (\(M = 20.17, SD = 10.87\)).

Race/ethnicity was reported as: 91.7% \((n = 11)\) Caucasian and 8.3% \((n = 1)\) East Asian.

**Measures**

**Content validity.** For each item of the OHVS, content validity was measured broadly using Likert-type items to assess the “relevance, representativeness, specificity, and clarity” (Haynes, Richard, & Kubany, 1995, p. 244). A panel of 12 oral health experts provided ratings to inform the item revision process. These expert ratings were provided on quantitative indices with

\(^1\) Note that the item pool developed by the APP lab was reduced to 45 items for content raters to reduce burden, at the suggestion of the thesis committee.
5-point Likert type scales, and these ratings were used to make item and scale revisions (Haynes, Richard, & Kubany, 1995; Nunnally & Bernstein, 1994). Representativeness and relevance were combined as one rating from *not at all* to *essential to the construct*. Specificity and clarity were also combined as one rating from *not at all* to *extremely*. Expert raters also provided qualitative feedback in the form of any additional suggestions for modifying items and the scale as a whole. See Appendix A.

**Demographic questionnaire.** Expert raters were asked to provide information about their age, sex, profession, and amount of time in an oral health-related field since their terminal degree. See Appendix B.

**Procedure**

An initial item pool of 45 items were generated by members of the APP research laboratory at WVU. Scale items were reviewed by experts in oral health-related professions online via email. Content validity ratings from expert judges were evaluated based on average scores across judges for relevance, representativeness, specificity, and clarity of items.

**Results**

Data were checked for missingness; all items were rated by all 12 content experts. The average rating for representativeness and relevance was 3.92 (SD = .73). The mean rating for specificity and clarity across items was 3.77 (SD = .70). See Table 1 for the characteristics of experts’ ratings for each item. There was a strong, positive relation between representativeness and clarity ratings, \( r = .85, p < .01 \), indicating that more representative items also were rated as having higher clarity. Based on the content ratings, the scale was reduced, with the content areas of orthodontics and prosthodontics removed based on feedback from the content experts. The feedback indicated that this thematic category may not be representative of oral health values
because not all people need orthodontic or prosthodontic care, and so the items would not be relevant for many participants. The scale was revised by the author and thesis chair to exclude items with low content validity ratings and to modify remaining items based on experts’ specific suggestions for item rewording. Items that had an average score less than four (i.e., high on the 5-point scale) on relevance and representativeness across judges were considered for removal. Items that had an average score less than four (i.e., moderately on the 5-point scale) on specificity and clarity were revised based on suggestions from the judges. In addition, items on which judges gave specific suggestions were modified. The scale was reduced to be 30 items; 28 of the original items were kept and two new items were added based on the experts’ suggestions. The average rating for representativeness and relevance for the 28 items that were kept from the original item pool was 3.98 ($SD = .38$), while the mean specificity and clarity of the remaining items was 3.83 ($SD = .28$). Items were revised and reworded based on the judges’ comments.

**Discussion**

This study aimed to develop and evaluate the content validity of an initial item pool for an oral health values scale. An item pool of 45 items was developed by the APP research laboratory for expert review. Based on feedback from a panel of expert raters, the scale was reduced to 30 items. Wording of items was revised based on suggestions from content experts. The scale items had medium to high content validity overall. Items that were rated as more relevant and representative of the construct were generally rated as having higher specificity and clarity. Specificity and clarity ratings were slightly lower than ratings for representativeness and relevance, suggesting that some items needed to be reworded to increase clarity.
Study 2

The goal of this study was to determine the internal structure of the 30-item Oral Health Values Scale (OHVS) by administering it to a developmental sample and conducting exploratory principal component analysis (PCA). In addition, this study aimed to assess the convergent validity of the scale by examining the associations among the OHVS and other measures of oral health-related constructs while controlling for social desirability. It was anticipated that oral health values would be positively associated with oral health literacy and retention of natural teeth. It also was expected that oral health values would be negatively related to apathy toward dental care, oral health impact on quality of life, dental fear, and distrust of dentists. It was hypothesized that oral health values would be positively related to oral health behaviors.

Method

Participants

The sample consisted of 306 participants living in the USA. Of these, five participants were excluded from analysis due to invalid responding (e.g., participants who did not answer 3 out of 4 validity check items correctly or who had one-way responses, such as always choosing “strongly agree,” throughout the measures). Participants included in the analysis of the OHVS were 301 American adults aged 21 to 70 (\(M = 39.69, SD = 11.89\)). A majority (58.1%) of respondents identified as female. Ethnicity was reported as 75.1% Caucasian (\(n = 226\)), 12.0% African American (\(n = 36\)), 8.0% Asian (\(n = 24\)), 4.0% Multiracial (\(n = 12\)), and 1.0% other (\(n = 3\)). Only 5.6% of participants identified as being of Hispanic or Latino descent. The median income was between $50,000 and $74,999, and the median level of education was 16 years or a college degree. Participants were from 41 different states and 32.6% identified as living an urban place, 42.9% identified as living in a suburban place, and 24.6% identified as living in a rural
place. Participants were recruited from MTurk and compensated $1.50 for their time. The survey was advertised as a study about answering questions related to dental experiences that would take approximately 1.5 hours to complete. WVU IRB approval (protocol # 1605115368) for the study was obtained.

**Measures**

**Oral Health Values Scale.** The OHVS is a 30-item 5-point Likert-type scale that is designed to measure the degree to which one demonstrates investment in improving or maintaining oral health. Response options range from “strongly disagree” to “strongly agree” Participants’ perceptions about the importance of oral health and a variety of dental-related situations are assessed. The scale also measures individuals’ perceptions of the significance of oral health in comparison to other aspects of health and valued outcomes. The items were developed by the APP research laboratory and rated by oral health care professionals for their content validity. See Appendix C.

**Demographic and general dental information questionnaire.** The demographic questionnaire asks for information about participants’ age, sex, ethnicity/race, yearly income, education, employment status, and other general information. The questionnaire contains questions related to dental history including queries about access to dental care (physical transportation), dental attendance, pain during treatment, and other dental related experiences. Items concerning oral health behaviors were correlated with the OHVS. Toothbrushing (how many times do you brush your teeth in one day), flossing (aside from brushing your teeth with a toothbrush, in the last seven days, how many days did you use dental floss or any other device to clean between your teeth), and attendance (about how long has it been since you last visited a dentist) behaviors were examined. See Appendix D.
Oral Health Impact Profile. (OHIP-14; Slade, 1997). The OHIP-14 is a 14-item self-report measure of OHRQoL that has seven subscales: functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability and handicap. There are two items for each of the subscales, and test-takers respond on a 5-point Likert-type scale where 4 = "very often", 3 = "fairly often", 2 = "occasionally", 1 = "hardly ever" and 0 = "never." The instrument is scored by summing all responses, and higher scores indicate higher levels of oral health impact on quality of life. Examples of items include: “Have you had difficulty chewing any foods because of problems with your teeth, mouth or dentures?” for the functional limitation subscale and “Have you found it uncomfortable to eat any foods because of problems with your teeth, mouth or dentures?” for the physical pain subscale.

Slade (1997) used data from the administration of the OHIP-49 to a sample of 1,217 older adults (aged 60+) in South Australia to develop the OHIP-14. A controlled stepwise regression analysis was used to determine which two items from each subscale would be included in the short version. The final measure had a Cronbach’s alpha of .88, indicating high internal consistency (Slade, 1997). The OHIP-14 accounts for 94% of the variance in the OHIP-49. The OHIP-14 has several strengths, including short administration time, strong psychometric properties, and frequent use in dental research. Thus, the OHIP-14 is a good measure of OHRQoL. See Appendix E.

Dental Fear Survey. (DFS; Kleinknecht, Klepac, & Alexander, 1973). The DFS is a 20-item questionnaire used to measure fear responses to dental stimuli. Respondents rate their level of behavioral and physiological responses for each item on a 5-point Likert-type scale, ranging from “no reaction, fear, or anxiety” to “persistent reaction, fear, or anxiety.” The DFS has three subscales derived from factor analysis: avoidance of dental care and anticipatory anxiety, anxiety
and fear of specific dental situations and stimuli, and physiological arousal during dental procedures (Kleinknecht et al., 1973). The survey is scored by summing responses to each item with possible scores ranging from 20-100. Higher total scores indicate higher anxious responses to dental stimuli and greater dental care related fear. Evidence for the internal consistency and test-retest reliability of the DFS has been shown in subsequent studies (Kleinknecht, Thorndike, McGlynn, & Harkavy, 1984; McGlynn, McNeil, Gallagher, & Vrana, 1987). For example, Hakeberg and Berggreen (1997) found high internal consistency of the DFS, $a = .89$, in a Swedish sample. There is also support for the convergent, discriminant, and predictive validity of the DFS (Smith & Moore, 1995; Wilson & Sinisko, 1997). See Appendix F.

**Dental Indifference Scale.** (DIS; Nuttall, 1996). The DIS is an 8-item multiple choice scale designed to measure apathy and lack of concern about dental health. Satisfactory internal consistency was found for the DIS with a Cronbach’s alpha of .71. The DIS was completed a second time by 345 of the participants in Nuttall’s (1996) developmental sample, and satisfactory test-retest reliability was found with a Pearson’s correlation coefficient of .79. The DIS is scored by summing total points scores, ranging from 0 to 8. Higher scores on the DIS indicate higher levels of dental indifference. In a sample of 385 dentate adults living in New Zealand, the average score on the DIS was a 3.1 (Jamieson & Thomson, 2002).

Higher scores on the dental indifference scale were associated with being young, male, and a manual laborer. Dental indifference was associated with tooth loss in the original normative sample (910 dentate Scottish adults). On average, those who scored high on the DIS had fewer teeth than the remainder of the sample and were less likely to have received dental care, indicating a good degree of convergent validity. The dental indifference scale may be useful in identifying groups who need oral health promotion and individuals who display
indifferent oral health behaviors (e.g., not complying with treatment, not engaging in preventive care). See Appendix G.

**Dental Free Time Trade-Off Scale.** (DFT-O; Fyffe, Deery, Nugent, Nuttall, & Pitts, 1999). The DFT-O is a 5-item instrument which measures patient satisfaction with dental health and utility of dental health with a dental free time trade-off utility score. The scale includes a Likert-type item about overall satisfaction with teeth and gums, a checklist with 14 statements about happiness with specific aspects of oral health, a question about time spent daily on dental care, a question about the amount of additional time a patient would be willing to spend on dental care per day to improve his or her dental health, and a question about the amount of free time an individual has each day. The utility score is determined by considering how much of patients’ free time they are willing to spend on taking additional care of their oral health. Utility scores are calculated with the following formula:

\[
\text{Utility} = \frac{\text{FREE TIME} - \text{TIME 1}}{\text{FREE TIME}}
\]

In this formula, FREE TIME = free time, in minutes as assessed by item 5 on the DFT-O and TIME 1 = extra tooth care time, in minutes a patient is willing to spend to improve oral health as assessed by item 4 on the DFT-O. Fyffe et al. (1999) observed a clustering of utility scores near the upper extreme with over 55% of respondents having a utility score of 0.98 or higher, suggesting that the scale lacks discriminative ability. The median value for extra time patients were willing to spend on dental care was an additional five minutes, and the median value of overall free time was 240 minutes. Test-retest reliability was measured with a two month interval between administrations and was found to be acceptable \((r = .67, p < .001)\). Other indicators of the psychometric quality of the DFT-O are not available. See Appendix H.
Dental Neglect Scale. (DNS; Thomson, Spencer, & Gaghwin, 1996). The DNS is a 6-item Likert-type scale that measures oral hygiene behaviors and attitudes toward oral health. Dental neglect is defined as “behavior and attitudes which are likely to have detrimental consequences for the individual’s oral health” (Locker, 2000 p. 415). Respondents rate each of the statements on the DNS on a 5-point Likert-type scale from 1 “definitely no” to 5 “definitely yes.” Lower scores on the DNS indicate greater dental neglect. The DNS contains two factor-analytically derived subscales: dental neglect and dental avoidance. These factors had eigenvalues greater than 1.0 and accounted for 58.4% of the variance in the scale. The DNS has acceptable internal consistency, $\alpha = .74$, and test-retest reliability, $r = .81$, suggesting that the scale is a reliable measure of dental neglect (Coolidge, Heima, Johnson, & Weinstein, 2009; Thomson et al., 1996). See Appendix I.

Importance of the Retention of Teeth Scale. (IRTS; Schuurs, Duivenvoorden, Velzen, & Verhage, 1984). Schuurs et al. (1984) developed a survey to assess the importance attached to the retention of natural teeth and administered it to a sample of 438 young adults (25 years of age) in Amsterdam who were either regular dental attenders (checkups every 6 months for at least the past four years) or irregular dental attenders (did not ask for a similar amount of check-up appointments). Test respondents are asked to rank order the relative importance of retaining their natural teeth along with four additional items: purchasing a television set, purchasing a living room suite, purchasing a car, and having a vacation. Schuurs et al. (1984) analyzed the results of the rank orderings by comparing dyads of each possible first ranked item with each second ranked item with the computer algorithm HOMALS (HOMogeneity analysis with Alternating Least Squares). Data were interpreted this way to determine if the IRTS could discriminate between regular and non-regular dental attenders. Regular dental attendance was
associated with the preference for preservation of teeth. For the purpose of this study, higher ratings for keeping natural teeth indicate higher importance of the retention of natural teeth. Preferring to retain one’s natural teeth over some other expenses is an important element of oral health values. Thus, the IRTS may help provide evidence of convergent validity for the OHVS. See Appendix J.

**Health Literacy in Dentistry Scale.** (HeLD-14; Jones, Brennan, Parker & Jamieson, 2015). The short form of the HeLD is a 14-item measure with seven subscales derived from the HeLD-29 (Jones, Parker, Mills, Brennan, & Jamieson, 2014) and based on the theoretical framework of the Health Literacy Management Scale (HeLMS; Jordan et al., 2013). Participants rate items on the HeLD-14 in terms of “difficulty experienced,” on a 5-point Likert-type scale in which 1 is “unable to do” and 5 is “without any difficulty” (Jones et al., 2015). Higher scores on the HeLD-14 indicate higher levels of oral health literacy. The HeLD-14 has seven subscales: Receptivity, Understanding, Support, Economic Barriers, Access, Communication and Utilisation. The HeLD-14 has a Cronbach’s α of .87, demonstrating high internal consistency. The HeLD-14 accounts for 93% of the variance in the original scale.

Convergent validity was demonstrated by measuring the relationship between the HeLD-14 and key literacy outcomes. Seeing a dentist in the last year was positively related to scores on the HeLD-14. Predictive validity was supported by comparing other self-reported health measures to the HeLD-14 using analysis of variance. Higher scores on the HeLD-14 were associated with greater OHRQoL as measured by the OHIP-14 and higher levels of self-rated general health and self-rated oral health (Jones, et al., 2015). The HeLD appears to be a reliable and valid measure of oral health literacy. The nomological network used in the HeLD that framed oral health literacy as an interrelationship among individual abilities, the healthcare
system, and broader society is vital to the development of future oral health instruments that consider the role of oral health literacy, including the OHVS. See Appendix K.

**Revised Dental Beliefs Survey.** (R-DBS; Milgrom, Weinstein, & Getz, 1995). The Revised Getz Dental Beliefs Survey (R-DBS) is a 28-item self-report measure of attitudes and reactions to dental procedures and dental care. The R-DBS has three factor-analytically derived subscales: Professionalism, Communication, and Lack of Control. Respondents rate how often they experience situations and feelings related to dental care on a 5-point Likert-type scale from 1 “never” to 5 “nearly always.” To score the instrument, responses are summed for a total overall score ranging from 28-140; higher scores indicate a more negative attitude toward dental professionals and dental care. Examples of items include: “I’m concerned that dentists might not be skilled enough to deal with my fears or dental problems” and “When I am in the chair I don’t feel like I can stop the appointment for a rest if I feel the need” (Milgrom et al., 1995).

The R-DBS has strong psychometric properties, including: satisfactory internal consistency, acceptable test-retest reliability, and convergent and discriminant validity. A Cronbach’s alpha of .95, was observed in a sample of dentally fearful adults (Kvale, Milgrom, Getz, Weinstein, & Johnsen, 2004). Test-retest reliability is acceptable for the R-DBS, $r = .88$ (Coolidge, Heima, Coldwell, Weinstein, & Milgrom, 2005). Convergent and discriminant validity was demonstrated by measuring the relationship between R-DBS subscales and measures of desired and predicted control in dental situations and in life more generally (Coolidge et al., 2005). More recent research has also supported the convergent and discriminant validity of the R-DBS in Swedish samples (Abrahamsson, Ohrn, & Hakeberg, 2009; Ohrn, Hakeberg, & Abrahamsson, 2008). See Appendix L.
Marlowe-Crowne Social Desirability Scale. (MCSDS; Reynolds, 1982). The Marlowe-Crowne social desirability scale is a 33-item instrument that measures the degree to which an individual responds in a socially desirable way with true-false items (Crowne & Marlowe, 1960). The scale was developed through the use of items from personality inventories and from expert ratings of social desirability. 18 items are keyed as true and 15 items are coded as false to indicate higher levels of social desirability. Internal consistency for the 33-item instrument as assessed by the Kuder-Richardson formula 20 is acceptable \( r = .88 \). Crowne and Marlowe (1960) found high test-retest reliability for the measure as well \( r = .89 \). A short form of the MCSDS was used for this study because the length is more comparable to the other measures used in this study and many reliable short forms of the scale are commonly used (Fischer & Fick, 1993; Reynolds, 1982; Strahan & Gerbasi, 1972). The 13-item short version of the MCSDS developed by Reynolds (1982) was used for this study. This short version has satisfactory reliability, \( r = .76 \), internal consistency, \( \alpha = .89 \), and is highly related to the original 33-item scale, \( r = .97 \) (Fischer & Fick, 1993). The MCSDS is included to account for response biases in which participants display themselves in overly favorable ways. See Appendix M.

Validity Check Items. A set of four items were included as a measure of attention and as a check of seriousness. Examples of items include: “what color are healthy teeth” and “please select “four” for this question.” Data from participants who answered more than one validity check item incorrectly were excluded in the analyses. See Appendix N.

Procedure

After revisions based on content validity analysis in Study 1, the size and nature of the developmental sample was determined and the OHVS and measures of other oral health-related constructs were administered. A large sample of 300 participants was necessary to conduct
exploratory PCA and is the number of participants recommended for scale development (Clark & Watson, 1995; Nunnally & Bernstein, 1994). Large developmental samples are necessary to have sufficient variability in the scores to further refine item content for the OHVS. Therefore, participants in Study 2 were “master workers” recruited using Amazon’s Mechanical Turk (MTurk), a crowdsourcing marketplace that is frequently used to collect large amounts of research data in the social and psychological sciences.

The MTurk platform is considered an efficient and inexpensive method of obtaining high quality data which yields more diverse samples than college student based participant pools (Buhrmester, Kwang, & Gosling, 2011). In addition, samples from MTurk are frequently used in behavioral and psychological research, and participants recruited on MTurk have comparable responses to participants in experiments conducted in person (Casler, Bickel, & Hackett, 2013; Crano, Brewer, & Lac, 2014; Mason & Suri, 2012).

While much of the existent literature on MTurk focuses on its positive qualities as a participant source, there are some limitations. MTurk samples, while more diverse than college student samples, are less representative of U.S. demographics than national samples (Berinsky, Huber, & Lenz, 2012). MTurk samples appear to have a higher percentage of participants who identify as female, who are college educated, and who live in urban areas than national norms (Huff & Tingley, 2015). Furthermore, MTurk samples may be more prone to social desirability bias effects and lower engagement than in-person samples (Peer, Vosgerau, & Acquisti, 2014). Despite its limitations, MTurk was chosen to recruit participants in Study 2 and Study 3 given the need for a large, generalizable population for scale development. Only adult, American citizens who could read and write English were allowed to participate in the studies that utilized MTurk.
All participants completed an initial consent before taking part in study measures. Participants then completed all study measures – demographic questionnaire, OHVS, OHIP-14, DFS, DIS, DFT-O, DNS, IRTS, HeLD, DBS, and the MCSDS. The OHVS was completed first in the set of measures and the demographics form was completed last; all other measures were completed in a randomized order by each participant. The internal consistency and internal structure of the scale of the OHVS were examined to further refine item content and optimize scale length. Associations among the OHVS and other study measures were examined to provide evidence of convergent validity.

Results

Descriptive Statistics

The data were examined for potential problems, such as missingness and assumptions of normality. No data were missing on any study measure, except for the DFT-O utility score, which was missing 4.65% of data. Data on the DFT-O in which participants did not provide a numerical response for free time or additional time to be spent on dental care were counted as missing (e.g., responses such as “most of the day” or “several hours”). These missing cases were excluded pairwise in subsequent statistical analyses. The OHIP (skew = 1.03, kurtosis = .35), DFS (skew = .39, kurtosis = -.93), DIS (skew = .25, kurtosis = -.98), HeLD (skew = -1.31, kurtosis = 2.20), and R-DBS (skew = .80, kurtosis = -.27) had non-normal distributions, and these measures were log transformed. The OHIP (skew = .43, kurtosis = .87) was normally distributed after log transformation. The DFS (skew = -.19, kurtosis = -1.11), DIS (skew = -.62, kurtosis = -.55), HeLD (skew = -2.59, kurtosis = .14), and R-DBS (skew = .20, kurtosis = -1.07) remained non-normally distributed. For greater ease of interpretation, subsequent correlational analyses were conducted with bootstrapping samples of 1,000 with the non-transformed scales.
This method is commonly used for non-normally distributed data with 95% confidence intervals provided by a large number of simulated samples (Bishara & Hittner, 2015; Haukoos & Lewis, 2005). Other continuous measures met assumptions of normality. There are two measures, the IRTS and DFT-O, which are rank-order and percentage variables respectively, indicating that results from parametric analyses should be interpreted cautiously. Given that several measures were non-continuous measures or had non-normally distributed data (OHIP, DFS, DIS, and HeLD), all correlation coefficients were conducted with bootstrapping of 1,000 samples. Confidence intervals for each correlation are not provided, except for when the confidence interval crosses 0 for a correlation with \( p < .05 \) because this would indicate that there is not enough evidence of a significant association between the two variables. Characteristics of each scale are included in Table 2.

**Scale Structure**

Exploratory principal component analysis (PCA) was conducted with promax rotation on the 30 items of the OHVS to determine the underlying structure of the scale. The Kaiser-Meyer-Olkin measure of sampling adequacy and Bartlett’s test of sphericity were conducted to determine if the items in the OHVS were appropriate for factor analysis. It is recommended that sampling adequacy be at .5 or higher to conduct factor analysis (Field, 2013). The Kaiser-Meyer-Olkin measure of sampling adequacy revealed a value of .93, suggesting that the data were suitable for factor analysis. With Bartlett’s test, chi square values that are statistically significant suggest that the correlation matrix of the items is not an identity matrix; that is, statistically insignificant chi square values would indicate that all of the items in the measure are unrelated to one another (Field, 2013). Bartlett’s test was significant, \( \chi^2 (435) = 4306.63, p < .001 \), indicating that the items were sufficiently related to one another to conduct PCA.
The scree plot suggested a six factor solution. See Figure 1. The relations among the factors were examined, revealing small to large positive correlations among the six extracted factors (interpretation of correlation sizes based on Cohen, 1988). See Table 3 for the relations among the factors. While varimax rotations are the most commonly used in scale development, varimax rotations assume that the extracted factors are not related to one another and minimize cross-loadings between factors. Oblique rotations allow the extracted factors to freely correlate, and thus, are more appropriate for this data set given the associations between the factors. Internal consistency for the 30-item scale was high ($\alpha = .93$).

Each factor had an eigenvalue greater than one, and together the six factors accounted for 60.29% of the variance in the scale. Some of the factors, however, accounted for a small portion of the variance in the total scale; thus these factors and the items loading onto them were considered for removal. The first factor accounted for 34.91% of the variance and seemed to measure the relative importance of seeking professional dental care with items such as “Going to a dentist is not worth the cost to me.” The second factor accounted for 7.14% of the variance and appeared to assess the value of overall oral health and appearance with items such as “Keeping my teeth healthy is a priority for me” and “My smile is an important part of my appearance.” The third factor accounted for 5.77% of variance and reflected the importance of flossing behaviors with items like “Flossing my teeth every day is a high priority for me.” The fourth factor accounted for 4.97% of variance and seemed to include items related to the importance of retaining natural teeth; “I would not mind if I had to have a false tooth or dentures” is an example item. The fifth factor accounted for 4.13% of the variance and contained items related to concerns about the impact of oral health on appearance with items such as “It would not bother me if my teeth looked yellow or stained.” Lastly, the sixth factor accounted for 3.37% of
the variance in the scale and appeared to measure the importance of brushing behaviors with items such as “Buying a new toothbrush every three to four months is a waste of my money.”

Of the 30 items, 29 loaded strongly onto one of the six factors with a factor loading of .400 or higher. See Table 4 for item loadings. One item, “Dental care is less important to me than other needs in my life” did not load strongly onto any one factor and was eliminated from the scale. Factors five and six accounted for a small portion of variance; both accounted for less than 5% of the overall variance. When a factor accounts for less than 5% of the total variance, it may be eliminated from subsequent analyses because it explains a small proportion of the overall variance (Hair, Black, Babin, & Anderson, 2009). In addition, another method of determining the number of factors in PCA, parallel analysis, was examined. Parallel analysis provides thresholds for what eigenvalues constitute significant factors by computing a correlation matrix from a data set randomly generated with a specific sample size and number of items (Franklin, Gibson, Robertson, Pohlmann, & Fralish, 1995; O’Connor, 2000). For this sample of 301 participants with 30 items, the parallel analysis suggested a four-factor solution when comparing the threshold eigenvalues computed in the analysis to the eigenvalues exhibited in the PCA; see Table 5. The items loading onto the fifth and sixth factors were eliminated from the overall scale, reducing the scale to 23 items. A PCA with promax rotation was then conducted on these remaining 23 items with 4 factors specified for extraction. The Kaiser-Meyer-Olkin statistic (.92) and Bartlett’s test, $\chi^2 (253) = 3275.92, p < .001$, indicated that the items were appropriate for PCA.

The scree plot and eigenvalues-greater-than-one rule suggested a four factor solution. See Figure 2. The four factors had small to large positive relations with one another, indicating that the oblique, promax rotation was appropriate. See Table 6. Altogether, the four factors accounted
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for 58.49% of the total variance. The first factor accounted for 37.60% of the variance and included 8 items related to dental attendance. The second factor accounted for 8.37% of the variance with 7 items that appeared to measure appearance and overall oral health value. The third factor accounted for 6.92% of the variance and included 4 items related to flossing. Lastly, the fourth factor accounted for 5.94% of the variance with 4 items referencing the value of retaining natural teeth. See Table 7 for the item loadings for each factor. All items loaded strongly onto their respective factors. The internal consistency of the 23-item final version of the OHVS was high ($\alpha = .91$).

**Impact of Social Desirability**

Given that oral health values were being examined and dental hygiene behaviors may be an area in which individuals wish to portray themselves in a favorable way, social desirability was examined as a covariate. Pearson’s $r$ correlations were conducted between the Marlowe-Crowne Social Desirability Scale (MCSDS) and all other study measures to determine if social desirability was related to the other outcomes. The OHVS was unrelated to social desirability ($p > .10$). The attendance ($p = .063$), appearance ($p > .10$), and retention ($p > .10$) factors of the OHVS were not statistically related to social desirability, however, the flossing factor had a small, positive relation with social desirability ($r = .14, p = .020$). This association suggests that participants responded in more positive, socially desirable ways to the flossing items. The OHIP ($r = .14, p = .018$), DFS ($r = .17, p = .004$), and DBS ($r = .20, p = .001$) had small, negative associations with social desirability, reflecting that participants may have under-reported negative impacts of oral health, dental fear, and the degree to which they distrust dentists. The DIS ($p > .10$) and DFT-O ($p = .073$) were not related to social desirability. The DNS ($r = .15, p = .011$), IRTS ($r = .18, p = .003$), and HeLD ($r = .12, p = .036$) had small, positive relations to
social desirability, indicating that participants portrayed their oral hygiene, the level of importance they attach to retaining their natural teeth, and their level of oral health literacy in a more socially favorable way. Due to the significant relations between social desirability and the other study measures, the MCSDS was included as a covariate in the remaining analyses (i.e., using partial correlations).

**Convergent validity**

Partial correlations were conducted with the OHVS in relation to the OHIP, DFS, DIS, DFT-O, DNS, IRTS, HeLD, and R-DBS, controlling for social desirability. Correlations were conducted with bootstrapping of 1,000 samples and a 95% confidence interval. See Table 8 for partial correlations among all measures. Given the large sample size, correlations of a moderate ($r = .30$) or greater magnitude were considered sufficient to demonstrate convergent validity.

The four factors had small to large associations with each other ($rs$ ranging from .28 to .65, all $p < .001$), suggesting that the subcomponents while related, measured somewhat different concepts. The OHVS was positively associated with the HeLD ($r = .40, p < .001$), suggesting that those who had more positive oral health values also had greater oral health literacy. All four factors of the OHVS were positively associated with the HeLD (all $ps < .05$). The OHVS had a small, negative association with the IRTS ($r = -.17, p < .01$), which indicates that those who scored higher on the OHVS rated keeping their natural teeth as more preferred than the alternatives in the IRTS (e.g., having a vacation, purchasing a car). All factors of the OHVS were negatively related to the IRTS except for flossing ($p > .10$), and the retention of teeth factor was most strongly associated with the IRTS ($r = -.21, p < .001$). These associations do not provide additional evidence of convergent validity because the IRTS did not have moderate correlations with the OHVS and its factors.
Somewhat surprisingly, the OHVS was not associated with the utility score of the DFT-O ($r = -.02, p > .10$). The four factors of the OHVS were not associated with the DFT-O either (all $p > .10$). This may be because there was relatively little variability in utility scores, with over 90% of respondents having a utility score of 80% or higher. The median number of additional minutes participants were willing to spend on dental care was 5 extra minutes and the median number of free time participants had in a day was 120 minutes. As suggested by the DFT-O developers, the utility score may lack discriminant validity (Fyffe, Deery, Nugent, Nuttall, & Pitts, 1999). As expected, the OHVS had a large, negative association with the DIS ($r = -.68, p < .001$). The four factors had small to large negative associations with dental indifference ($rs -.29$ to -.70, all $p < .001$). The relation between the OHVS and the DIS suggests that participants having greater value in the importance of oral health have less apathy and indifference toward oral health. Similarly, higher scores on the OHVS were related to lower scores on the R-DBS ($r = -.25, p < .001$), reflecting that positive values toward oral health are indicative of less distrust of dentists and dental care. Interestingly, only the dental attendance ($r = -.37, p < .001$) and appearance ($r = -.14, p = .019$) factors of the OHVS were related to distrust of dentists on the R-DBS.

The OHVS was negatively associated with the DFS ($r = -.20, p = .001$), suggesting that participants placing greater value on oral health tend to report less dental fear. However, not all of the individual factors of the OHVS were related to dental fear. Only the dental attendance factor was related to dental fear ($r = -.31, p < .001$). Aspects of oral health values tied to seeking and receiving professional dental care were related to dental fear whereas other dimensions, appearance ($r = -.04, p > .10$), flossing ($r = -.09, p > .10$), and retention of natural teeth ($r = .002, p > .10$), were not related to the concept of dental fear and anxiety. The OHVS was negatively
associated with the OHIP ($r = -.30, p < .001$). It is likely that those who have greater oral health values engage in more preventive oral care and have better overall oral health. Those with low oral health values may be less likely to engage in oral health behaviors and thus have more negative impacts on their quality of life as a result of poor oral health. Each of the four factors of the OHVS, attendance ($r = -.34, p < .001$), appearance ($r = -.18, p = .002$), flossing ($r = -.13, p = .030$), and retention of natural teeth ($r = -.13, p = .027$), were negatively related to the OHIP. The OHVS had a strong, positive relation to the DNS ($r = .73, p < .001$). Participants with higher oral health values exhibited responses related to engaging in more oral health behaviors. All four factors of the OHVS were positively related to the DNS ($rs = .34$ to .71, all $p < .001$).

Partial correlations between the OHVS and oral health behaviors were conducted, controlling for social desirability. See Table 9 for partial correlations between the OHVS and oral health behaviors. The OHVS had a small, positive relation to toothbrushing frequency ($r = .29, p < .001$), which suggests that those who place greater value in oral health brush their teeth more often. Each of the four factors of the OHVS was positively related to toothbrushing behavior ($rs = .18$ to .39, all $p < .01$). Similarly, the OHVS had a moderate, positive relation to the number of days a week a person flossed, indicating that those with higher oral health value flossed more days per week ($r = .49, p < .001$). All four factors of the OHVS were also positively related to flossing behavior ($rs = .13$ to .63, all $p < .05$). Time between dental visits had a moderate, negative relation to the OHVS ($r = -.48, p < .001$), which indicates that those who scored higher on the OHVS had less time between dental visits. The four factors had small to large negative relations to time between dental visits ($rs = -.23$ to -.57, all $p < .001$).
Discussion

The purpose of this study was to develop a reliable and valid instrument of oral health values. A final 23-item scale with four factors was derived based on results from an exploratory principal factors analysis. The final scale had excellent internal consistency ($\alpha = .91$) and each of the four subcomponents had high internal consistency ($\alpha = .76$ to .87). The final scale accounted for a large portion of the total variance in the 23 items (i.e., accounting for 58.49% of the variance). While it is generally recommended that the variance explained by a scale constitute at least 60% of the total variance in items (Hair et al., 2009), it is not unusual in psychology and the social sciences to have scales that account for much less variance (e.g., $> 40\%$). The first factor, dental attendance, explains 37.60% of the total variance, indicating that it may be a useful standalone measure for examining some oral health behaviors and outcomes.

Correlations between the reduced scale and other oral health variables were conducted to examine convergent validity. Positive associations with oral health literacy and intent to engage in oral health behaviors provided evidence of the convergent validity of the scale. The OHVS was negatively related to dental indifference and lower oral health-related quality of life, providing further evidence of convergent validity. Furthermore, only the attendance factor of the OHVS was moderately, negatively correlated with distrust of dentists. Since attendance is the only aspect of oral health values involved dental care professionals measured by the OHVS, the lack of meaningful associations between the DBS and the overall scale and other factors is understandable. The flossing and retention factors of the OHVS were weakly related to lower OHRQoL, suggesting that lower value of flossing and retention of natural teeth may not indicate more negative oral health impacts. In addition, retention of natural teeth may not have been strongly associated with negative oral health impacts due to the average participant likely not
being affected by edentulism given the mean age ($M = 39.69$). Future research in this area might examine whether the OHVS and its factors are related to oral health outcomes in regard to the number of decayed, missing, or filled teeth a person has to determine whether oral health values are related to people’s oral health status, particularly since there is an abundance of evidence linking lower OHRQoL to poorer oral health status (Cunha-Cruz, Hujoel, & Kressin, 2007; Naito et al., 2006).

The relatively weak association between oral health values and dental fear appears to be driven by the factor of the OHVS related to dental attendance. It may be that highly dentally fearful individuals have lower values with dental attendance specifically because professional dental care is intensely anxiety-provoking, whereas other aspects of oral health values (e.g., appearance, daily flossing and tooth brushing care) are unrelated to dental fear because those situations do not elicit a fear response. Specific values related to dental attendance may help explain why there appears to be symptomatic attendance in individuals with high dental fear. That is, dentally fear people tend to seek professional dental care when there is a significant problem with their oral health and avoid regular dental checkups and examinations (Armfield, Stewart, & Spencer, 2007). While it might be expected that dentally fearful individuals would not value professional dental care as highly, there is no evidence to suggest that those with higher dental fear differ from non-dentally fearful people in other aspects of oral health values. The appearance, flossing, and retention factors of the OHVS were not related to dental fear. This pattern of correlations between the remaining subcomponents and dental fear suggest that the scale may have some evidence of discriminant validity.

There was no association between the OHVS and the DFT-O. The DFT-O seems to lack discriminant validity and may not be suitable for correlational analyses as a percentage variable.
The relation between the OHVS and the IRTS was relatively weak. It is possible that the weak association is due to the IRTS being a single, rank-order item. In addition, the other options ranked in the IRTS do not include ones related to oral or overall health. It seems unlikely that people would ever actually have to directly choose between having a vacation and keeping their natural teeth.

Oral health behaviors were related to the OHVS and its factors in the hypothesized ways. Those with higher scores on the OHVS brushed their teeth more times per day and flossed more days per week. While all four factors were related to these outcomes, the flossing factor was most strongly related to toothbrushing and flossing. Higher oral health values were associated with spending less time between dental visits. The attendance factor had the strongest association with time between dental visits, perhaps because those values closely reflect a commitment to receiving professional cleanings and exams.

Overall, Study 2 was successful in developing a multidimensional measure of oral health values with good psychometric properties. Study 3 was conducted to confirm the internal structure of the scale.

**Study 3**

The purpose of this study was to examine and confirm the internal structure of the OHVS in a new sample. In order to determine the underlying structure, the scale was administered to a large validation sample and confirmatory factor analysis (CFA) was conducted. The relations among the OHVS and other measures related to oral health were analyzed to provide evidence of convergent validity. It was hypothesized that a similar pattern of relations would emerge as seen in the developmental sample data set. Specifically, it was expected that some factors of oral health values would be positively associated with the importance of retaining natural teeth and
oral health literacy. It also was anticipated that some factors of oral health values would be negatively related to distrust of dentists, dental neglect, apathy toward dental care, dental fear, and oral health-related quality of life. The ability of the total OHVS and its factors to statistically predict oral health-related outcomes (e.g., brushing, flossing, dental attendance) also was examined.

Method

Participants

Participants were 308 adults living in the USA aged 18 to 98 ($M = 36.01, SD = 12.14$). No participants were excluded from the analysis as all participants passed at least three out of four validity check items and did not exhibit other forms of invalid responding. In this sample, 53.2% of participants identified as female. Participants reported their ethnicity as 83.4% Caucasian ($n = 257$), 7.8% African American ($n = 24$), 5.2% Asian ($n = 16$), 0.6% American Indian/Alaskan Native ($n = 2$), 1.9% Multiracial ($n = 16$), and 1.0% other ($n = 3$). Only 4.2% ($n = 13$) of participants identified as being of Hispanic or Latino descent. In this sample, median income was between $50,000 and $74,999, and the median level of education was 16 years. Participants were from 45 different states in the USA, and 29.2% identified as living an urban place, 45.8% identified as living in a suburban place, and 25.0% identified as living in a rural place. WVU IRB approval (protocol # 1605115368) is on file for the study.

Measures

The same set of measures included in Study 2 were used in Study 3. These instruments were used to determine the consistency of relations among oral health values and related concepts.
Procedure

The OHVS and a battery of measures related to oral health were administered to a large validation sample of adult workers with HIT acceptance rate 95% or greater on MTurk. Participants from the developmental sample were excluded from taking part in the validation study. In order to conduct confirmatory factor analysis with structural equation modelling, a sample size of at least 150 to 200 subjects is recommended, and it is often recommended to have 10 subject per variable/item of interest (Anderson & Gerbing, 1988; Wolf, Harrington, Clark, & Miller, 2013). Participants completed an online consent form before completing the questionnaires. Participants completed the same set of questionnaires (OHVS, OHIP-14, DFS, DIS, DFT-O, DNS, IRTS, HeLD, DBS, MCSDS, and demographics questionnaire) as the developmental sample. All questionnaires were presented in a randomized order with the exception of the OHVS appearing first and the demographics questionnaire appearing last. Confirmatory factor analysis was conducted on the OHVS to determine if the internal structure of the OHVS was the same. Correlational analyses were performed to determine the associations among the OHVS and the other study measures.

Results

Descriptive Statistics

The data were examined for missingness and to ensure that statistical assumptions were met (e.g., normal distribution, presence of outliers). As in the developmental sample, there were no missing data except for the DFT-O utility score. Participants were required to provide an answer to every question in the study measures. However, for the DFT-O, 11 participants answered with a non-numeric response, such as “none, I have no free time” or “a couple of hours.” These responses were counted as missing data with the result that the DFT-O had 3.57%
missing data; the missing cases were excluded pairwise in our statistical analyses. Most of the measures were normally distributed. However, the OHIP (skew = 1.02, kurtosis = .35), DIS (skew = .53, kurtosis = -.36), HeLD (skew = -.76, kurtosis = -.18), and R-DBS (skew = .64, kurtosis = -.48) had non-normal distributions (i.e., they were each slightly skewed). These measures were log-transformed. The transformations did not normalize the distributions for the OHIP (skew = .43, kurtosis = -1.00), DIS (skew = .21, kurtosis = -1.12), HeLD (skew = -1.11, kurtosis = .73), and R-DBS (skew = .06, kurtosis = -1.21). As in Study 2, the non-transformed versions of these scales were used in subsequent correlational analyses with bootstrapping of 1,000 samples. Similarly, correlations conducted with the IRTS and DFT-O were performed with bootstrapping. See Table 10 for descriptive information on the total scales and the four factors of the OHVS. The internal structure of the OHVS in the validation sample was excellent (α = .92). The attendance (α = .87), appearance (α = .87), flossing (α = .73), and retention (α = .71) factors had acceptable internal consistency.

**Confirmatory Factor Analysis**

Confirmatory factor analysis (CFA) was conducted with structural equation modelling (SEM) using the AMOS statistical package to determine if the four factors of oral health values found in the PCA from Study 2 (i.e., attendance, appearance, flossing, and retention) could be modeled as latent variables with the validation sample data. For each of the four factors, the observed items loading onto that factor were included in the model. In addition, the item that loaded most strongly onto each factor was theorized to be the best indicator of that factor and its factor loading was set to one. In the model, attendance, appearance, flossing, and retention were allowed to covary. See Figure 3. This decision was made since the four factors were found to be related to one another in Study 2. Pearson’s $r$ correlation coefficients were conducted to provide
evidence for these relations again with the validation sample data set. There were moderate to large, positive relations among the four factors. See Table 11. The model is recursive because it does not contain feedback loops and error values were not allowed to covary. In order to determine the fit of the model, several indices were evaluated. It is recommended to report at least one comparative fit index (e.g., CFI) and a residual-based fit index (e.g., RMR; Tabachnick & Fidell, 2013).

The resulting model showed acceptable to poor fit overall, $\chi^2 = 604.90$ (224, $N = 308$), $p < .001$, CMIN/DF = 2.70, SRMR = .059, CFI = .880, TLI = .865, RMSEA = .074. Many guidelines have been suggested for SEM model fit indices (Hooper, Coughlan, & Mullen, 2008; Tabachnick & Fidell, 2013). The $\chi^2$ values is an absolute measure of fit and is considered acceptable when $p > .050$. In general, CFI and TLI values greater than or equal to .90 are indicative of good model fit. RMSEA values lower than .05 are ideal, however, values as high as .08 are considered acceptable. It is recommended that the CMIN/DF value be less than 3, however, values less than 2 are considered optimal. Lower SRMR values are considered acceptable (e.g., less than .08). While some indices showed acceptable model fit (i.e., CMIN/DF, SRMR, RMSEA), other fit indices reflected relatively poor model fit (i.e., $\chi^2$, CFI, TLI).

Modification indices were examined to determine if some variables should be allowed to covary or enter into a predictive relationship to improve the model fit. By allowing some of the error terms to covary, the overall model fit improved, $\chi^2 = 467.97$ (217, $N = 308$), $p < .001$, CMIN/DF = 2.16, SRMR = .067, CFI = .921, TLI = .908, RMSEA = .061. See Figure 4. Standardized regression weights reflected that the model accounted for a large portion of the variance (39% to 87%) in the items for each factor. The model fit was improved by making some changes based
on the modification indices. Nonetheless, overall fit was still in the acceptable to poor range for the fit indices (Hu & Bentler, 1999).²

**Impact of Social Desirability**

The relations among the Marlowe-Crowne Social Desirability Scale (MCSDS) and other study measures were examined with Pearson’s $r$ correlation coefficients to determine if participants represented themselves in an overly positive manner, with bootstrapping of 1,000 samples. There was a small, positive relation between the MCSDS and the OHVS ($r = .12, p = .035$), suggesting that respondents may have presented themselves in a more favorable way on this measure. The attendance ($r = .08, p > .10$), appearance ($r = .09, p > .10$) and retention ($r = .004, p > .10$) factors of the OHVS were not related to social desirability, however, the flossing factor was positively related to social desirability ($r = .27, p < .001$). There was no relation between the MCSDS and oral health-related quality of life ($r = -.03, p > .10$), dental indifference ($r = -.05, p > .10$), dental free time trade-off ($r = .006, p > .10$), importance of retaining natural teeth ($r = .03, p > .10$), dental fear ($r = -.11, p = .050$) and oral health literacy ($r = .10, p = .074$). In contrast, there was a small, negative relation between the MCSDS and distrust of dentists ($r = -.14, p = .014$), indicating that participants may have minimized their responses for this socially undesirable characteristic. Since participants responded in socially desirable ways to some study measures, the MCSDS was included as a covariate in the remaining correlational analyses.

² Principal axis factoring with promax rotation was also conducted on the developmental data set to determine if there were any differences in the factor structure based on extraction method. There were no differences in the number of factors extracted or item loadings, except that item #1 did not load strongly onto any one factor with the principal axis factoring. The exclusion of this item in confirmatory factor analysis SEM did not improve model fit for the OHVS. Principal components analysis of the validation data set revealed some differences in factor structure between the two samples.
Convergent Validity

Convergent validity was assessed by examining the relation of the OHVS to the OHIP, DFS, DIS, DFT-O, DNS, IRTS, HeLD, and R-DBS. Partial correlations controlling for social desirability were conducted between all Study 3 measures using bootstrapping with 1,000 samples. See Table 12 for partial correlations among Study 3 measures. As in Study 2, correlations of at least moderate magnitude ($r \geq .30$) were considered demonstrative of convergent validity (Cohen, 1988).

A similar pattern of relationships emerged between oral health values and other oral health-related constructs as seen in Study 2. As expected, the OHVS had a large, positive relation to oral health literacy ($r = .57, p < .001$). The four factors, attendance ($r = .58, p < .001$), appearance ($r = .50, p < .001$), flossing ($r = .23, p < .001$), and retention ($r = .50, p < .001$), also had small to large positive associations with the HeLD. These findings suggest that participants with higher oral health value also have higher oral health literacy. The OHVS ($r = .72, p < .001$) and its four factors ($rs .47 to .67, all p <.001$) had moderate to large, positive associations with oral hygiene behaviors as measured by the DNS, indicating that oral health values are related to less dental neglect. As seen in Study 2, the OHVS and its four factors (all $p > .10$) were not related to the utility score of the DFT-O, reflecting that oral health values may not be related to the amount of additional time participants are willing to spend on dental care. The OHVS had a small, negative relation ($r = -.19, p = .001$) with the IRTS which reflects that participants with higher oral health values were more likely to rate retention of natural teeth as the most preferred option. The attendance ($r = -.21, p < .001$) and retention ($r = -.17, p = .004$) factors also were negatively related to the IRTS, however, the appearance ($r = -.10, p = .075$) and flossing ($r = -$
.11, \( p < .056 \)) factors were not associated with the IRTS. This suggests that only some aspects of oral health values may be related to the desire to retain one’s natural teeth.

The OHVS was negatively related to dental indifference \((r = -.64, p < .001)\); participants with higher oral health values endorsed less apathy toward dental health. The attendance \((r = -.67, p < .001)\), appearance \((r = -.41, p < .001)\), flossing \((r = -.45, p < .001)\), and retention \((r = -.50, p < .001)\) factors of the OHVS also had moderate, negative associations with the DIS. The OHVS also had a negative association with the OHIP \((r = -.34, p < .001)\), providing evidence that oral health values are related to greater oral health-related quality of life. Similarly, the attendance \((r = -.35, p < .001)\), appearance \((r = -.28, p < .001)\), and retention \((r = -.38, p < .001)\) factors of the OHVS were negatively related to the OHIP, indicating that these dimensions of oral health values are associated with less negative impact of oral health on functioning. However, the flossing factor did not have a significant relation to the OHIP based on bootstrapping, 95% CI \([- .240, .002]\), \( r = -.12, p = .044 \). The OHVS was negatively related to distrust of dentists \((r = -.48, p < .001)\) as were the attendance \((r = -.56, p < .001)\), appearance \((r = -.56, p < .001)\), flossing \((r = -.19, p = .001)\), and retention \((r = -.39, p < .001)\) factors of the OHVS. In contrast to Study 2, the OHVS and all four factors were negatively related to the DFS \((rs -.21 \text{ to } -.44, \text{ all } p < .001)\), reflecting that individuals with higher oral health values were somewhat more likely to report fear of dental situations and stimuli.

Partial correlations between the OHVS and oral health behaviors were examined, controlling for social desirability. See Table 13 for partial correlations between oral health behaviors and the OHVS. The OHVS had significant relations to oral health behaviors. Frequency of toothbrushing was positively related to the OHVS and its four factors \((rs = .19 \text{ to } .30, \text{ all } p < .01)\). The OHVS and its four factors were also associated with flossing \((rs = .31 \text{ to} \)
Time spent between dental visits had a small negative association with the OHVS \( (r = -0.49, p < .001) \) and small to large negative associations with the four factors of the OHVS \( (rs = 0.25 \text{ to } -0.57, \text{ all } p < .001) \).

**Discussion**

The aim of this study was to confirm the underlying structure of the OHVS derived in Study 2. The OHVS had excellent internal consistency, \( \alpha = 0.92 \), and its four subcomponents had high internal consistency \( (\alpha_s = 0.71 \text{ to } 0.87) \). The OHVS was administered to a large validation sample to determine if the structure found in the developmental sample held in a different sample. Confirmatory factor analysis with structural equation modeling was conducted to examine the theorized set of relations among the items and factors (attendance, appearance, flossing, and retention). Overall, the model fit for the OHVS ranged from acceptable to poor depending on the fit index. The lack of consistent model fit suggests that the structure of the OHVS may have differed between the developmental and validation samples. A difference in underlying scale structure may be due to differences between the samples. For example, the validation sample had a higher percentage of male participants than the developmental sample and male participants may have a different response pattern to items on the OHVS than female participants. Furthermore, social desirability was related to responses to the OHVS in the validation sample but not in the developmental sample, suggesting that participants were more likely to respond in socially favorable ways to items.

While both the developmental and validation samples were collected through Amazon’s MTurk, the developmental sample used participants who were “master workers” whereas the validation sample enrolled participants who had a 95% or better approval rating on the site. The “master worker” status requirements are proprietary information not released to researchers,
however, it is likely that there are more stringent criteria to be a “master worker” beyond a high approval rating. Therefore, the participants in the two samples may have had slightly different rates of attention and engagement to study tasks.\(^3\) In addition to possible differences between the samples, the scale itself may not have a stable structure. Some items on the OHVS may not have consistent relations to the factors and overall scale due to items being poorly worded or due to sources of measurement error (e.g., similarity in item wording). Additional analyses could be conducted to determine if sample differences led to the lack of consistent structure between the two samples. Future research may reexamine the wording of items on the OHVS to ensure that items are expressed clearly and simply. Administering the OHVS to a different kind of sample besides an online platform like MTurk would reveal additional information about the underlying structure of the OHVS.

The relations between oral health values and other oral health-related constructs was examined to provide evidence of convergent validity. In Study 3, the OHVS was generally related to the other measures in the same associations revealed in Study 2. In both studies, oral health values were positively related to oral health literacy and engagement in dental self-care. These associations indicate that participants with higher oral health values were more likely to have greater oral health literacy and to be more attentive to dental care. Each of the four factors of the OHVS were positively related to oral health literacy and dental care. Oral health values were not related to the utility score of the DFT-O. As discussed in Study 2, the DFT-O may lack discriminant validity since scores tend to hang toward the upper extreme with most participants having high utility scores. As anticipated, oral health values were related to retention of natural

\(^3\) Note that there has not been systematic research conducted on this area of the MTurk labor market. The current study did not exclude master workers from the validation sample, therefore, some participants from the validation sample could have been master workers.
teeth. While most of the individual factors of the OHVS held the same relations with this measures, there were some exceptions. Only the attendance and retention factors of the OHVS were related to the retention of natural teeth, indicating that these aspects of oral health values may be more predictive of one’s desire to retain natural teeth. The same pattern of relations between oral health values and retention of natural teeth that was observed in Study 2 and the strength and direction of relations did not differ, suggesting that oral health values, especially attendance and retention aspects, are consistently related to the desire to retain one’s natural teeth.

The OHVS and its four factors were negatively related to distrust of dentists and apathy toward dental care, providing further evidence of convergent validity. These relations were the same as those produced in Study 2, reflecting that the associations between oral health values and distrust of dentists and dental indifference are reliable across different samples. Oral health values were negatively associated with lower OHRQoL, indicating that those with higher oral health values perceive less negative impacts on their life from their oral health. Overall, the OHVS and its four factors had slightly stronger relations to OHRQoL in Study 3 than in Study 2, although the flossing factor was weakly associated with OHRQoL in both samples. These small differences may reflect that in this validation sample some items of the OHVS were not associated in the same ways that were found in Study 2. There was a somewhat different pattern of correlations between oral health values and dental fear in the validation sample. In the developmental sample, only the overall scale and the attendance factor were related to dental fear. In contrast, the OHVS and all four factors were negatively related to dental fear in the validation sample, indicating that those with higher oral health values were less likely to be dentally fearful. Given the inconsistent model fit from the CFA, these differences between the
two samples may reflect that participants in each sample responded to some items in different ways. In future research, it would be helpful to examine the predictive ability of the OHVS and the DFS for oral health behaviors and outcomes.

As in study 2, the OHVS and its four factors were related to oral health behaviors. The OHVS was positively associated with brushing and flossing behavior and negatively associated with larger amounts of time between dental visits. Furthermore, the flossing factor was more strongly related to brushing and flossing than the other factors. This may be because flossing is, in some ways, a more optional preventive dental practice. Recent reports indicate that flossing may not offer additional benefit above and beyond toothbrushing (Teo, Brenner, & Bal, 2017), although, this is an area of controversy in the field of dentistry. Since flossing may not be as essential to oral health as some other oral health behaviors, having high oral health values related to flossing may be more indicative of a person’s oral health behavior than other oral health values such as having positive oral health values related to appearance. The attendance factor was more strongly related to time between dental visits than the other factors, which suggests that attendance related oral health values may be predictive of regular dental attendance.

Study 3 aimed to confirm the factor structure found in Study 2, however, the model fit from the CFA was inconsistent with some fit indices indicating poor fit (CFI, TLI) and others reflecting adequate to good fit (SRMR, RMSEA). Exploratory principal components analysis could be conducted on the validation sample data set to determine if items do not load onto the same factors as items did in the developmental data set. Nonetheless, the correlations among the OHVS and its four factors and other study measures were generally similar between the two samples. This consistency provides evidence for the convergent validity of the scale and suggests that even if there are slight structural differences between the developmental and validation
samples, the OHVS and its four factors are meaningful indicators of the importance one places on oral health.

**General Discussion**

These three studies aimed to develop and validate a new scale to measure values associated with oral health, the OHVS. In Study 1, the content validity of the items of the OHVS was examined. Results showed that items had medium to high representativeness, relevance, specific, and clarity. The OHVS was administered to a large developmental sample in Study 2; a four factor structure was determined from principal component analysis and the OHVS exhibited good internal consistency and evidence of convergent validity. Finally, Study 3 validated the factor structure found in Study 2, although the model fit from confirmatory factor analysis suggests that the structure of the OHVS may not have been consistent across Study 2 and Study 3. Correlations among the OHVS and other measures of oral health-related constructs and oral health behaviors in Study 2 and 3 provided further evidence of the convergent and concurrent validity of the OHVS. The scale and its four factors had high internal consistency.

The OHVS is intended for use in behavioral dentistry research settings. It may provide a useful indicator of the importance a person places on oral health and be predictive of oral health behaviors. As a measure of the subset of attitudes related to the abstract goal of good oral health, the OHVS offers an overall rating of a person’s attitudes toward engaging in various oral health behaviors. When considering Ajzen’s (1991) theory of planned behavior, one’s attitude toward a behavior is influential in whether a person actually performs the behavior. If a person has a favorable attitude toward a behavior and there are strong subjective norms to take part in the behavior and perceived ability to do the behavior, then a person has a stronger intent or motivation to do the behavior. In oral health, having favorable attitudes toward oral health in
societies wherein there is a pressure to have good oral hygiene may result in greater behavioral intent and increased dental care behaviors for individuals who perceive that they have behavioral control.

Since many western societies, including the USA, have a subjective norm to engage in oral hygiene and preventive care, it might be anticipated that there would be little variation in people’s oral health behaviors. The literature shows, however, that a large percentage of Americans do not see a dentist regularly and do not brush or floss as often as is recommended (Institute of Medicine, 2011). Despite the strong subjective norms to engage in good oral hygiene, many Americans do not take proper care of their teeth and gums. Therefore, one’s attitudes toward oral health may provide a discriminative measure of who is more likely to perform oral hygiene behaviors in our culture. As an approximate measure of oral health values and attitudes, the OHVS may have predictive utility for a host of oral health behaviors and outcomes, including attendance of professional dental appointments, frequency of flossing and brushing, caries experience, and periodontal disease. Furthermore, each of the four factors generally had the same relations with study measures as the overall scale, suggesting that the factors may be able to individually predict oral health behaviors and outcomes.

The OHVS shows much promise of being a useful measure in epidemiological and behavioral dentistry research, however, there are some limitations inherent to its development and validation and to the scale itself. First, the samples for development and validation were obtained online through Amazon’s MTurk. It is not possible to verify participants’ identity due to this data collection method. In addition, participants from MTurk may be more likely to exhibit demand effects and respond in socially desirable ways than other types of samples.
(Paolacci & Chandler, 2014). It would be useful to have additional data from an in-person sample to see if the results obtained here generalize to other populations.

Second, all measures used in these studies were self-report assessments and questionnaires. Participants may not have responded truthfully or accurately to all items. Multi-method designs should also be used in future studies examining the reliability and validity of the OHVS. In particular, informant reports, behavioral measures, and archival evidence (e.g., chart reviews to determine dental attendance) alongside self-report measures would provide additional information about the psychometric properties of the OHVS. While there is evidence of convergent and concurrent validity for the OHVS, the present studies do not provide evidence of discriminant validity, an important element of construct validity. Inclusion of measures that should have no relation to the OHVS is essential to follow-up studies.

Third, the same set of measures was used in the developmental and validation samples. While this was helpful in showing the consistency of the relation of the OHVS to other measures across samples, using the same measures does not provide evidence of generalizability. For instance, it is not clear if the OHVS and dental fear are related when dental fear is assessed with other self-report measures, or if the OHVS would be related to observable behavioral avoidance in dental situations. For several study measures (e.g., DIS, DNS, DFT-O, IRTS), there do not appear to be measures of the same constructs available in other formats. In addition, some study measures (OHIP, DFS) are so widely used in behavioral dentistry that it would not be advisable to use similar scales of lower quality. Future research may examine the generalizability of the relations found here by using alternative measures of oral health literacy, dental fear, and oral health-related quality of life.
Finally, the OHVS has some limitations as a measure. The OHVS is a Likert-type self-report measure and is thus a subjective view of a person’s oral health values that may be influenced by social desirability bias. While the initial item pool for the OHVS was examined for content validity, revised items were not resubmitted to expert review.

Overall, the OHVS produced in these studies appears to be a reliable and valid scale of oral health values. There is still work, however, to be done in demonstrating that the factor structure observed in these samples is consistent and generalizable. Next steps for the OHVS include administering the scale to an in-person and representative sample, examining the relation between the OHVS and oral health indicators (e.g., periodontal disease, caries), and examining the relation between the OHVS and oral health behaviors. While the OHVS still has some steps ahead to provide evidence of a stable factor structure, the scale has good psychometric properties and will be useful in future research in behavioral dentistry.
References


<table>
<thead>
<tr>
<th>Item</th>
<th>M (SD) of Representativeness and Relevance</th>
<th>M (SD) of Specificity and Clarity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Keeping all of my natural teeth is a priority for me.</td>
<td>4.25 (.75)</td>
<td>3.92 (.90)</td>
</tr>
<tr>
<td>2. It is okay if you have a tooth in the back of your mouth pulled.</td>
<td>3.25 (1.06)</td>
<td>3.00 (1.21)</td>
</tr>
<tr>
<td>3. It is very important to me to keep all of my natural teeth.</td>
<td>4.42 (.67)</td>
<td>4.25 (.87)</td>
</tr>
<tr>
<td>4. I would not mind if I had to have a false tooth or a “bridge.”</td>
<td>3.50 (.91)</td>
<td>3.58 (.90)</td>
</tr>
<tr>
<td>5. I would prefer to save a tooth even if it would be cheaper to have the tooth pulled.</td>
<td>4.25 (.75)</td>
<td>4.17 (.75)</td>
</tr>
<tr>
<td>6. I would rather get dentures than have to take care of my natural teeth.</td>
<td>4.17 (.94)</td>
<td>4.17 (1.03)</td>
</tr>
<tr>
<td>7. Fixing a broken tooth is only needed if it is uncomfortable in your mouth or causes pain.</td>
<td>3.92 (1.08)</td>
<td>3.75 (1.14)</td>
</tr>
<tr>
<td>8. It is important to me to have white teeth.</td>
<td>3.58 (.90)</td>
<td>3.92 (.90)</td>
</tr>
<tr>
<td>9. It does not matter to me whether my smile is &quot;perfect.&quot;</td>
<td>3.67 (1.07)</td>
<td>3.67 (1.07)</td>
</tr>
<tr>
<td>10. Having a few stains on your teeth is pretty normal.</td>
<td>3.67 (1.16)</td>
<td>3.83 (.84)</td>
</tr>
<tr>
<td>11. Having healthy-looking gums is important to me.</td>
<td>4.08 (.67)</td>
<td>4.00 (.95)</td>
</tr>
<tr>
<td>12. I avoid foods that will stain my teeth.</td>
<td>3.67 (1.07)</td>
<td>3.83 (.94)</td>
</tr>
<tr>
<td>13. Your smile is a very important part of your appearance.</td>
<td>4.33 (.99)</td>
<td>4.17 (.94)</td>
</tr>
<tr>
<td>14. It does not matter whether your breath smells nice.</td>
<td>3.42 (1.38)</td>
<td>3.50 (1.45)</td>
</tr>
<tr>
<td>15. I would not mind if I had a missing tooth in the front of my mouth.</td>
<td>4.50 (.80)</td>
<td>3.83 (1.12)</td>
</tr>
<tr>
<td>16. If you have a toothache it is best to wait and see if it will go away on its own.</td>
<td>4.25 (.75)</td>
<td>3.83 (1.19)</td>
</tr>
<tr>
<td>17. Getting dental checkups regularly is an excellent use of time and money.</td>
<td>4.42 (.90)</td>
<td>4.00 (1.13)</td>
</tr>
<tr>
<td>18. Taking off from work or other activities to go for dental care is a good use of time.</td>
<td>4.00 (1.04)</td>
<td>3.75 (1.06)</td>
</tr>
<tr>
<td>19. If I had to put off dental care so that I could buy something I really wanted, that would be alright with me.</td>
<td>4.08 (.90)</td>
<td>3.67 (.99)</td>
</tr>
<tr>
<td>20. Dental care is too expensive given what you get out of it.</td>
<td>3.67 (1.56)</td>
<td>3.17 (1.40)</td>
</tr>
<tr>
<td>21. Dental care has to be a very low priority for me given other needs in life.</td>
<td>4.08 (1.00)</td>
<td>3.42 (1.17)</td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td>------</td>
<td>-----------------------------------------------------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>22</td>
<td>Even though dental treatment is painful sometimes, it is still worth it in the long run.</td>
<td>3.83 (1.47)</td>
</tr>
<tr>
<td>23</td>
<td>I think it is important for me to see a dentist or hygienist regularly.</td>
<td>4.58 (.52)</td>
</tr>
<tr>
<td>24</td>
<td>I think you can overcome most dental problems by waiting them out.</td>
<td>3.92 (1.31)</td>
</tr>
<tr>
<td>25</td>
<td>Having pain or a broken tooth are the primary reasons one should go for dental care.</td>
<td>4.17 (1.03)</td>
</tr>
<tr>
<td>26</td>
<td>Getting a dental exam to hear that everything is &quot;okay&quot; is really not worth my money or time.</td>
<td>3.67 (1.37)</td>
</tr>
<tr>
<td>27</td>
<td>Buying a new toothbrush every three to four months is a good investment.</td>
<td>3.33 (1.56)</td>
</tr>
<tr>
<td>28</td>
<td>Flossing your teeth every day is really not necessary.</td>
<td>4.00 (1.21)</td>
</tr>
<tr>
<td>29</td>
<td>I think that brushing your teeth at least twice every day is absolutely essential.</td>
<td>3.75 (1.42)</td>
</tr>
<tr>
<td>30</td>
<td>Spending money on mouthwash is a luxury.</td>
<td>4.33 (.78)</td>
</tr>
<tr>
<td>31</td>
<td>The condition of my teeth and gums is an important part of my overall health.</td>
<td>3.33 (1.30)</td>
</tr>
<tr>
<td>32</td>
<td>I make sure I have floss available whenever I need it.</td>
<td>4.50 (1.17)</td>
</tr>
<tr>
<td>33</td>
<td>Going to a dentist or hygienist is more expensive than it should be.</td>
<td>3.50 (1.24)</td>
</tr>
<tr>
<td>34</td>
<td>If you are busy, it is okay to miss a day or two of flossing.</td>
<td>3.58 (1.38)</td>
</tr>
<tr>
<td>35</td>
<td>Flossing every day is not important.</td>
<td>3.58 (1.38)</td>
</tr>
<tr>
<td>36</td>
<td>Spending money to buy floss is wasteful.</td>
<td>3.58 (1.31)</td>
</tr>
<tr>
<td>37</td>
<td>I am willing to spend a full two minutes twice a day to brush my teeth.</td>
<td>4.33 (.78)</td>
</tr>
<tr>
<td>38</td>
<td>Getting braces to straighten your teeth is a good investment of time and money.</td>
<td>4.08 (.79)</td>
</tr>
<tr>
<td>39</td>
<td>It is silly to get braces to straighten your teeth just a little bit.</td>
<td>3.50 (1.38)</td>
</tr>
<tr>
<td>40</td>
<td>Braces have the potential to improve your bite and quality of life.</td>
<td>3.92 (1.00)</td>
</tr>
<tr>
<td>41</td>
<td>Braces are often more of a luxury than a necessity.</td>
<td>4.00 (1.21)</td>
</tr>
<tr>
<td>42</td>
<td>I think it is important to have braces as soon as problems are identified.</td>
<td>4.00 (.85)</td>
</tr>
<tr>
<td>43</td>
<td>It would not bother me to have dentures.</td>
<td>4.17 (1.12)</td>
</tr>
<tr>
<td>44</td>
<td>Even though braces are expensive, they are a good investment because they can improve the appearance of your teeth.</td>
<td>3.75 (1.36)</td>
</tr>
</tbody>
</table>
45. Spending money on braces is a waste of time and money.\textsuperscript{B} 3.67 (1.37) 3.58 (1.24)

\textit{Note:} \textsuperscript{A} = item retained for developmental sample, \textsuperscript{B} = item removed from scale, \textsuperscript{C} = item revised and reworded for developmental sample based on wording suggestions from content experts
Table 2. *Mean, standard deviation, and internal consistency of total scores of Study 2 measures.*

<table>
<thead>
<tr>
<th>Measure</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Cronbach’s Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>OHVS-30</td>
<td>114.59</td>
<td>18.17</td>
<td>0.93</td>
</tr>
<tr>
<td>OHVS-23</td>
<td>86.12</td>
<td>14.44</td>
<td>0.91</td>
</tr>
<tr>
<td>Attendance</td>
<td>30.02</td>
<td>6.43</td>
<td>0.86</td>
</tr>
<tr>
<td>Appearance</td>
<td>28.50</td>
<td>4.68</td>
<td>0.87</td>
</tr>
<tr>
<td>Flossing</td>
<td>11.60</td>
<td>3.78</td>
<td>0.78</td>
</tr>
<tr>
<td>Retention</td>
<td>13.41</td>
<td>2.24</td>
<td>0.76</td>
</tr>
<tr>
<td>OHIP</td>
<td>24.62</td>
<td>10.11</td>
<td>0.94</td>
</tr>
<tr>
<td>DFS</td>
<td>49.38</td>
<td>21.15</td>
<td>0.97</td>
</tr>
<tr>
<td>DIS</td>
<td>2.95</td>
<td>2.00</td>
<td>0.67</td>
</tr>
<tr>
<td>DFT-O</td>
<td>0.90</td>
<td>0.16</td>
<td>N/A</td>
</tr>
<tr>
<td>DNS</td>
<td>22.06</td>
<td>5.12</td>
<td>0.80</td>
</tr>
<tr>
<td>IRTS</td>
<td>2.37</td>
<td>1.57</td>
<td>N/A</td>
</tr>
<tr>
<td>HeLD</td>
<td>59.31</td>
<td>9.25</td>
<td>0.90</td>
</tr>
<tr>
<td>R-DBS</td>
<td>58.45</td>
<td>25.7</td>
<td>0.97</td>
</tr>
<tr>
<td>MCSDS</td>
<td>5.63</td>
<td>3.51</td>
<td>0.82</td>
</tr>
</tbody>
</table>

*Note:* OHVS = Oral Health Values Scale, OHIP = Oral Health Impact Profile, DFS = Dental Fear Survey, DIS = Dental Indifference Scale, DFT-O = Dental Free Time Trade Off, DNS = Dental Neglect Scale, IRTS = Importance of the Retention of Teeth Scale, HeLD = Health Literacy in Dentistry Scale, R-DBS = Revised Dental Beliefs Survey, MCSDS = Marlowe-Crowne Social Desirability Scale
Table 3. *Pearson’s r correlation coefficients among the six extracted factors in the first PCA of Study 2.*

<table>
<thead>
<tr>
<th>Factor</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>.55**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>.39**</td>
<td>.37**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>.41**</td>
<td>.37**</td>
<td>.22**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>.38**</td>
<td>.40**</td>
<td>.24**</td>
<td>.31**</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>.50**</td>
<td>.35**</td>
<td>.38**</td>
<td>.27**</td>
<td>.25**</td>
</tr>
</tbody>
</table>

*Note:* Factor 1 = importance of professional dental care, Factor 2 = importance of oral health/appearance, Factor 3 = value of flossing, Factor 4 = importance of retaining natural teeth, Factor 5 = appearance related concerns, Factor 6 = importance of brushing.

*Note:* **p < .01
Table 4. *Factor loadings of Oral Health Values Scale in Study 2 from first PCA with promax rotation.*

<table>
<thead>
<tr>
<th>Items</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Keeping my teeth healthy is a priority for me.</td>
<td>.464</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. It does not matter to me if I have healthy-looking teeth.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.551</td>
<td></td>
</tr>
<tr>
<td>3. It is worth it to me to take time off work for a dental appointment.</td>
<td></td>
<td></td>
<td></td>
<td>.623</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. It is okay for me to miss a day or two of flossing when I am busy.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.755</td>
</tr>
<tr>
<td>5. I would have a broken tooth fixed only if it caused me discomfort.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.643</td>
<td></td>
</tr>
<tr>
<td>6. My smile is an important part of my appearance.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.687</td>
</tr>
<tr>
<td>7. Going to a dentist is not worth the cost to me.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.760</td>
<td></td>
</tr>
<tr>
<td>8. Flossing my teeth every day is a high priority for me.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.763</td>
</tr>
<tr>
<td>9. I would not mind if I had to have a false tooth or dentures.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.836</td>
</tr>
<tr>
<td>10. The way my teeth and gums look to other people is important to me.</td>
<td></td>
<td></td>
<td></td>
<td>.637</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Dental care is less important to me than other needs in my life.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Brushing my teeth at least two times a day is important to me.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.568</td>
</tr>
<tr>
<td>13. It would not bother me if my teeth looked yellow or stained.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.742</td>
</tr>
<tr>
<td>14. I would prefer to save a tooth even if it would be a lot cheaper to have it pulled.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.573</td>
</tr>
<tr>
<td>15. If I have a toothache, I prefer to wait and see if it will go away on its own before seeing a dentist.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.689</td>
<td></td>
</tr>
<tr>
<td>16. It would not bother me if I lost a tooth and it was visible to others.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.774</td>
</tr>
<tr>
<td>17. I avoid foods and drinks that might stain my teeth.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.654</td>
</tr>
</tbody>
</table>
DEVELOPING AN ORAL HEALTH VALUES SCALE

18. Going to the dentist is only important if my teeth or gums are bothering me. .780
19. I make sure I have dental floss available with me so I have it when I need it. .702
20. I would be willing to put off dental care so that I could buy something I wanted. .575
21. Having healthy-looking gums is important to me. .551
22. I would rather get dentures than spend money to treat cavities or gum disease. .653
23. Getting regular dental checkups is a good use of my time and money. .650
24. It is a priority to me that my breath always smells nice. .727
25. It is important to me to keep my natural teeth. .725
26. I believe it is okay to skip brushing my teeth when I am busy. .655
27. I think it is important for me to see a dentist regularly. .657
28. I think it is important that my teeth and gums are a source of pride. .741
29. Buying a new toothbrush every three to four months is a waste of my money. .703
30. The condition of my teeth and gums is an important part of my overall health. .590

Note: Factor 1 = importance of professional dental care, Factor 2 = importance of oral health/appearance, Factor 3 = value of flossing, Factor 4 = importance of retaining natural teeth, Factor 5 = appearance related concerns, Factor 6 = importance of brushing. Item loadings less than .40 were suppressed.
Table 5. Eigenvalue thresholds from parallel analysis and observed eigenvalues from PCA in Study 2.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Parallel analysis</th>
<th>PCA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.64</td>
<td>10.47</td>
</tr>
<tr>
<td>2</td>
<td>1.55</td>
<td>2.14</td>
</tr>
<tr>
<td>3</td>
<td>1.48</td>
<td>1.73</td>
</tr>
<tr>
<td>4</td>
<td>1.42</td>
<td>1.49</td>
</tr>
<tr>
<td>5</td>
<td>1.37</td>
<td>1.24</td>
</tr>
<tr>
<td>6</td>
<td>1.32</td>
<td>1.01</td>
</tr>
</tbody>
</table>
Table 6. *Pearson’s r* correlation coefficients among the four factors in the second PCA of Study 2.

<table>
<thead>
<tr>
<th>Factor</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>.58***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>.39***</td>
<td>.37***</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>.40***</td>
<td>.43***</td>
<td>.20***</td>
</tr>
</tbody>
</table>

*Note:* Factor 1 = importance of professional dental care, Factor 2 = importance of oral health/appearance, Factor 3 = value of flossing, Factor 4 = importance of retaining natural teeth.

***p < .001
Table 7. *Factor loadings of reduced Oral Health Values Scale in Study 2 from second PCA with promax rotation.*

<table>
<thead>
<tr>
<th>Items</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keeping my teeth healthy is a priority for me.</td>
<td>.440</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>It is worth it to me to take time off work for a dental appointment.</td>
<td>.519</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>It is okay for me to miss a day or two of flossing when I am busy.</td>
<td></td>
<td>.790</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I would have a broken tooth fixed only if it caused me discomfort.</td>
<td>.573</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My smile is an important part of my appearance.</td>
<td></td>
<td>.810</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Going to a dentist is not worth the cost to me.</td>
<td></td>
<td>.772</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flossing my teeth every day is a high priority for me.</td>
<td></td>
<td></td>
<td>.747</td>
<td></td>
</tr>
<tr>
<td>I would not mind if I had to have a false tooth or dentures.</td>
<td></td>
<td></td>
<td>.847</td>
<td></td>
</tr>
<tr>
<td>The way my teeth and gums look to other people is important to me.</td>
<td></td>
<td></td>
<td>.814</td>
<td></td>
</tr>
<tr>
<td>I would prefer to save a tooth even if it would be a lot cheaper to have it pulled.</td>
<td>.570</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If I have a toothache, I prefer to wait and see if it will go away on its own before seeing a dentist.</td>
<td>.691</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I avoid foods and drinks that might stain my teeth.</td>
<td></td>
<td>.693</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Going to the dentist is only important if my teeth or gums are bothering me.</td>
<td>.780</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I make sure I have dental floss available with me so I have it when I need it.</td>
<td>.689</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I would be willing to put off dental care so that I could buy something I wanted.</td>
<td>.660</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Having healthy-looking gums is important to me.</td>
<td>.664</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I would rather get dentures than spend money to treat cavities or gum disease.</td>
<td>.680</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Getting regular dental checkups is a good use of my time and money.</td>
<td></td>
<td>.730</td>
<td></td>
<td></td>
</tr>
<tr>
<td>It is a priority to me that my breath always smells nice.</td>
<td>.722</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>It is important to me to keep my natural teeth.</td>
<td></td>
<td>.726</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I think it is important for me to see a dentist regularly.</td>
<td>.730</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>I think it is important that my teeth and gums are a source of pride.</td>
<td>.721</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The condition of my teeth and gums is an important part of my overall health.</td>
<td>.551</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
Note: Factor 1 = importance of professional dental care, Factor 2 = importance of oral health/appearance, Factor 3 = value of flossing, Factor 4 = importance of retaining natural teeth. Item loadings less than .40 were suppressed.
Table 8. Partial correlations among OHVS and Study 2 measures, accounting for social desirability bias.

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
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<th>10</th>
<th>11</th>
<th>12</th>
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<tbody>
<tr>
<td>1. OHVS</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Attendance</td>
<td>.89***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Appearance</td>
<td>.86***</td>
<td>.65***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Flossing</td>
<td>.69***</td>
<td>.46***</td>
<td>.51***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Retention</td>
<td>.57***</td>
<td>.38***</td>
<td>.46***</td>
<td>.28***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>6. OHIP</td>
<td>-.30***</td>
<td>-.34***</td>
<td>-.18**</td>
<td>-.13*</td>
<td>-.13*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. DFS</td>
<td>-.20**</td>
<td>-.31***</td>
<td>-.04</td>
<td>-.09</td>
<td>.002</td>
<td>.53***</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>8. DIS</td>
<td>-.68***</td>
<td>-.70***</td>
<td>-.47***</td>
<td>-.49***</td>
<td>-.29***</td>
<td>.34***</td>
<td>.29***</td>
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</tr>
<tr>
<td>9. DFT-O</td>
<td>-.02</td>
<td>.01</td>
<td>.08</td>
<td>.02</td>
<td>.002</td>
<td>-.19**</td>
<td>-.20**</td>
<td>.04</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>10. DNS</td>
<td>.73***</td>
<td>.71***</td>
<td>.57***</td>
<td>.55***</td>
<td>.34***</td>
<td>-.46***</td>
<td>-.39***</td>
<td>-.63***</td>
<td>.09</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. IRTS</td>
<td>-.17**</td>
<td>-.16**</td>
<td>-.13*</td>
<td>-.05</td>
<td>-.21***</td>
<td>.12*</td>
<td>.08</td>
<td>.19**</td>
<td>-.01</td>
<td>-.17**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. HeLD</td>
<td>.40***</td>
<td>.43***</td>
<td>.33***</td>
<td>.15*</td>
<td>.19**</td>
<td>-.44***</td>
<td>-.31***</td>
<td>-.38***</td>
<td>.09</td>
<td>.43***</td>
<td>-.20***</td>
<td></td>
</tr>
<tr>
<td>13. R-DBS</td>
<td>-.25***</td>
<td>-.37***</td>
<td>-.14*</td>
<td>-.04</td>
<td>-.01</td>
<td>.57***</td>
<td>.65***</td>
<td>.32***</td>
<td>-.17**</td>
<td>-.44***</td>
<td>.14*</td>
<td>-.49***</td>
</tr>
</tbody>
</table>

Note: OHVS = Oral Health Values Scale, OHIP = Oral Health Impact Profile, DFS = Dental Fear Survey, DIS = Dental Indifference Scale, DFT-O = Dental Free Time Trade Off, DNS = Dental Neglect Scale, IRTS = Importance of the Retention of Teeth Scale, HeLD = Health Literacy in Dentistry Scale, R-DBS = Revised Dental Beliefs Survey

*p < .05, **p < .01, ***p < .001
Table 9. Partial correlations between the OHVS and oral health behaviors in Study 2, controlling for social desirability bias.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Toothbrushing</th>
<th>Flossing per week</th>
<th>Last dental visit</th>
</tr>
</thead>
<tbody>
<tr>
<td>OHVS</td>
<td>.29***</td>
<td>.49***</td>
<td>-.48***</td>
</tr>
<tr>
<td>Attendance</td>
<td>.22***</td>
<td>.38***</td>
<td>-.57***</td>
</tr>
<tr>
<td>Appearance</td>
<td>.21***</td>
<td>.36***</td>
<td>-.28***</td>
</tr>
<tr>
<td>Flossing</td>
<td>.39***</td>
<td>.63***</td>
<td>-.30***</td>
</tr>
<tr>
<td>Retention</td>
<td>.18**</td>
<td>.13*</td>
<td>-.23***</td>
</tr>
</tbody>
</table>

Note: OHVS = Oral Health Values Scale

* p < .05, ** p < .01, *** p < .001
Table 10. *Mean, standard deviation, and internal consistency of Study 3 measures.*

<table>
<thead>
<tr>
<th>Measure</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Cronbach’s Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>OHVS-30</td>
<td>114.31</td>
<td>18.59</td>
<td>0.93</td>
</tr>
<tr>
<td>OHVS-23</td>
<td>86.43</td>
<td>14.72</td>
<td>0.92</td>
</tr>
<tr>
<td>Attendance</td>
<td>29.89</td>
<td>6.31</td>
<td>0.87</td>
</tr>
<tr>
<td>Appearance</td>
<td>28.84</td>
<td>4.66</td>
<td>0.87</td>
</tr>
<tr>
<td>Flossing</td>
<td>12.04</td>
<td>3.60</td>
<td>0.73</td>
</tr>
<tr>
<td>Retention</td>
<td>15.82</td>
<td>3.12</td>
<td>0.71</td>
</tr>
<tr>
<td>OHIP</td>
<td>25.65</td>
<td>11.37</td>
<td>0.95</td>
</tr>
<tr>
<td>DFS</td>
<td>50.51</td>
<td>20.58</td>
<td>0.97</td>
</tr>
<tr>
<td>DIS</td>
<td>2.62</td>
<td>1.74</td>
<td>0.58</td>
</tr>
<tr>
<td>DFT-O</td>
<td>0.93</td>
<td>0.10</td>
<td>N/A</td>
</tr>
<tr>
<td>DNS</td>
<td>22.20</td>
<td>5.06</td>
<td>0.80</td>
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<tr>
<td>IRTS</td>
<td>2.58</td>
<td>1.60</td>
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<tr>
<td>HeLD</td>
<td>58.85</td>
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<td>0.90</td>
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<tr>
<td>R-DBS</td>
<td>58.34</td>
<td>25.36</td>
<td>0.97</td>
</tr>
<tr>
<td>MCSDS</td>
<td>6.29</td>
<td>3.30</td>
<td>0.78</td>
</tr>
</tbody>
</table>

*Note:* OHVS = Oral Health Values Scale, OHIP = Oral Health Impact Profile, DFS = Dental Fear Survey, DIS = Dental Indifference Scale, DFT-O = Dental Free Time Trade Off, DNS = Dental Neglect Scale, IRTS = Importance of the Retention of Teeth Scale, HeLD = Health Literacy in Dentistry Scale, R-DBS = Revised Dental Beliefs Survey, MCSDS = Marlowe-Crowne Social Desirability Scale
Table 11. *Pearson’s r correlation coefficients among the four factors in Study 3.*

<table>
<thead>
<tr>
<th>Factor</th>
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</thead>
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</tr>
<tr>
<td>2</td>
<td>.67***</td>
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<td></td>
</tr>
<tr>
<td>3</td>
<td>.47***</td>
<td>.44***</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>.68***</td>
<td>.66***</td>
<td>.36***</td>
</tr>
</tbody>
</table>

*Note:* Factor 1 = importance of professional dental care, Factor 2 = importance of oral health/appearance, Factor 3 = value of flossing, Factor 4 = importance of retaining natural teeth.

***$p < .001$***
Table 12. Partial correlations among OHVS and Study 3 measures, accounting for social desirability bias.

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. OHVS</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>2. Attendance</td>
<td>.91***</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Appearance</td>
<td>.85***</td>
<td>.67***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Flossing</td>
<td>.67***</td>
<td>.48***</td>
<td>.45***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Retention</td>
<td>.81***</td>
<td>.68***</td>
<td>.67***</td>
<td>.38***</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>6. OHIP</td>
<td>-.34***</td>
<td>-.35***</td>
<td>-.28***</td>
<td>-.12*</td>
<td>-.38***</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>7. DFS</td>
<td>-.39***</td>
<td>-.44***</td>
<td>-.29***</td>
<td>-.21***</td>
<td>-.28***</td>
<td>.48***</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>8. DIS</td>
<td>-.64***</td>
<td>-.67***</td>
<td>-.41***</td>
<td>-.45***</td>
<td>-.50***</td>
<td>.33***</td>
<td>.35***</td>
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</tr>
<tr>
<td>9. DFT-O</td>
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<td>-.05</td>
<td>-.07</td>
<td>-.07</td>
<td>-.05</td>
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</tr>
<tr>
<td>10. DNS</td>
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<td>.67***</td>
<td>.61***</td>
<td>.47***</td>
<td>.56***</td>
<td>-.51***</td>
<td>-.45***</td>
<td>-.62***</td>
<td>-.01</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>11. IRTS</td>
<td>-.19**</td>
<td>-.21***</td>
<td>-.10</td>
<td>-.11</td>
<td>-.17**</td>
<td>.21***</td>
<td>.04</td>
<td>.22***</td>
<td>-.04</td>
<td>-.19**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. HeLD</td>
<td>.57***</td>
<td>.58***</td>
<td>.50***</td>
<td>.23***</td>
<td>.50***</td>
<td>-.52***</td>
<td>-.36***</td>
<td>-.47***</td>
<td>.07</td>
<td>.63***</td>
<td>-.22***</td>
<td></td>
</tr>
<tr>
<td>13. R-DBS</td>
<td>-.48***</td>
<td>-.56***</td>
<td>.56***</td>
<td>.19**</td>
<td>-.39***</td>
<td>.48***</td>
<td>.65***</td>
<td>.39***</td>
<td>-.07</td>
<td>-.51***</td>
<td>.13*</td>
<td>-.50***</td>
</tr>
</tbody>
</table>

Note: OHVS = Oral Health Values Scale, OHIP = Oral Health Impact Profile, DFS = Dental Fear Survey, DIS = Dental Indifference Scale, DFT-O = Dental Free Time Trade Off, DNS = Dental Neglect Scale, IRTS = Importance of the Retention of Teeth Scale, HeLD = Health Literacy in Dentistry Scale, R-DBS = Revised Dental Beliefs Survey

* p < .05, ** p < .01, *** p < .001
Table 13. *Partial correlations between the OHVS and oral health behaviors in Study 3, controlling for social desirability bias.*

<table>
<thead>
<tr>
<th>Measure</th>
<th>Toothbrushing</th>
<th>Flossing frequency per week</th>
<th>Time since last dental visit</th>
</tr>
</thead>
<tbody>
<tr>
<td>OHVS</td>
<td>.29***</td>
<td>.50***</td>
<td>-.49***</td>
</tr>
<tr>
<td>Attendance</td>
<td>.25***</td>
<td>.45***</td>
<td>-.57***</td>
</tr>
<tr>
<td>Appearance</td>
<td>.24***</td>
<td>.32***</td>
<td>-.36***</td>
</tr>
<tr>
<td>Flossing</td>
<td>.30***</td>
<td>.57***</td>
<td>-.25***</td>
</tr>
<tr>
<td>Retention</td>
<td>.19**</td>
<td>.31***</td>
<td>-.33***</td>
</tr>
</tbody>
</table>

*Note: OHVS = Oral Health Values Scale*

** p < .01, *** p < .001
Figure 1. The scree plot of the first exploratory PCA conducted in Study 2, which suggests a six factor solution.
Figure 2. The scree plot of the second exploratory PCA conducted in Study 2, which indicates a four factor solution.
Figure 3. SEM of confirmatory factor analysis in Study 3 of oral health values related to dental attendance, appearance, flossing, and retention of natural teeth with standardized estimates.
Figure 4. SEM of confirmatory factor analysis in Study 3 of oral health values related to dental attendance, appearance, flossing, and retention of natural teeth with standardized estimates and modifications made to allow some error terms to correlate.
Appendix A

Content Validity Scale

Dear Oral Health Professional –

Thank you for considering helping me with my master’s thesis. I am a doctoral student in Clinical Psychology at West Virginia University in the USA, working with Dr. Dan McNeil. My thesis involves the development of a self-report measure of Oral Health Values. This construct includes, but is not limited to, the level of meaning, worth, importance, time, money, and resources one invests in oral health, self-care, and professional oral health care. The Oral Health Values Scale which I hope to construct is intended to help in the understanding of individual differences in oral health values, which may be a useful treatment target in future research. After review of possible scale items by you and other professionals, we will modify the items and construct a scale of perhaps 15 items that will be administered to large population-based samples.

This project has been approved by the Institutional Review Board at West Virginia University. No consent form is required of you, however, given that you are acting in a professional consultative role. Your completion and response to this form indicates your consent.

I ask that you carefully review each item, and rate it using two scales, one indicating relevance and representativeness of the construct, and the other assessing each item’s specificity and clarity. As you can see, the items are grouped into thematic areas. In addition to the ratings, we encourage your feedback in any of these areas:

- Suggested re-wording of any items
- Addition of new thematic areas
- Addition of new items

Thank you for your time and effort in providing this feedback. I will acknowledge all respondents in my master’s thesis document, and will send you an electronic copy of the completed thesis.

Sincerely,

Cierra B. Edwards  
Doctoral Student

Daniel W. McNeil, PhD  
Professor of Psychology  
Eberly Distinguished Professor  
Clinical Professor of Dental Practice  
& Rural Health
Please rate the scale’s instructions and items for relevance and representativeness to the construct of oral health values using the following scale:

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
<td>Essential to the construct</td>
</tr>
</tbody>
</table>

Please rate the scale’s items for specificity and clarity in assessing the construct of oral health values using the following scale:

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all</td>
<td>Slightly</td>
<td>Somewhat</td>
<td>Moderately</td>
<td>Extremely</td>
</tr>
</tbody>
</table>

Provide any other feedback or suggestions you have about specific items below that item.

**Keeping Natural Teeth**

1. Keeping all of my natural teeth is a priority for me.
2. It is okay if you have a tooth in the back of your mouth pulled.
3. It is very important to me to keep all of my natural teeth.
4. I would not mind if I had to have a false tooth or a “bridge.”
5. I would prefer to save a tooth even if it would be cheaper to have the tooth pulled.
6. I would rather get dentures than have to take care of my natural teeth.
7. Fixing a broken tooth is only needed if it is uncomfortable in your mouth or causes pain.

**Appearance**

8. It is important to me to have white teeth.
9. It really does not matter to me whether my smile is “perfect.”
10. Having a few stains on your teeth is pretty normal.

11. Having healthy-looking gums is important to me.

12. I avoid foods that will stain my teeth.

13. Your smile is a very important part of your appearance.

14. It does not matter whether your breath smells nice.

15. I would not mind too much if I had a missing tooth in the front of my mouth.

**Professional Dental Treatment**

16. If you have a toothache it is best to wait and see if it will go away on its own.

17. Getting dental checkups regularly is an excellent use of time and money.

18. Taking off from work or other activities to go for dental care is a good use of time.

19. If I had to put off dental care so that I could buy something I really wanted, that would be alright with me.

20. Dental care is too expensive given what you get out of it.

21. Dental care has to be a very low priority for me given other needs in life.

22. Even though dental treatment is painful sometimes, it is still worth it in the long run.

23. I think it is important for me to see a dentist or hygienist regularly.

24. I think you can overcome most dental problems by waiting them out.

25. Having pain or a broken tooth are the primary reasons one should go for dental care.

26. Getting a dental exam to hear that everything is “okay” is really not that important.

**Daily Care**

27. Buying a new toothbrush every three to four months is a good investment.

28. Flossing your teeth every day is really not that necessary.

29. I think that brushing your teeth at least twice every day is absolutely essential.
30. Spending money on mouthwash is a luxury.

31. The condition of my teeth and gums is an important part of my overall health.

32. I make sure I have floss available whenever I need it.

33. Going to a dentist or hygienist is more expensive than it should be.

34. If you are busy, it is okay to miss a day or two of flossing.

35. Flossing every day is not important.

36. Spending money to buy floss is wasteful.

37. I am willing to spend a full two minutes twice a day to brush my teeth.

**Orthodontics and Prosthodontics**

38. Getting braces to straighten your teeth is a good investment of time and money.

39. It is silly to get braces to straighten your teeth just a little bit.

40. Braces have the potential to improve your bite and quality of life.

41. Braces are more of a luxury than a necessity.

42. I think it is important to have orthodontic treatment as soon as problems are identified.

43. It would not bother me to have dentures.

44. Even though braces are expensive, they are a good investment because they can improve the appearance of your teeth.

45. Spending money on braces is a waste of time and money.

If you have any other suggestions for additional items, please provide them below.
Appendix B

Demographic questionnaire for content experts

What is your sex? _____

What is your age? _____ years

What is your race/ethnicity?
Click on each that applies:

- White/Caucasian
- Black/African American
- Hispanic
- Asian
- Native American
- Other: ___________________________

What is your job or occupation? _____

How many years of experience do you have in dental research and/or dental practice? _____
Appendix C

Oral Health Values Scale

This survey asks you about your experiences with oral health. Please indicate your level of agreement with each of the following statements.

<table>
<thead>
<tr>
<th>1. Keeping my teeth healthy is a priority for me.</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. It does not matter to me if I have healthy-looking teeth.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>3. It is worth it to me to take time off work for a dental appointment.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>4. It is okay for me to miss a day or two of flossing when I am busy.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>5. I would have a broken tooth fixed only if it caused me discomfort.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>6. My smile is an important part of my appearance.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>7. Going to a dentist is not worth the cost to me.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
8. Flossing my teeth every day is a high priority for me.

9. I would not mind if I had to have a false tooth or dentures.

10. The way my teeth and gums look to other people is important to me.

11. Dental care is less important to me than other needs in my life.

12. Brushing my teeth at least two times a day is important to me.

13. It would not bother me if my teeth looked yellow or stained.

14. I would prefer to save a tooth even if it would be a lot cheaper to have it pulled.

15. If I have a toothache, I prefer to wait and see if it will go away on its own before seeing a dentist.

16. It would not bother me if I lost a tooth and it was visible to others.
17. I avoid foods and drinks that might stain my teeth.

18. Going to the dentist is only important if my teeth or gums are bothering me.

19. I make sure I have dental floss available with me so I have it when I need it.

20. I would be willing to put off dental care so that I could buy something I wanted.

21. Having healthy-looking gums is important to me.

22. I would rather get dentures than spend money to treat cavities or gum disease.

23. Getting regular dental checkups is a good use of my time and money.

24. It is a priority to me that my breath always smells nice.

25. It is important to me to keep my natural teeth.
26. I believe it is okay to skip brushing my teeth when I am busy.

27. I think it is important for me to see a dentist regularly.

28. I think it is important that my teeth and gums are a source of pride.

29. Buying a new toothbrush every three to four months is a waste of my money.

30. The condition of my teeth and gums is an important part of my overall health.
Appendix D

Demographic and General Dental Information Questionnaire

1. What is your gender? Male Female

2. What is your age? ________ years

3. What is your race/ethnicity? White/Caucasian
   Click on each that applies: Black/African American
   Native Hawaiian or Other Pacific Islander
   Multiracial
   Asian
   American Indian/Alaskan Native
   Other: ___________________________

4. What is your marital status? Single Separated
   Married Divorced
   Live-in partner Widowed

5. Number of years of education? ___________________________
   (For example, High School Diploma = 12 years,
   College Degree = 16 years)

6. What is your job or occupation? ___________________________

7. What is your current job or occupation status? Working full time
   Working part time
   Looking for work – unemployed
   Retired
Disabled – unable to work

8. What state do you reside in? ______________________________

9. Do you live in an urban, rural, or suburban place? __________________________

10. How do you get to dental appointments?

   Have a car/truck/vehicle that I primarily or solely use
   Have a car/truck/vehicle that I share with a spouse/partner
   Borrow a car/truck/vehicle
   Have a family member bring me
   Have a friend bring me
   Have a social services agency bring me
   Other: ____________________________

11. For the vehicle that gets you to dental appointments, how reliably does it run?

   0 1 2 3 4
   Very
   Very
   Unreliable
   Reliable

12. What factors make it difficult for you to schedule or attend dental appointments?

   Hard to get away from work
   Child care
   Transportation hard to arrange
   Other: ____________________________

13. About how long has it been since you last visited a dentist? Include all types of dentists, such as, orthodontists, oral surgeons, and all other dental specialists, as well as dental hygienists.

   6 months or less
   More than 6 months, but not more than 1 year ago
More than 1 year, but not more than 2 years ago
More than 2 years, but not more than 3 years ago
More than 3 years, but not more than 5 years ago
More than 5 years ago
Never have been to a dentist

14. What was the main reason you last visited the dentist?

Went in on own for check-up, examination or cleaning
Was called in by the dentist for check-up, examination or cleaning
Something was wrong, bothering or hurting me
Went for treatment of a condition that dentist discovered at earlier check-up or examination
Other

15. How many times do you brush your teeth in one day?

1 time
2 times
3 times
4 times
5 times
6 times
7 times
8 times
9 or more times

16. Overall, how would you rate the health of your teeth and gums?
Excellent
Very good
Good
Fair
Poor

17. Aside from brushing your teeth with a toothbrush, in the last seven days, how many days did you use dental floss or any other device to clean between your teeth? 0-7

18. When you go to the dentist, what typically gets you to go?

   Regular cleaning and exam
   Pain
   Seeing a cavity or another problem in my mouth
   Other: _________________________

19. Do you presently have any dental pain?

   0  1  2  3  4
   No    Severe
   Pain  Pain

20. How often do you floss your teeth?

   At least twice a day
   Once every day
   2-6 times a week
   Once a week
   Once every 2-3 weeks
   Once a month
   Once every 2-6 months
   Once every 7 months to a year
   Less often than once a year
21. How often do you brush your teeth?  
- At least twice a day
- Once every day
- 2-6 times a week
- Once a week
- Once every 2-3 weeks
- Once a month
- Once every 2-6 months
- Once every 7 months to a year
- Less often than once a year

22. How often do you use a mouthwash?  
- At least twice a day
- Once every day
- 2-6 times a week
- Once a week
- Once every 2-3 weeks
- Once a month
- Once every 2-6 months
- Once every 7 months to a year
- Less often than once a year

23. Have you ever had problems with gagging during dental visits?  
- 0 Never
- 1 Almost Always or Always
- 2
- 3
- 4

24. If you have EVER had problems  
- 0
- 1
- 2
- 3
- 4
with gagging during dental visits, Very Very
how severe have these problems Mild Severe
been?

25. If you have EVER had problems 0 1 2 3 4
with gagging during dental visits, Never Almost Always
how often has gagging interrupted or Always
the dental treatment?

26. What triggers your gagging during
__________ _________ _________
dental visits? (list ALL that apply)
(For example, x-rays, impressions, fingers in your mouth, instruments in your mouth)

27. Do you have problems with gagging 0 1 2 3 4
at times other than dental visits? Never Almost Always
or Always

28. If you have EVER had problems 0 1 2 3 4
with gagging at times other than Very Very
dental visits, how severe have these Mild Severe
problems been?

29. What triggers your gagging at
__________ _________ _________
these other times? (list ALL
that apply)
(For example, brushing your teeth, eating certain foods)
Appendix E

Oral Health Impact Profile

For each of the following questions, please indicate how frequently you have experienced each of the following impacts in the last 12 months.

<table>
<thead>
<tr>
<th>Impact</th>
<th>Never</th>
<th>Hardly ever</th>
<th>Occasionally</th>
<th>Fairly often</th>
<th>Very often</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Have you had trouble <em>pronouncing any words</em> because of problems with your teeth, mouth or dentures?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>2. Have you felt that your <em>sense of taste</em> has worsened because of problems with your teeth, mouth or dentures?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>3. Have you had <em>painful aching</em> in your mouth?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>4. Have you found it <em>uncomfortable to eat any foods</em> because of problems with your teeth, mouth or dentures?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>5. Have you been <em>self-conscious</em> because of your teeth, mouth or dentures?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
6. Have you felt tense because of problems with your teeth, mouth or dentures?

7. Has your diet been unsatisfactory because of problems with your teeth, mouth or dentures?

8. Have you had to interrupt meals because of problems with your teeth, mouth or dentures?

9. Have you found it difficult to relax because of problems with your teeth, mouth or dentures?

10. Have you been a bit embarrassed because of problems with your teeth, mouth or dentures?
11. Have you been a bit *irritable with* other people because of problems with your teeth, mouth or dentures?

12. Have you had *difficulty doing your usual jobs* because of problems with your teeth, mouth or dentures?

13. Have you felt that life in general was *less satisfying* because of problems with your teeth, mouth or dentures?

14. Have you been *totally unable to function* because of problems with your teeth, mouth or dentures?
Appendix F

Dental Fear Survey

INSTRUCTIONS: The items in this questionnaire refer to various situations, feelings, and reactions related to dental work. Please rate your feeling or reaction on these items by using the following scales. Fill in the appropriate circle which most closely corresponds to your reaction.

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>Once or Twice</th>
<th>A Few Times</th>
<th>Often</th>
<th>Nearly Every Time</th>
</tr>
</thead>
</table>

1. Has fear of dental work ever caused you                       ○ ○ ○ ○ ○ ○
to put off making an appointment?

2. Has fear of dental work ever caused you                       ○ ○ ○ ○ ○ ○
to cancel or not appear for an
appointment?

When having dental work done:

<table>
<thead>
<tr>
<th></th>
<th>Not At All</th>
<th>A Little</th>
<th>Somewhat</th>
<th>Much</th>
<th>Very Much</th>
</tr>
</thead>
</table>

3. My muscles become tense…                           ○ ○ ○ ○ ○ ○

4. My breathing rate increases…                       ○ ○ ○ ○ ○ ○

5. I perspire…                                        ○ ○ ○ ○ ○ ○

6. I feel nauseated and sick to my                     ○ ○ ○ ○ ○ ○
stomach…

7. My heart beats faster…                              ○ ○ ○ ○ ○ ○
Following is a list of things, and situations that many people mention as being somewhat anxiety or fear producing. Please rate how much fear, anxiety, or unpleasantness each of them causes you. (If it helps, try to imagine yourself in each of these situations and describe what your common reaction is.)

<table>
<thead>
<tr>
<th></th>
<th>Not At All</th>
<th>A little</th>
<th>Somewhat</th>
<th>Much</th>
<th>Very much</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. Making an appointment for dentistry.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>9. Approaching the dentist’s office.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>10. Sitting in the waiting room.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>12. The smell of the dentist’s office.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>13. Seeing the dentist walk in.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>14. Seeing the anesthetic needle.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>15. Feeling the needle injected.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>16. Seeing the drill.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>17. Hearing the drill.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>18. Feeling the vibrations of the drill.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>19. Having your teeth cleaned.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>20. All things considered, how fearful are you of having dental work done?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
Appendix G
Dental Indifference Scale

<table>
<thead>
<tr>
<th>Question</th>
<th>Responses</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) I usually use (tick any which apply)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. A toothbrush to clean my teeth</td>
<td></td>
<td>score 1 if neither</td>
</tr>
<tr>
<td>b. Floss or a special brush to clean between my teeth</td>
<td></td>
<td>b. nor c. is ticked</td>
</tr>
<tr>
<td>c. Disclosing tablets to check my teeth are clean</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2) At present</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. I think there is something wrong with my teeth but it is not bad enough to go to a dentist</td>
<td></td>
<td>score 1 if a. or d. is ticked</td>
</tr>
<tr>
<td>b. I think there is something wrong with my teeth and I intend to see a dentist about it soon</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. I am going for a check-up within the next year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. I do not think I need any treatment so I am not planning to go to a dentist just now</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3) If I lost a filling in a back tooth, but it did not hurt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. I would immediately arrange to go to a dentist</td>
<td></td>
<td>score 1 if b. or c. is ticked</td>
</tr>
<tr>
<td>b. I would wait to see if it started hurting or got any worse before going to a dentist</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. It would not be a problem – I would not see a dentist about it</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4) I usually make an appointment to visit a dentist</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. When my dentist reminds me</td>
<td></td>
<td>score 1 if d. is ticked</td>
</tr>
<tr>
<td>b. At the end of my last appointment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. When I think it is time to go for another check-up</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. Only when I think there is something wrong with my teeth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5) If my gums bled, but they did not hurt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. It would not be a problem; I would not see a dentist about it</td>
<td></td>
<td>score 1 if a. or c. is ticked</td>
</tr>
<tr>
<td>b. I would immediately arrange to see a dentist</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. I would wait to see if it started hurting or got worse before going to a dentist</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6) About ALL your dental appointments in the last 5 years (tick any which apply)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. I have not made a dental appointment in the last 5 years</td>
<td></td>
<td>score 1 if a. or b. or e. is ticked</td>
</tr>
<tr>
<td>b. During the last 5 years I have forgotten to go to a dental appointment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. During the last 5 years I have only missed an appointment through illness or another unavoidable reason</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. During the last 5 years I have never missed a dental appointment</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
appointment
e. During the last 5 years I have cancelled a dental appointment because the problem went away

7) If I had a **VERY** painful BACK tooth
   a. I would prefer it to be taken out
   b. I would prefer it to be left alone
   c. I would prefer it to be filled

   score 1 if a. or b. is ticked

8) I would say my **main** reason for not going to the dentist for a checkup would be
   a. Because I think treatment is painful
   b. Because it takes too long to get to a dentist
   c. Because I feel worried or anxious about going
   d. Because I cannot see the point of visiting for a check-up
   e. Because my dentist makes me feel guilty about the state of my teeth
   f. Because it costs too much
   g. Because I have no time to get to a dentist
   h. I do not put off going – I attend for regular checkups
Appendix H
Dental Free Time Trade-Off Scale

In the next questions we would like to try to measure how much you value the condition of your teeth and gums. Remember, there are no right or wrong answers.

1. First think about your teeth and gums and decide how happy you are with their current condition, then tick the box which best describes how you feel about this.

Very unhappy ☐  Unhappy ☐  Neither ☐  Happy ☐  Very happy ☐

2. Think about your teeth and gums and try to decide if there are any things you would like to change about them. Now read through the list below and tick any boxes which describe the way you feel.

I am happy with my teeth and gums as they are ☐

I would be happier if I did not have a toothache ☐

I would be happier if my teeth were whiter ☐

I would be happier if I had fewer gaps between my teeth ☐

I would be happier if I had straighter teeth ☐

I would be happier if I had “nicer” looking teeth ☐

I would be happier if my gums didn’t bleed when I brushed my teeth ☐

I would be happier if I had fresher breath ☐

I would be happier if I didn’t have any fillings ☐

I would be happier if I had fissure sealants (plastic coatings) in my back teeth to stop them getting decay ☐

I would be happier if I didn’t have any decayed teeth ☐

I would be happier if I didn’t have marks on my front teeth ☐

I would be happier if I could change something else about my teeth or gums ☐

If you ticked the last statement, tell us what you would like to change ______________
3. How much time do you usually spend looking after your teeth and gums (brushing, flossing, or using a mouthwash) each day?

<table>
<thead>
<tr>
<th>Time</th>
<th>No time</th>
<th>about 1 minute</th>
<th>1-2 minutes</th>
<th>2-3 minutes</th>
<th>3-4 minutes</th>
<th>4-5 minutes</th>
<th>5-6 minutes</th>
<th>6-7 minutes</th>
<th>7-8 minutes</th>
<th>8-9 minutes</th>
<th>9-10 minutes</th>
<th>more than 10 minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
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<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

If more than 10 minutes each day, tell us how long ________________________________

What we would like to know now is how important the changes you said you would like in question 2 are to you. One way of finding this out is to ask you how much of your FREE TIME you would be willing to give up each day to get these changes.

4. IMAGINE that ALL the changes you said you would most like to be made in question 2 could be achieved by you spending MORE of your FREE TIME each day looking after your teeth. How much of your FREE TIME would you be willing to spend to achieve the change?

<table>
<thead>
<tr>
<th>Time</th>
<th>No more time each day</th>
<th>1 more minute each day</th>
<th>2 more minutes each day</th>
<th>3 more minutes each day</th>
<th>4 more minutes each day</th>
<th>5 more minutes each day</th>
<th>6 more minutes each day</th>
<th>7 more minutes each day</th>
<th>8 more minutes each day</th>
<th>more than 10 minutes each day</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
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<td>☐</td>
</tr>
</tbody>
</table>

If more than 10 minutes each day, tell us how long ________________________________

5. Approximately how much FREE TIME do you have in a day? _____________________
Appendix I

Dental Neglect Scale

Please rate the items below using the following scale:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Definitely NO</td>
<td>Neutral</td>
<td>Definitely YES</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

___1. I keep up my home dental care.

___2. I receive the dental care I should.

___3. I need dental care, but I put it off.

___4. I brush as well as I should.

___5. I control snacking between meals as well as I should.

___6. I consider my dental health to be important.
Appendix J

Importance of the Retention of Teeth Scale

Rank how much you would prefer each item using this following scale:

1 = Most preferred
2 = Second most preferred
3 = Third most preferred
4 = Fourth most preferred
5 = Fifth most preferred

You may think of your preferences in terms of how important each one is to you or much you would be willing to invest your money in each one.

Using the above scale for reference, please rank the items below in order of preference.

_____ A new television set
_____ A new living room suite (set of furniture)
_____ A new car
_____ A vacation
_____ Keeping you natural teeth
Appendix K

Health Literacy in Dentistry Scale

For each of the following questions, please indicate how often you experienced difficulty with each of the situations.

<table>
<thead>
<tr>
<th>Situation</th>
<th>Unable to do</th>
<th>Very difficult</th>
<th>With some difficulty</th>
<th>With little difficulty</th>
<th>Without any difficulty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Are you able to pay attention to your dental or oral health needs?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>2. Are you able to make time for things that are good for your oral and dental health?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>3. Are you able to fill in dental forms (e.g., enrollment forms)?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>4. Are you able to read dental or oral health information brochures left in dental clinics and waiting rooms?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
5. Are you able to take family or a friend with you to a dental appointment? ○ ○ ○ ○ ○ ○ ○

6. Are you able to ask someone to go with you to a dental appointment? ○ ○ ○ ○ ○ ○ ○

7. Are you able to pay to see a dentist? ○ ○ ○ ○ ○ ○ ○

8. Are you able to pay for medication to manage your dental or oral health? ○ ○ ○ ○ ○ ○ ○

9. Do you know how to get a dentist’s appointment? ○ ○ ○ ○ ○ ○ ○

10. Do you know what to do to get a dentist’s appointment? ○ ○ ○ ○ ○ ○ ○
11. Are you able to use information from a dentist to make decisions about your dental health?

12. Are you able to discuss your dental or oral health with people other than a dentist?

13. Are you able to carry out instructions that a dentist gives you?

14. Are you able to use advice from a dentist to make decisions about your dental health?
Appendix L

Dental Beliefs Survey

The items in this questionnaire refer to various situations, feelings, and reactions related to dental work. Please rate your feelings or beliefs on these items by clicking the category (never, once or twice, a few times, often, or nearly always) which most closely corresponds to your feelings about dentistry in general.

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>Once or Twice</th>
<th>A Few Times</th>
<th>Often</th>
<th>Nearly Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>I am concerned that dentists recommend work that is not really needed.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
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<tr>
<td>2.</td>
<td>I believe dentists say/do things to withhold information from me.</td>
<td>○</td>
<td>○</td>
<td>○</td>
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<tr>
<td>3.</td>
<td>I worry if the dentist is technically competent and is doing quality work.</td>
<td>○</td>
<td>○</td>
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<tr>
<td>4.</td>
<td>I have had dentists say one thing and do another.</td>
<td>○</td>
<td>○</td>
<td>○</td>
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<tr>
<td>5.</td>
<td>I am concerned that dentists provide all the information I need to make good decisions.</td>
<td>○</td>
<td>○</td>
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<td>6.</td>
<td>Dentists don’t seem to care that patients sometimes need a rest.</td>
<td>○</td>
<td>○</td>
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<td>7.</td>
<td>I’ve had dentists seem reluctant to correct work unsatisfactory to me.</td>
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</tbody>
</table>
8. When a dentist seems in a hurry I worry that I’m not getting good care.

9. I am concerned that the dentist is not really looking out for my best interests.

10. Dentists focus too much on getting the job done and not enough on the patients comfort.

11. I’m concerned that dentists might not be skilled enough to deal with my fears or dental problems.

12. I feel dentists do not provide clear explanations.

13. I am concerned that dentists do not like to take the time to really talk to patients.


15. Dental professionals say things to make me feel guilty about the way I care for my teeth.
<p>| | | | | | | | | | | | | | | | |</p>
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<tbody>
<tr>
<td>16.</td>
<td>I am concerned that dentists will not take my worries (fears) about dentistry seriously.</td>
<td>Never</td>
<td>Once or Twice</td>
<td>A Few Times</td>
<td>Often</td>
<td>Nearly Always</td>
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<td>17.</td>
<td>I am concerned that dentists will put me down (make light of my fears).</td>
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<td>18.</td>
<td>I am concerned that dentists do not like it when a patient makes a request.</td>
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<td>19.</td>
<td>I am concerned that dental personnel will embarrass me over the condition of my teeth.</td>
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<td>20.</td>
<td>I believe that dentists don’t have enough empathy for what it is really like to be a patient.</td>
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<tr>
<td>21.</td>
<td>When I am in the chair I don’t feel like I can stop the appointment for a rest if I feel the need.</td>
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<tr>
<td>22.</td>
<td>Dentists don’t seem to notice that patients sometimes need a rest.</td>
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<tr>
<td>23.</td>
<td>Once I am in the chair I feel helpless (that things are out of my control).</td>
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</table>
24. If I were to indicate that it hurts, I think that the dentist would be reluctant to stop and try to correct the problem.

25. I have had dentists not believe me when I said I felt pain.

26. Dentists often seem in a hurry, so I feel rushed.

27. I am concerned that the dentist will do what he wants and not really listen to me while I’m in the chair.

28. Being overwhelmed by the amount of work needed (all the bad news) could be enough to keep me from beginning treatment.
### Appendix M

#### Social Desirability Scale

Listed below are a number of statements concerning personal attitudes and traits. Read each item and decide whether the statement is true or false as it pertains to you personally.

<table>
<thead>
<tr>
<th>Statement</th>
<th>True</th>
<th>False</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. It is sometimes hard for me to go on with my work if I am not encouraged.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. I sometimes feel resentful when I don't get my way.</td>
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<td></td>
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<tr>
<td>3. On a few occasions, I have given up doing something because I thought too little of my ability.</td>
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<td></td>
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<tr>
<td>4. There have been times when I felt like rebelling against people in authority even though I knew they were right.</td>
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<tr>
<td>5. No matter who I'm talking to, I'm always a good listener.</td>
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<td></td>
</tr>
<tr>
<td>6. There have been occasions when I took advantage of someone.</td>
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<td></td>
</tr>
<tr>
<td>7. I'm always willing to admit it when I make a mistake.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. I sometimes try to get even rather than forgive and forget.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. I am always courteous, even to people who are disagreeable.</td>
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<td></td>
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<tr>
<td>10. I have never been irked when people expressed ideas very different from my own.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. There have been times when I was quite jealous of the good fortune of others.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. I am sometimes irritated by people who ask favors of me.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. I have never deliberately said something that hurt someone's feelings.</td>
<td></td>
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</tbody>
</table>
Appendix N

Validity Check Items

Please select four for this item.

What color are healthy teeth?
A. Red
B. Green
C. White
D. Black

What color are healthy gums?
A. Blue
B. Pink
C. Green
D. Silver

How many eyes are most people born with?

0 1 2 3 4

○ ○ ○ ○ ○