

Running head: Dental Patient Satisfaction

Patient Satisfaction in Military Dental Treatment Facilities

A Graduate Management Project

Submitted to the Faculty of

The U.S. Army-Baylor University

Graduate Program in Healthcare Administration

By

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### **Abstract**

The purpose of this study is to identify predictors of satisfaction with the dentist and hygienist in military dental treatment facilities. Respondents completed 658,443 surveys during seventeen fiscal quarters, beginning with the fourth quarter of 2000 using a standardized Department of Defense questionnaire. Responses with missing data were deleted resulting in final data sets of 309,261 for the dentist satisfaction and 98,792 for hygiene satisfaction. Principle component factor analysis was utilized to assess the underlying constructs of satisfaction and hierarchical multiple linear regression to assess the predictive effects of the dependent variables on the three independent variables: (1) overall satisfaction with today's visit, (2) overall satisfaction with the clinic, (3) behavioral intent of the patient's likelihood to return to the clinic. On a seven-point, bi-polar adjective rating scale, patients' mean scores were 6.53 (dentist) and 6.61 (hygienist) regarding satisfaction with visit, suggesting that patients are highly satisfied. Factor analysis revealed that beliefs about care (51.5% for dentists and 46.7% for hygienists) and environment (20.1% for dentists and 26.8% for hygienists) were the most important factors to satisfaction. All regression models developed for patient satisfaction achieved statistical significance. The regression models for dentist satisfaction explained 33.8% of the shared variance for satisfaction with today's visit and 34.7% of the variance in regards to overall satisfaction. The hygiene regression models explained 31.4% of the shared variance for satisfaction with today's visit and 29.1% of the variance for overall satisfaction. These findings are useful in educating providers about the relationship of consumer satisfaction with the interpersonal experience.



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## **Introduction**

### *Conditions that prompted the study*

The purpose of this study is to identify predictors of satisfaction in military dental treatment facilities. Active duty service members of the U.S. Air Force, Army, Marines and Navy receive the bulk of their dental care from one of the 300 military dental treatment facilities positioned around the world. Patient satisfaction is an important facet in the provision of dental care to a community. In a response to quality criticisms of the military health system, The Assistant Secretary of Defense for Health Affairs mandated that hospitals and clinics post quarterly report cards in an effort to assure beneficiaries of the high quality of care being provided (Martin, 1998 (Policy 98-016); Martin, 1998 (Policy 98-101)). Patient satisfaction is an integral component of the report cards and thus military dentistry had to develop a method of standardizing the assessment of patient satisfaction in military dental treatment facilities. Dental health is extremely important for the military as dental assets are not always readily available in the deployed environment. Since the dental health of soldiers directly affects the risk of a dental emergency while deployed, customer satisfaction is an important component of military dental care. Quarterly patient satisfaction reports are generated for each dental treatment facility, but the data has never been analyzed in aggregate to identify trends or predictors of satisfaction.

### *Problem Statement*

The Department of Defense (DoD) Dental Satisfaction Survey utilized in this project monitors the satisfaction of military beneficiaries who receive treatment in military dental clinics throughout the world. The Dental Satisfaction Survey was developed by a Tri-Service working group in 1998, approved by the DoD Institutional Review Board and implemented in 1999 by the Tri-Service Center for Oral Health Studies (TSCOHS). The problem statement is that the current



survey is administered in the dental clinics as there is no Tri-Service dental central appointment system comparable to the medical system to mail the survey to a random list of patients. Are there specific variables or factors that increase patient satisfaction is the research question for this project? This is important to military dentistry as the findings can be utilized to educate providers on the patient-provider interaction. More satisfied patients are more likely to return to the clinic for their needed care and can potentially aid in the dental readiness mission.

### *Literature Review*

Traditionally, the clinician's technical competence and mechanical precision was an important factor in the assessment of dental satisfaction (Kress & Shulman, 1997); lay opinions played no role in this method of measuring quality. Consumerism forced dentists to compete for patients and traditional patient satisfaction became an important part of providing dental services once consumerism became an integral part of the dental patient mindset (Kress, 1988).

A large body of work in the field of patient satisfaction exists in the medical literature. Medical care patient satisfaction studies have consistently shown that the quality of the interpersonal interactions between the provider and the patient play a large role in defining patient satisfaction (Ben-Sira, 1976; Ben-Sira, 1980; Ross, Wheaton & Duff, 1981). A similar body of research exists for the dental field. Ross and Duff (1982) found that patients return to the dentist for subsequent care due to satisfaction with the interpersonal component of the dental relationship rather than the technical quality of the care received. Evidence for both medical and dental patient satisfaction studies show that desirable interactions lead to more satisfied patients who better understand and more accurately follow prescribed regimens (Francis, Korsch & Morris, 1969; Korsch, Gozzi & Francis, 1968). A satisfied patient may have a different set of behaviors that ultimately manifest both into a healthier patient and a more satisfied customer.



Of all the studies on dental patient satisfaction in the US, only one allows for generalization of the results. The National Opinion Research Center interview survey by Kreisberg and Treiman adhered to randomization principles with a large sample size, but this study was completed over 30 years ago. Kreisberg and Treiman (1962) identified dentists' personality, skill in minimizing pain and patients' fear to be the three leading concerns of the public with dental care. McKeithen (1966) found that the dentist's personality was the most frequently mentioned feature of an ideal dentist and Collet (1974) discovered that the dentist's personality was the major reason for patients' becoming dissatisfied and leaving their dentist. Koslowsky, Bailit and Valuzzo (1974) also concluded that patient concerns were centered around the dentist's personality and technical competence, and that fees ranked lowest in importance of those factors studied. These pioneering dental studies all seemed to directly link satisfaction with the inter-personal relations between the dentist and the patient. Whereas dentists often assume that quality is directly related to technical expertise, Crall and Morris (1988) and Abrams, Ayers and Vogt-Peterson (1986) found that patient satisfaction was not well correlated to dentists' perception of quality treatment.

Newsome and Wright (1999) reviewed 46 studies of patient satisfaction and found the factors most commonly identified with dental patient satisfaction were technical competence, interpersonal factors, convenience, costs and facilities. Davies and Ware (1982) developed the Dental Satisfaction Questionnaire (DSQ) and found that access, availability/convenience, cost, pain and quality were all independent elements of patient satisfaction. Golletz, Milgrom and Mancl (1995) used the DSQ on a low income group of dental patients and reported similar findings to Davies and Ware. They reported that the type of insurance coverage did make a difference with pain management and access to care. Murray and Kaplin (1981) reported six





dimensions of satisfaction based on an evaluation of patients from 14 private practices. They were: (1) general treatment, (2) staff performance, (3) organization/ efficiency, (4) convenience, (5) pain and (6) patient-personal interaction. Cost issues were not cited as a key dimension. Kress and Silversin (1985) found 7 areas that were important to satisfaction and were in the following categories: (1) facilities, (2) staff, (3) appointments, (4) treatment (quality), (5) cost, (6) dentist and (7) communication. In a recent study of 23-year olds from Norway, positive beliefs about the dentist, low dental anxiety, having a dental home and reporting that the last dental treatment was not painful were predictors of satisfaction and explained 58% of the variance (Skaret, Berj, Raadal & Kvale, 2005). Interpersonal interaction between the patient and the dentist was also reported as the most important factor to satisfaction among Ugandan adolescents in 2004 (Okullo, Astrom & Haugerjorden, 2004).

Only a few studies have looked at the influence of demographic characteristics on satisfaction. Murray and Kaplin (1981) reported overall satisfaction was not related to the age, sex, education or income of the patient. In contrast, Kress and Silversin's (1985) studies found that older persons, women and people in higher socioeconomic categories were more satisfied with their dental care from over 14,000 evaluations. They also found that long-term patients had increased levels of satisfaction. Douglas, Reisine and Cipes (1985) found that patients of female dentists were more satisfied with costs and access to care than were a matched sample of patients whose dentists were male. The facts that women, higher income, and better educated people appear more satisfied are consistent with studies that have shown that these are the same factors that determine use of dental services (Kress, 1988). A 1978 study by the Opinion Research Corporation for the American Dental Association concluded that about one-third of American





adults became dissatisfied with their dental care. Over 50% cited perceived quality problems as the reason for dissatisfaction (Bishop, 1993).

Studies have demonstrated that different levels of perceived satisfaction exist between different groups of people. Perceived differences in satisfaction levels can be very important when providing care primarily to individuals of multi-ethnic backgrounds of predominantly lower income levels. There has been the suggestion that patients' satisfaction with their dentist is a primary determinant of whether they seek preventive care prior to the need for complex dental treatment (Liddell & May, 1984; Liddell & Locker, 1992). Those who are dissatisfied and avoid preventive care then jeopardize their dental health and have the potential to develop advanced stages of disease that could have been detected and treated routinely during the preventive stage. This finding could be very important to the military population as getting soldiers dentally ready for deployment is a primary mission of the Army Dental Care System. Dental emergencies in deployed military populations have been well documented and evaluated and shown that those with emergent conditions suffer emergencies at 7-10 times the rate of orally healthy soldiers (Chaffin, King & Fretwell, 2001; Chisick & King, 1993; Teweles & King, 1987). If soldiers with the most severe dental disease are dissatisfied with care, they could potentially avoid or limit future dental encounters. Such behavior could potentially lead to decreased levels of oral health and increased dental emergencies in the deployed environment.

Dentists have become very aware that the interpersonal dynamic between the provider and the patient is an important determinant in perceived satisfaction. A study by O'Shea, Corah, and Ayer (1986) displayed that US dentists recognize that patient dissatisfaction has a significant impact on care-seeking behavior, and in particular, on decisions to seek a new dentist. A 1995 study by Hardie, Ransford and Zernick found that the majority of patients in a multi-ethnic area



had no preference for the ethnicity for their provider, except for Hispanics. Hispanics preferred providers in their own ethnic group during times of high anxiety and poor dental health. In addition, dental patient satisfaction among minority ethnic groups has been demonstrated to be lower in dentist care and communication, dental staff and efficiency of the dental office (Handelman, Fan-Hsu & Proskin, 1990).

There appear to be no published articles on consumer satisfaction with the care provided by dental hygiene providers. Ovid lists 29,065 journal articles on patient satisfaction, 1,386 articles on dental patient satisfaction, and 114 articles on dental hygiene patient satisfaction. The articles on dental hygiene satisfaction focus on job satisfaction of the hygiene provider, satisfaction with the dental hygiene school/curriculum and satisfaction with varying dental hygiene procedures. Additional searches using EBSCO and Google proved fruitless. One abstract has been published on patient satisfaction with the hygiene provider. Johnson (1996) reported on a pilot test of a survey instrument aimed at assessing patient satisfaction at the Idaho State University Dental Hygiene Clinic.

A few dental patient satisfaction studies have used regression and factor analysis. Gopalakrishna and Mummalaneni (1993) utilized regression and their model included waiting time, availability and convenience of care, cost of care, pain management, and continuity of care and explained 19% of overall dental satisfaction. Only one study utilized factor analysis to explore the components of dental patient satisfaction. Handelman, Fan-Hsu and Proskin (1990) researched patient satisfaction in four types of dental practices. The settings included private practice offices, hospital dental clinics, neighborhood health centers and group practices in shopping centers. They found that five factors explained 36% of the shared variance. The factors were grouped into the dentist, staff, efficiency, time-cost and access. The authors did not report





the individual contributions of each factor. The statistically significant components of each factor are listed in Table 1.

Table 1. Five factors of patient satisfaction and components of each factor as reported by Handelman, Fan-Hsu & Proskin, 1990.

Factor	Components of each factor
Dentist	Pain management, skill of dentist, understanding & communication
Staff	Satisfaction with receptionist & dental assistants
Efficiency	Promptness of dentist, telephone accessibility & appointment availability
Time-Cost	Total number of visits & treatment costs
Access	Transportation, office hours & appointment availability

Dental patient satisfaction among active duty service members has not been widely studied. Chisick conducted two studies of active duty service member dental satisfaction. In a study of 9,510 soldiers Army, Chisick (1994) found that military members reported above average satisfaction with all aspects of care except access. Satisfaction with access to care was consistently rated low. In a 1998 study of 15,915 DoD active duty personnel, satisfaction was rated high and was consistent across all demographics (Chisick & Pointdexter, 1998). These studies found that the domains of military satisfaction were similar to the civilian studies focusing on access, availability/convenience, interpersonal skills, and pain control as predictors of satisfaction. Costs were not included because active duty military members are not required to pay for dental care. Chisick concluded that active duty personnel were generally very satisfied with military dental care and satisfaction did not vary significantly across demographics. Dunn



(2004) reported a high degree of patient satisfaction of Air Force members who received care at a deployed dental clinic in the Middle East.

Military family members do not receive their care in military dental facilities, but rather utilize the TRICARE dental insurance to seek care in the civilian sector. In 1994, the Tri-Service Center for Oral Health Studies conducted a comprehensive 26-site oral health survey of Army, Navy, Marine Corps and Air Force active duty personnel between April of 1994 and January of 1995. Chisick (1997) utilized the results of the 1994 survey to analyze satisfaction with family dental care and reported below-average satisfaction with almost all attributes of that care with access scores being the worst. These results were from the infancy of the TRICARE dental contract. In the 1994-95 survey, Chisick and Piotrowski (1999) further assessed satisfaction with family member dental care and reported high levels of satisfaction in contrast to the 1992 survey. Waiting periods for care was the most significant complaint. Being female, greater time in service and being in the Marines or Navy were positive predictors of satisfaction. The presence of the DoD sponsored TRICARE insurance and patient-perceived barriers to care were predictors for dissatisfaction.

Two recent studies have developed models to predict patient satisfaction with military medical care. Mangelsdorff and Finstuen (2003) identified that attitudes and beliefs about the care received were the most salient factors in the prediction model. Waiting time as a measure of access and age, health status, and gender demographic variables were also significant predictors of satisfaction. A refinement of the model was recently published and validated the previous study (Mangelsdorff, Finstuen, Larsen & Weinberg, 2005). Military beneficiary status (active duty, retired or family member), the reason for the visit, and additional variables regarding beliefs about the care and waiting time variables were added to the model and are predictive of



patient satisfaction in the military medical setting. These previous studies are precursors to this project and hopefully will lead to the validation of a dental specific model.

The Starfield Model (1973) guides the development of this study and focuses upon the characteristics of the practice setting. Starfield relies upon the constructs of structure, process and outcome as introduced by Donabedian and the model is applied in a dental practice setting for this project. The project focuses on the outcome of patient satisfaction. The Starfield Model has previously been used within the dental community to evaluate patient satisfaction (Coppola, Ozcan, & Bogacki, 2003).

There are significant gaps in the literature of military dental satisfaction based on the military paradigm shift and the duration of time since the last assessment formal assessment. The current world paradigm dictates that satisfaction be reassessed. Dental emergencies and the potential for varying levels of prevention seeking treatment are true public health issues for military health care.

### *Purpose*

The purpose of this study is to identify levels and predictors of satisfaction in military dental treatment facilities. Two different units of analyses were utilized. The first part of the project will focus on identifying determinants of patient satisfaction for those who received treatment from a dentist. The second part of the project will identify predictors of patient satisfaction for those service members who received dental hygiene services. The null hypothesis for satisfaction with the dentists is that there is no difference in patient satisfaction based on the belief about care, environment surrounding the appointment or person/demographic variables. [H<sub>0</sub>: b<sub>1</sub> = b<sub>2</sub> = b<sub>3</sub> . . . b<sub>33</sub> = 0] The alternate hypothesis is that at least one variable is different. [H<sub>a</sub>: b<sub>i</sub> not equal to 0] The null hypothesis for satisfaction with the hygienist is that there is no





difference in patient satisfaction based on the belief about care, environment surrounding the appointment or person/demographic variables. [ $H_0: b_1 = b_2 = b_3 \dots b_{29} = 0$ ] The alternate hypothesis is that at least one variable is different. [ $H_a: b_i$  not equal to 0]

### **Methodology**

This project is a secondary analysis of dental patient satisfaction data collected in military dental treatment facilities. The surveys are anonymous and do not contain patient identifiers.

#### *Survey Instrument*

The dental satisfaction survey was composed of 27 questions focusing on access, quality, interpersonal relationships, overall satisfaction, and demographic data and was approved by the DoD Institutional Review Board to ensure patient privacy. A copy of the survey is attached in Appendix A. The surveys analyzed for this project were administered from the fourth quarter of fiscal year 2000 through the fourth quarter of 2004. A copy of the survey instrument and seventeen digitalized text files (one per quarter) of data were received directly from TSCOHS. LTC David Moss, the Army representative to TSCOHS, is the point of contact for the data.

#### *Data*

The seventeen text files were imported into SPSS version 12. One master file was created with 658,443 surveys. Fiscal year and quarter variables were added. Two different data sets were created for this project.

The first data set focused on identifying satisfaction factors associated with care provided by the dentist. The second data set is focused on satisfaction with the dental hygienist. Survey question number two asked respondents to indicate if they received treatment from a dentist, hygienist or both providers during the visit. Those who responded affirmative to seeing a dentist



during the visit were kept in the dentist data set resulting in 448,555 surveys. Patients that only received hygiene treatment were kept in the second data set resulting in 130,801 respondents. All cases with missing data were deleted resulting in two data sets with no missing data. The final data sets consisted of 309,261 respondents for the dentist and 98,792 for the hygienist set.

### *Dependent Variables*

The study examined three dependent variables:

1.  $Y_1$  was defined as the assessment of satisfaction with the dental care for **today's visit**
2.  $Y_2$  as satisfaction with the **clinic's ability** to take care of the patient's dental needs
3.  $Y_3$  as the behavioral intent of the patient based on the rating if they would return to the clinic for further dental needs if they had a choice

The first two dependent variables were based on responses to a seven point bi-polar adjective rating scale as shown in Table 2. The third dependent variable ( $Y_3$ ) is based on responses to whether they would return to the dental clinic for further care if given a choice.



Table 2. Bi-polar adjective rating scale for Y<sub>1</sub> and Y<sub>2</sub>

Coded Value	Survey Response
1	Completely dissatisfied
2	Very dissatisfied
3	Somewhat dissatisfied
4	Neither satisfied nor dissatisfied
5	Somewhat satisfied
6	Very satisfied
7	Completely satisfied

### *Independent variables*

The independent variables were divided into three major categories: person characteristics, beliefs about the care itself and environmental factors. The grouping of independent variables was not arbitrary, but rather based on recent studies of patient satisfaction in military medical treatment facilities as previously mentioned in the review of the literature (Mangelsdorff & Finstuen, 2003; Mangelsdorff, Finstuen, Larsen & Weinberg, 2005). A recent study published in the Journal of Healthcare Management (Otani, Kurz & Harris, 2005) also found three similar groupings of patient satisfaction attributes; access to care, staff care and physician care.

The demographic variables (person characteristics) included on the survey are age, gender, beneficiary category (active duty, family member, or retiree), military rank and military service. Race was not included on the survey. Patients responded to seven belief questions regarding the care provided by the dentist or hygienist and were rated on a five-point scale as shown in Table 3. Environmental factors included whether the appointment was scheduled or





not, number of days waiting for appointment, rating of the number of days waited for an appointment, whether the patient was seen on time for the appointment, fiscal year and fiscal quarter. The code sheet for the dental data set is presented in Appendix C and the code sheet for the hygiene data set is in Appendix D.

Table 3. Response options for rating belief of care from dentist or hygienist

Coded Value	Survey Response
1	Poor
2	Fair
3	Good
4	Very Good
5	Excellent

### *Statistical methods*

Data are summarized by generating descriptive statistics for all variables in the sample. Means, standard deviations and correlation coefficients are reported for all continuous variables. Frequency, percentage and correlation coefficients are reported for demographic variables.

An analysis was performed to assess the representativeness of the two samples. The methodology employed resulted in eliminating all cases with missing data which presents a potential for bias. Descriptive statistics were generated for included and excluded cases for each of the data sets and compared. Analysis of variance (ANOVA) was used to assess if there are statistical differences between excluded and included cases.

A principal components factor analysis with a Varimax rotation was used to assess the nature of dental satisfaction. Kerlinger asserts that the two basic purposes of factor analysis are



to identify the factors (underlying variables) and to test hypothesis among variable relationships. A factor is a construct and also can be called a latent variable. Factor analyses are used in this project to help identify which variables are composed of the same fundamental properties or are measuring the same thing. The principal component method uses mathematics to develop a solution to the complex problem and is able to extract the variance accounted for by each set of variables (factors). Simultaneous linear equations are calculated resulting in eigenvalues. The extraction of the variables is according to the proportion of explained variance from the original data set. Only a subset of the original variables are retained as the residual variables have small explanatory relevance. The results must be rotated in order to have meaning and adequate interpretation. The Varimax rotation was developed in 1958 and rotates the data so that axes are moved to a position so that the sum of the variances of the loadings is the maximum possible. The Varimax rotation method typically ends with each variable loading (associated with) only one factor and thus is easier for interpretation. The overarching goal of this portion of the project was to identify the main components or factors of satisfaction (Abid, 2003; Kerlinger, 1973; & Thurstone, 1947).

Hierarchical multiple linear regression analyses are utilized to assess the predictive effects of the dependent variables on overall satisfaction with today's visit, overall satisfaction with the clinic and the patient's behavioral intent on returning to the clinic for future care. Regression is used to predict the amount of variance accounted by dependent variable from the set of independent variables. The independent variables are also referred to as the predictors. Regression utilizes F tests to compute the significance of each variable. Hierarchical regression is similar to stepwise regression except that the researcher controls the number of variables added to the model and the order in which the variables are entered.



Galton and Pearson are generally credited with developing the first regression techniques (Stanton, 2001). Galton's work on heredity utilizing peas led to the early discovery of the technique and Pearson added to his work. Simple linear regression is used to predict the effect of one independent variable on one dependent variable. Multiple linear regression allows the use of several predictive variables to assess their predictive value on the one dependent variable. In general, regression is used to examine the relationship between several independent variables on one dependent variable. The assumptions of multiple regression are normality, linearity, continuous variables and homoscedasticity (Allison, 1999).

This methodology focuses on the analysis of reduced and full regression models to estimate the individual and unique contribution of each independent variable. Hierarchical regression was chosen as the method takes into account the difference in hierarchy or importance of each of the independent variables. Hierarchical regression accounts for correlations among variables and allows examination of each variable's effect on the model holding all other variables constant. In a review of the literature, Greenland (1994) determined that hierarchical methods were superior to other forms of regression due to the ability to handle multiple exposures. The coefficient of determination statistic ( $R^2$ ) quantifies the predictive effect of each variable. The two regression models are presented in Figures 1 and 2. Cronbach's alpha was used to assess inter-item reliability. Alpha level is set at  $p=.01$  for regression analyses.





$$Y_n = b_0 + b_1 \text{age17\_under} + b_2 \text{age18\_19} + b_3 \text{age20\_29} + b_4 \text{age30\_39} + b_5 \text{age40\_49} + b_6 \text{male} + b_7 \text{Active Duty} + b_8 \text{Dependent} + b_9 \text{E1\_E4} + b_{10} \text{E5\_E9} + b_{11} \text{Warrant} + b_{12} \text{Army} + b_{13} \text{Navy} + b_{14} \text{USMC} + b_{15} \text{Air Force} + b_{16} \text{Courtesy} + b_{17} \text{Thoroughness} + b_{18} \text{Quality} + b_{19} \text{Attention} + b_{20} \text{Explanation} + b_{21} \text{Helped} + b_{22} \text{Time} + b_{23} \text{ScheduledAppt} + b_{24} \text{DaysWaited} + b_{25} \text{RateDaysWaited} + b_{26} \text{SeenOnTime} + b_{27} \text{FY2000} + b_{28} \text{FY2001} + b_{29} \text{FY2002} + b_{30} \text{FY2003} + b_{31} \text{QTR1} + b_{32} \text{QTR2} + b_{33} \text{QTR3} + \epsilon$$

- $Y_n$  dependent variable;  $Y_1$  is Patient Satisfaction with Today's visit;  $Y_2$  Patient Satisfaction with clinic's ability to take care of needs;  $Y_3$  – Behavioral intent to return to clinic
- $b_0$  is the regression constant, or the Y intercept.
- $X_n$  represents the predictor variables.
- $\epsilon$  represents random error.

Figure 1. Regression Model for Satisfaction with Dentist

$$Y_n = b_0 + b_1 \text{age17\_under} + b_2 \text{age18\_19} + b_3 \text{age20\_29} + b_4 \text{age30\_39} + b_5 \text{age40\_49} + b_6 \text{male} + b_7 \text{Active Duty} + b_8 \text{Dependent} + b_9 \text{E1\_E4} + b_{10} \text{E5\_E9} + b_{11} \text{Warrant} + b_{12} \text{Army} + b_{13} \text{Navy} + b_{14} \text{USMC} + b_{15} \text{Air Force} + b_{16} \text{Courtesy} + b_{17} \text{Thoroughness} + b_{18} \text{Quality} + b_{19} \text{ScheduledAppt} + b_{20} \text{DaysWaited} + b_{21} \text{RateDaysWaited} + b_{22} \text{SeenOnTime} + b_{23} \text{FY2000} + b_{24} \text{FY2001} + b_{25} \text{FY2002} + b_{26} \text{FY2003} + b_{27} \text{QTR1} + b_{28} \text{QTR2} + b_{29} \text{QTR3} + \epsilon$$

- $Y_n$  dependent variable;  $Y_1$  is Patient Satisfaction with Today's visit;  $Y_2$  Patient Satisfaction with clinic's ability to take care of needs;  $Y_3$  – Behavioral intent to return to clinic
- $b_0$  is the regression constant, or the Y intercept.
- $X_n$  represents the predictor variables.
- $\epsilon$  represents random error.

Figure 2. Regression Model for Hygienist Satisfaction

## Results

### Satisfaction with the Dentist

A total of 309,261 surveys from the last quarter of fiscal year 2000 through the fourth quarter of fiscal year 2004 were analyzed for this portion of the project. The majority of subjects were male (77.5%, n=239,531) and reported being an active duty service member (98%, n=302,973). The service affiliations of respondents are as follows: Air Force - 45.8 % (n =



141,672), Army - 22.3% (n = 69,059), Marines - 11.3%(n = 34814), Navy - 19.8%, and other .8%. The bulk of active duty respondents were enlisted personnel (83.3%, n=257,388) with the remaining subjects being officers.

Descriptive statistics, including means and correlations, for the independent and dependent variables are presented in Table 4. Overall satisfaction was rated high as the mean score for overall satisfaction with today's visit was 6.53 (*SD* .83) and overall satisfaction with the clinic's ability take care of the needs was rated 6.42 (*SD* .84) on the seven-point bi-polar adjective rating scale. Almost 98% of respondents noted that they would return to the clinic for care if they were given a choice. Returning to the clinic for future appointments was operationalized as the behavior intent of the patient. The ratings of the beliefs about the care received were high as well. Mean scores on the seven belief questions ranged from 4.51 to 4.67 on a five-point scale. Dentist courtesy and friendliness received the highest rating (4.67) while the amount of time the dentist spent with the patient was rated lowest (4.51). All seven questions regarding the beliefs about the dentist were highly significantly correlated with the three dependent variables. The trend presented in the table is that the belief questions are highly correlated with the first two dependent variables (overall satisfaction with today's visit and ability of the clinic to meet the needs) and moderately correlated with the behavioral intent of returning to the clinic for further care. The correlation table presented in Table 4 illustrates that, in general, older patients are more satisfied with care than those in younger age categories and that Non-Commissioned Officers and Officers are more satisfied than younger enlisted and Warrant Officers.



Table 4. Descriptive Statistics: Patient Satisfaction, Behavioral Intent, and Predictor Variables

Dental Patient Satisfaction, Intent, and Predictors	n	%	mean	Std Dev	Correlation		
					Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>3</sub>
Dependent Variables							
Y <sub>1</sub> – Overall satisfaction with care received today's visit	309261	-	6.53	.83	1.000	.674**	.261**
Y <sub>2</sub> – Overall satisfaction with clinic's ability to meet needs	309261	-	6.42	.84		1.000	.299**
Y <sub>3</sub> – Behavioral Intent: would return to this facility for care	309261	-	1.97	.21			1.000
Person Characteristics							
Age Group Categories							
17 years and under	1517	.49	-	-	-.004*	-.009**	-.006**
18-19 years	28697	9.28	-	-	-.030**	-.018**	-.016**
20-29 years	159823	51.68	-	-	-.045**	-.042**	-.018**
30-39 years	86590	28.00	-	-	.032**	.023**	.019**
40-49 years	28478	9.21	-	-	.050**	.047**	.019**
50 years and above	4156	1.34	-	-	.021**	.025**	.002ns
Gender							
Male	239531	77.42	-	-	.004*	.012**	.008**
Female	69730	22.58	-	-	-.004*	-.012**	-.008**
Beneficiary Categories							
Active Duty	302973	97.97	-	-	.012**	.024**	.019**
Family Member of Active Duty	4910	1.59	-	-	-.013**	-.027**	-.015**
Retiree	1378	.44	-	-	-.002ns	-.001ns	-.012**
Military Rank Categories							
E1 – E4	126660	40.96	-	-	-.046**	-.029**	-.035**
E5 – E9	130728	42.27	-	-	.031**	.019**	.026**
Warrant Officer	3883	1.25	-	-	-.003*	-.009**	-.003*
Officer	47990	15.52	-	-	.020**	.015**	.012**
Service Branch Categories							
Army	69059	22.33	-	-	-.026**	-.029**	-.006**
Navy	61160	19.78	-	-	-.008**	-.002ns	.010**
Marine Corps	34814	11.25	-	-	-.030**	-.025**	-.015**
Air Force	141672	45.82	-	-	.047**	.042**	.007**
Other Service	2556	.82	-	-	.002ns	.002ns	-.003ns





## Beliefs About the Care Itself

Thoroughness of dental treatment	309261	-	4.65	.63	.514**	.481**	.238**
Dentist explanation of procedures	309261	-	4.55	.73	.478**	.445**	.219**
Overall quality of care received from dentist	309261	-	4.66	.62	.541**	.501**	.264**
How much the dentist helped you	309261	-	4.57	.69	.519**	.489**	.238**
Dentist attention to what you had to say	309261	-	4.64	.64	.493**	.463**	.226**
Dentist courtesy and friendliness	309261	-	4.67	.62	.487**	.452**	.217**
Amount of time dentist spent with you	309261	-	4.51	.74	.494**	.468**	.216**

## Environmental Factors

Scheduled appointment							
Yes	270541	87.48	-	-	.039**	.000ns	.023**
No	38720	12.52	-	-	-.039**	-.000ns	-.023**
Number of days waited for appointment	309261	-	4.95	2.11	.015**	-.052**	-.008**
Rating of days waited for appointment	309261	-	4.09	.97	.274**	.389**	.144**
Seen on time							
Yes	253827	82.07	-	-	.104**	.101**	.080**
No/no appointment	55434	17.92	-	-	-.104**	-.101**	-.080**

## Fiscal Year

2000	23319	7.54	-	-	-.005**	-.005**	.003*
2001	91352	29.54	-	-	-.012**	-.013**	-.001ns
2002	65014	21.02	-	-	.002ns	.001ns	.000ns
2003	68870	22.27	-	-	.006**	.007**	.000ns
2004	60706	19.63	-	-	.009**	.010**	-.002ns

## Fiscal Quarter/Seasonality

1	69476	22.47	-	-	.001ns	-.001ns	.003ns
2	74473	24.08	-	-	.007**	.010**	.004*
3	71911	23.25	-	-	.002ns	-.001ns	-.004*
4	93401	30.20	-	-	-.009**	-.007**	-.002ns

Note: Correlations: ns=not significant, \* significant at .05 level, \*\* significant at .01 level  
 Rating reliabilities were assessed by Coefficient Alpha and obtained .81 for Y<sub>1</sub> and Y<sub>2</sub>, .66 for Y<sub>1</sub>, Y<sub>2</sub>, and Y<sub>3</sub>, and .95 for all seven belief items.



*Factor Analysis*

The principal component factor analyses with Varimax rotation identified two major components of patient satisfaction and are presented in Table 5. All seven variables associated with rating beliefs about the dentist were significant and included in the beliefs factor. The first construct identified was beliefs about care and all seven variables associated with rating satisfaction with the dentist were significant and included in the beliefs factor. The rotated factor loadings (correlations) for each of the seven dentist satisfaction questions are as follows: overall quality of care (.919), thoroughness of treatment (.900), how much dentist helped you (.896), dentist attention to what you had to say (.895), courtesy and friendliness (.878), amount of time with dentist (.861), and explanation of procedures (.853)

The second factor identified was termed the environment factor and composed of four variables. The rotated factor loadings for each of the four environmental variables are as follows: scheduled appointment (.863), number of days waited for appointment (.832), rating of number of days waited for appointment (-.417) and patient seen at appointed time (.774). Beliefs about the care accounted for 51.54% and environmental factors 20.09% of the total variance. Cumulatively, the two factors accounted for 71.63% of the total variance in dental satisfaction.



Table 5. Principal Components Factor Analysis, Rotation Component Matrix Solution for Belief and Environment Dental Items

Item	Rotated Factor Loadings (Correlation)	
	Factor 1 - Beliefs	Factor 2 - Environment
Overall quality of care received from dentist	.919	.020
Thoroughness of dental treatment	.900	.002
How much the dentist helped you	.896	.013
Dentist attention to what you had to say	.895	.015
Dentist courtesy and friendliness	.878	.002
Amount of time dentist spent with you	.861	.002
Dentist explanation of procedures	.853	.018
Was appointment scheduled	.042	.863
Number of days waited for appointment	-.001	.832
Rating of number of days waited	.393	-.417
Patient seen at appointed time	.119	.774

Note: N = 309,261 dental patients; Varimax Rotation Method

### *Regression Analysis*

Hierarchical multiple regression models were created for each of the three dependent variables. Table 6 presents the results of the regression model for the dependent variable overall satisfaction with dental care received during today's visit. All tested effects are significant at the alpha equals .01 level except fiscal year ( $p=.96$ ) is not statistically significant and fiscal quarter/seasonality ( $p=.0410$ ) is significant at the .05 level. The full regression model accounts for 33.8%





of the shared variance, with  $F(33, 309227) = 4,787.97$ ,  $p < .0001$ . Hierarchical regression allowed the identification of the largest contributors to the full model. Beliefs about the care is an aggregation of all seven questions regarding care received by the dentist and account for 23.5% of the explained variance with  $F(7, 309227) = 15,678.89$ ,  $p < .0001$ . The belief factor accounts for almost seventy-percent of the 33.8% of the shared variance explained by the full model. Held in isolation, each individual belief does not describe a large percentage of the variation. Person characteristics and environmental factors are all significant individually and in aggregate, but do not describe a large portion of the explained variation. The demographic variables (person characteristics) were all statistically significant, but had little explanatory value and minimal contribution to the overall model. The variables are significant based on the extremely large sample size. The minimal contribution of the demographic variables lack of differences in satisfaction based on demographics is as important of a finding as the contributory effects of the other two factors. The military serves a diverse set of beneficiaries and the minimal contribution of person characteristics to the model suggests that patients are not being treated differently solely based on a demographic characteristic.



Table 6. Hierarchical Multiple Regression Analyses of Hypotheses associated with Y<sub>1</sub> Overall Satisfaction With Dental Care Received During Today's Visit

Effects tested	R <sup>2</sup> Full	R <sup>2</sup> Reduced	R <sup>2</sup> Change	df <sub>1</sub>	df <sub>2</sub>	F	p
<b>Full Model Regression</b>	.33816944	.00000000	.33816944	33	309227	4787.97	.0000
<i>Person Characteristics</i>	.33816944	.33723680	.00093264	15	309227	29.05	.0000
Age Group Categories	.33816944	.33783180	.00033764	5	309227	31.55	.0000
Gender	.33816944	.33808119	.00008825	1	309227	41.23	.0000
Beneficiary Categories	.33816944	.33812859	.00004085	2	309227	9.54	.0000
Military Rank Categories	.33816944	.33813108	.00003836	3	309227	5.97	.0005
Service Branch Categories	.33816944	.33813258	.00003686	4	309227	4.31	.0018
<i>Beliefs About the Care Itself</i>	.33816944	.10326961	.23489983	7	309227	15678.89	.0000
Thoroughness of dental treatment	.33816944	.33606191	.00210753	1	309227	984.70	.0000
Dentist explanation of procedures	.33816944	.33722631	.00094313	1	309227	440.66	.0000
Overall quality of care received from dentist	.33816944	.33096678	.00720266	1	309227	3365.30	.0000
How much the dentist helped you	.33816944	.33567686	.00249258	1	309227	1164.61	.0000
Dentist attention to what you had to say	.33816944	.33799148	.00017796	1	309227	83.15	.0000
Dentist courtesy and friendliness	.33816944	.33756260	.00060684	1	309227	283.53	.0000
Amount of time dentist spent with you	.33816944	.33644104	.00172840	1	309227	807.56	.0000
<i>Environmental Factors</i>	.33816944	.32675194	.01141750	11	309227	484.96	.0000
Scheduled appointment	.33816944	.33805108	.00011836	1	309227	55.30	.0000
Number of days waited for appointment	.33816944	.33757619	.00059325	1	309227	277.18	.0000
Rating of days waited for appointment	.33816944	.32899489	.00917455	1	309227	4286.62	.0000
Seen on time	.33816944	.33680948	.00135996	1	309227	635.41	.0000
Fiscal Year	.33816944	.33816814	.00000130	4	309227	.15	.9623
Fiscal Quarter/Seasonality	.33816944	.33815177	.00001767	3	309227	2.75	.0410

The second regression model utilized overall satisfaction with the clinic's ability to take care of the dental needs as the dependent variable and is presented in Table 7. All tested effects are significant at the alpha equals .01 level except fiscal year ( $p=.7926$ ), fiscal quarter/seasonality ( $p=.3479$ ) and gender ( $p=.2610$ ) are not significant in this model. The full model accounts for 34.7% of the shared variance, with  $F(33, 309227) = 4,970.37$ ,  $p < .0001$ . Similar to the first model, the aggregate variable of beliefs about the care itself  $F(33, 309227) = 410911.13$ ,  $p < .0001$  is the single largest predictor of satisfaction accounting for 16.1% of the shared variance. Though beliefs about care is the largest contributor to this model, the variable has a smaller contribution than in the first model (Y1). Beliefs about the care may be less important on the overall assessment of the clinic's ability to take care of patient needs than compared to the satisfaction with today's visit. Environmental factors  $F(33, 309227) = 2,591.39$ ,  $p < .0001$  accounted for 6% of the shared variance. The environment factor variable rating of days waited for the appointment seemed to be the most important variable accounting for 4.9% of the shared variance. This finding suggests that the number of days waited for the appointment is important, but the subjective rating of the days waited is more salient to the patient.



Table 7. Hierarchical Multiple Regression Analyses of Hypotheses associated with Y<sub>2</sub> Overall

Satisfaction with Clinic's Ability to Take Care of Dental Needs

Effects tested	R <sup>2</sup> Full	R <sup>2</sup> Reduced	R <sup>2</sup> Change	df <sub>1</sub>	df <sub>2</sub>	F	p
<b>Full Model Regression</b>	.34658777	.00000000	.34658777	33	309227	4970.37	.0000
<i>Person Characteristics</i>	.34658777	.34530757	.00128020	15	309227	40.39	.0000
Age Group Categories	.34658777	.3458767	.00073010	5	309227	69.10	.0000
Gender	.34658777	.34658510	.00000267	1	309227	1.26	.2610
Beneficiary Categories	.34658777	.34633237	.00025540	2	309227	60.43	.0000
Military Rank Categories	.34658777	.34648646	.00010131	3	309227	15.98	.0000
Service Branch Categories	.34658777	.34639967	.00018810	4	309227	22.25	.0000
<i>Beliefs About the Care Itself</i>	.34658777	.18519747	.16139030	7	309227	10911.13	.0000
Thoroughness of dental treatment	.34658777	.34467924	.00190853	1	309227	903.21	.0000
Dentist explanation of procedures	.34658777	.34620759	.00038018	1	309227	179.92	.0000
Overall quality of care received from dentist	.34658777	.34246236	.00412541	1	309227	1952.35	.0000
How much the dentist helped you	.34658777	.34429315	.00229462	1	309227	1085.93	.0000
Dentist attention to what you had to say	.34658777	.34638509	.00020268	1	309227	95.92	.0000
Dentist courtesy and friendliness	.34658777	.34637690	.00021087	1	309227	99.79	.0000
Amount of time dentist spent with you	.34658777	.34524373	.00134404	1	309227	636.07	.0000
<i>Environmental Factors</i>	.34658777	.28635475	.06023302	11	309227	2591.39	.0000
Scheduled appointment	.34658777	.34537642	.00121135	1	309227	573.27	.0000
Number of days waited for appointment	.34658777	.34610653	.00048124	1	309227	227.75	.0000
Rating of days waited for appointment	.34658777	.29791567	.04867210	1	309227	23034.05	.0000
Seen on time	.34658777	.34232524	.00426253	1	309227	2017.24	.0000
Fiscal Year	.34658777	.34658420	.00000357	4	309227	.42	.7926
Fiscal Quarter/Seasonality	.34658777	.34658080	.00000697	3	309227	1.10	.3479





Patient behavioral intent was utilized as the dependent variable for the third regression model and the results are presented in Table 8. The behavioral intent was assessed from the question of whether patients would return to the dental facility for future care if they were given a choice. All tested effects are significant at the alpha equals .01 level except age group ( $p=.1738$ ), gender ( $p=.8618$ ) and fiscal quarter/ seasonality ( $p=.1582$ ) are not significant in this model. The full model  $F(33, 309227) = 827.54$ ,  $p < .0001$  explains 8.1% of the shared variance. Though this model is statistically significant it describes only a small amount of the overall variation. Due to the low predictability, it is not a very useful model. The largest contributor to the model is the aggregate of the beliefs about dental care and accounts for 5% of the shared variance. The contribution of the beliefs factor is the largest of all variables, but is still much smaller when compared to the first two models.

Table 8. Hierarchical Multiple Regression Analyses of Hypotheses associated with Y<sub>3</sub> Behavioral Intent:  
Would Return To This Dental Facility For Dental Care Needs

Effects tested	R <sup>2</sup> Full	R <sup>2</sup> Reduced	R <sup>2</sup> Change	df <sub>1</sub>	df <sub>2</sub>	F	p
<b>Full Model Regression</b>	.08114661	.00000000	.08114661	33	309227	827.54	.0000
<i>Person Characteristics</i>	.08114661	.08000878	.00113783	15	309227	25.53	.0000
Age Group Categories	.08114661	.08112374	.00002287	5	309227	1.53	.1738
Gender	.08114661	.08114652	.00000009	1	309227	.03	.8618
Beneficiary Categories	.08114661	.08096312	.00018349	2	309227	30.88	.0000
Military Rank Categories	.08114661	.08066319	.00048342	3	309227	54.23	.0000
Service Branch Categories	.08114661	.08095351	.00019310	4	309227	16.25	.0000
<i>Beliefs About the Care Itself</i>	.08114661	.03092308	.05022353	7	309227	2414.57	.0000
Thoroughness of dental treatment	.08114661	.08073032	.00041629	1	309227	140.10	.0000
Dentist explanation of procedures	.08114661	.08096897	.00017764	1	309227	59.78	.0000
Overall quality of care received from dentist	.08114661	.07524138	.00590523	1	309227	1987.32	.0000
How much the dentist helped you	.08114661	.08083257	.00031404	1	309227	105.69	.0000
Dentist attention to what you had to say	.08114661	.08111104	.00003557	1	309227	11.97	.0005
Dentist courtesy and friendliness	.08114661	.08107949	.00006712	1	309227	22.59	.0000
Amount of time dentist spent with you	.08114661	.08109536	.00005125	1	309227	17.25	.0000
<i>Environmental Factors</i>	.08114661	.07346605	.00768056	11	309227	234.98	.0000
Scheduled appointment	.08114661	.08098922	.00015739	1	309227	52.97	.0000
Number of days waited for appointment	.08114661	.08110567	.00004094	1	309227	13.78	.0001
Rating of days waited for appointment	.08114661	.07806638	.00308023	1	309227	1036.61	.0000
Seen on time	.08114661	.07788598	.00326063	1	309227	1097.32	.0000
Fiscal Year	.08114661	.08108341	.00006320	4	309227	5.32	.0003
Fiscal Quarter/Seasonality	.08114661	.08113118	.00001543	3	309227	1.73	.1582



Cronbach's alpha was used to test the inter-item reliability of the seven questions aggregated into the beliefs about care. The Cronbach's alpha was .954 which suggests high inter-item reliability of the seven questions explaining why the aggregate beliefs variable accounted for large proportions of the shared variance versus each individual effect tested. The conceptual model for satisfaction with the dentist is presented below in Figure 3:

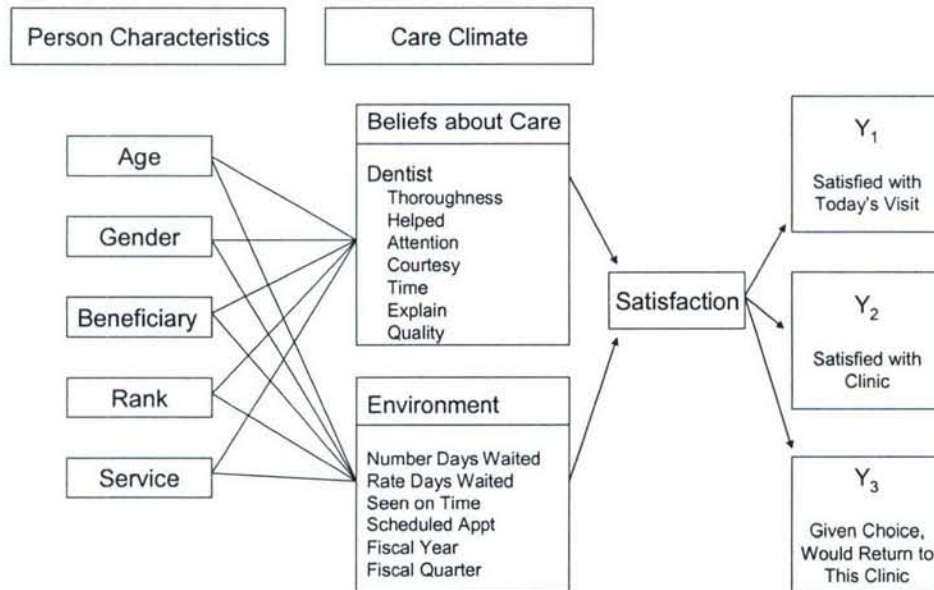


Figure 3. Dentist Patient Satisfaction Conceptual Model

To assess the representativeness of the sample, frequencies and means of included and excluded cases were examined. There were 139,294 cases not included in the dentist data set as at least one variable was missing for each of the cases. These excluded cases were compared to the included cases ( $n=309,261$ ) for differences in demographics and mean satisfaction scores. Table 9 shows demographic comparisons of included and excluded cases the dentist data set. Rough estimations can be made from comparing frequencies of the demographic classes, but many of the excluded cases had missing data for the demographic variables. Generally the excluded cases and included cases do not differ drastically although a greater percentage of



active duty service members, males, and those belonging to the Air Force completely filled out the survey

Table 9. Demographic comparisons of included and excluded cases for the dentist data set

	Included Cases		Excluded Cases	
	Number	Percentage	Number	Percentage
<b>Age Groups</b>				
17 and under	1517	0.5%	5482	4.3%
18 - 19	28697	9.3%	12378	9.7%
20 - 29	159823	51.7%	57932	45.2%
30 - 39	86590	28.0%	34235	26.7%
40 - 49	28478	9.2%	12821	10.0%
50 and over	4156	1.3%	5384	4.2%
<b>Beneficiary</b>				
Active Duty	302973	98.0%	92728	76.4%
Family Member	4910	1.6%	22898	18.9%
Retiree	1378	0.4%	5721	4.7%
<b>Military Rank</b>				
E1 - E4	126660	41.0%	42096	42.5%
E5 - E9	130728	42.3%	40849	41.2%
Warrant	3883	1.3%	1706	1.7%
Officer	47990	15.5%	14421	14.6%
<b>Military Service</b>				
Army	69059	22.3%	34781	28.5%
Navy	61160	19.8%	26237	21.5%
Marine Corps	34814	11.3%	14978	12.3%
Air Force	141672	45.8%	43778	35.9%
Other	2556	0.8%	2214	1.8%
<b>Gender</b>				
Male	239531	77.5%	83005	65.8%
Female	69730	22.5%	43223	34.2%





To assess if satisfaction differs for those who completely filled out the survey versus those who did not, an assessment of mean values was performed and is presented in Table 10. The mean values of the seven questions regarding satisfaction with the dentist (beliefs about the care itself) are not practically different between the included and excluded cases. The largest difference is .05 on a five-point scale. This small difference does indicate that there is a tendency for included cases to have slightly higher levels of satisfaction. The ANOVA results for all seven-belief questions indicate that there are statistically significant differences between the groups, but this is due to the extremely large sample size. Even though there are statistical differences between the two samples, practically there are no differences. Satisfaction levels of the three independent variables are also presented. Satisfaction with today's visit is 6.53 for included cases as compared to 6.47 for excluded cases. Similarly, overall satisfaction with the clinic for included cases is 6.42 for included cases and 6.36 for excluded cases. The differences are .06 on a seven-point scale and indicate a minor increase in satisfaction for included cases, but no practical difference. The ANOVA did show that there are statistical differences between  $Y_1$  and  $Y^2$  for included versus excluded cases, but as earlier mentioned there is no clinical or practical difference between the samples based on these mean values.



Table 10. Comparison of mean dentist satisfaction values of included and excluded cases

	Included Cases		Excluded Cases	
	Mean	SD	Mean	SD
<b>Satisfaction with Dentist</b>				
Courtesy	4.67	0.62	4.63	0.65
Thoroughness	4.65	0.63	4.60	0.68
Explanation	4.55	0.73	4.52	0.76
Time	4.51	0.74	4.46	0.78
Attention	4.64	0.64	4.60	0.68
Help	4.57	0.69	4.53	0.73
Overall quality	4.66	0.62	4.62	0.67
<b>Independent Variables</b>				
Y <sub>1</sub> - Satisfaction with today's visit	6.53	0.83	6.47	0.91
Y <sub>2</sub> - Overall satisfaction with the clinic	6.42	0.84	6.36	0.94
Y <sub>3</sub> – Behavioral intent to return to the clinic	1.97	0.21	1.95	0.26

It is also important to assess whether satisfaction for each of the independent variables differ according to the demographic variables available for analysis. Table 11 presents the mean satisfaction for today's visit, overall satisfaction and the intent to return to the clinic stratified by the demographic variables. There are no practical differences in the intent to return to the clinic (Y<sub>3</sub>) for any of the demographic groupings. There are some differences amongst groups for Y<sub>1</sub> and Y<sub>2</sub>. For satisfaction with today's visit and overall clinic satisfaction, the data show a trend that older, active duty, senior personnel (E5 – E9 and officers), and Air Force personnel exhibit higher satisfaction levels.



Table 11. Mean satisfaction of the three independent variables stratified by demographics

Demographic Variables	Mean (SD) Satisfaction with Today's Visit (Y <sub>1</sub> )	Mean (SD) Overall Satisfaction with Clinic (Y <sub>2</sub> )	Mean (SD) Intent to Return to Clinic (Y <sub>3</sub> )
<b>Age Group Categories</b>			
17 years and under	6.49 (.90)	6.32 (1.04)	1.95 (.26)
18-19 years	6.45 (.87)	6.38 (.86)	1.96 (.23)
20-29 years	6.50 (.85)	6.39 (.84)	1.96 (.22)
30-39 years	6.57 (.80)	6.46 (.83)	1.97 (.17)
40-49 years	6.66 (.77)	6.55 (.80)	1.98 (.20)
50 years and above	6.68 (.83)	6.61 (.85)	1.97 (.20)
<b>Gender</b>			
Male	6.53 (.83)	6.43 (.83)	1.97 (.20)
Female	6.53 (.84)	6.41 (.86)	1.97 (.21)
<b>Beneficiary Categories</b>			
Active Duty	6.53 (.83)	6.43 (.83)	1.97 (.21)
Family Member /Active Duty	6.45 (.94)	6.25 (1.04)	1.94 (.28)
Retiree	6.50 (.90)	6.42 (.97)	1.93 (.29)
<b>Military Rank Categories</b>			
E1 – E4	6.49 (.87)	6.40 (.85)	1.96 (.23)
E5 – E9	6.56 (.81)	6.44 (.83)	1.98 (.19)
Warrant Officer	6.51 (.84)	6.36 (.90)	1.96 (.23)
Officer	6.57 (.79)	6.45 (.83)	1.97 (.19)
<b>Service Branch Categories</b>			
Army	6.49 (.87)	6.38 (.91)	1.97 (.22)
Navy	6.52 (.81)	6.42 (.83)	1.97 (.19)
Marine Corps	6.46 (.87)	6.37 (.87)	1.96 (.24)
Air Force	6.57 (.78)	6.46 (.79)	1.97 (.20)
Other Service	6.55 (.85)	6.45 (.85)	1.96 (.22)





*Satisfaction with the Hygiene Provider*

Surveys with no missing data (n= 98,792) from the last quarter of fiscal year 2000 through the fourth quarter of fiscal year 2004 were analyzed for this portion of the project. The majority of subjects were male (76.6%, n=75,700) and reported being an active duty service member (98.6%, n=97,370). The service affiliations of respondents are as follows: Air Force 31.3 % (n = 30,945), Army 29.2% (n = 28,891), Marines 14.0%(n = 13,826), Navy 24.7%. The majority of active duty respondents were enlisted personnel (81.2%, n=80,142) with the remaining subjects being from the officer ranks.

Descriptive statistics, including means and correlations, for the independent and dependent variables are presented in Table 12. Overall satisfaction was rated high as the mean score for overall satisfaction with today's visit was 6.61 (SD .79) and overall satisfaction with the clinic's ability take care of the needs was rated 6.44 (SD .82) on the seven-point bi-polar adjective rating scale. Ninety-eight percent of respondents noted that they would return to the clinic for care if they were given a choice. The ratings of the beliefs about care were high as well. The courtesy and friendliness of the hygiene provider was rated highest receiving a means score of 4.79 and thoroughness of the hygiene treatment received a mean score of 4.73 which was the lowest rating of the three beliefs about care ratings. Mean scores on the three belief questions ranges from 4.73 to 4.79, on a five-point scale, and all were highly significantly correlated with the three dependent variables. The trend presented in the table is that the belief questions are more highly correlated with the first two dependent variables (overall satisfaction with today's visit and ability to of the clinic to meet the needs) and moderate correlation with the behavioral intent of returning to the clinic for further care. The correlation table presented in Table12 does illustrate that that, in general, older patients are more satisfied with care than those



in younger age categories and that Non-Commissioned Officers and Officers are more satisfied than younger enlisted and Warrant Officers. The correlations would also indicate the males are more satisfied with the dental care than females. The average patient had to wait five days to receive an appointment and respondents rated this as a 4.02 on the five-point scale. This indicates satisfaction with the waiting for the appointment, but is the lowest score of all variables.



Table 12. Descriptive Statistics: Patient Satisfaction, Behavioral Intent, and Predictor Variables

Dental Patient Satisfaction, Intent, and Predictors	n	%	mean	Std Dev	Correlation		Coeff.
					Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>3</sub>
Dependent Variables							
Y <sub>1</sub> – Overall satisfaction with care received today's visit	98792	-	6.61	.79	1.000	.631**	.234**
Y <sub>2</sub> – Overall satisfaction with clinic's ability to meet needs	98792	-	6.44	.82		1.000	.277**
Y <sub>3</sub> – Behavioral Intent: would return to this facility for care	98792	-	1.98	.19			1.000
Person Characteristics							
Age Group Categories							
17 years and under	310	.30	-	-	-.008*	-.010**	-.006ns
18-19 years	7425	7.50	-	-	-.030**	-.019**	-.013**
20-29 years	50377	51.00	-	-	-.039**	-.044**	-.019**
30-39 years	29972	30.30	-	-	.026**	.022**	.016**
40-49 years	9583	9.70	-	-	.046**	.050**	.019**
50 years and above	1125	1.10	-	-	.021**	.025**	.005ns
Gender							
Male	75700	76.60	-	-	.015**	.022**	.016**
Female	23092	23.40	-	-	-.015**	-.022**	-.016**
Beneficiary Categories							
Active Duty	97370	98.60	-	-	.023**	.033**	.038**
Family Member of Active Duty	1212	1.20	-	-	-.026**	-.036**	-.038**
Retiree	210	.20	-	-	.003ns	.001ns	-.006*
Military Rank Categories							
E1 – E4	34939	35.40	-	-	-.051**	-.028**	-.033**
E5 – E9	45203	45.80	-	-	.032**	.019**	.028**
Warrant Officer	1827	1.80	-	-	-.003ns	-.012**	-.006**
Officer	16823	17.00	-	-	.023**	.014**	.007*
Service Branch Categories							
Army	28891	29.20	-	-	-.020**	-.040**	.005ns
Navy	24411	24.70	-	-	.003ns	.020**	.017**
Marine Corps	13826	14.00	-	-	-.003ns	-.008**	-.005ns
Air Force	30945	31.30	-	-	.019**	.026**	-.007*
Other Service	719	.70	-	-	.003ns	.005ns	.000ns





Beliefs About the Care Itself								
Thoroughness of hygiene treatment	98792	-	4.73	.57	.523**	.443**	.236**	
Overall quality of care received from hygienist	98792	-	4.75	.55	.531**	.441**	.248**	
Hygienist courtesy and friendliness	98792	-	4.79	.56	.501**	.424**	.224**	
Environmental Factors								
Scheduled appointment								
Yes	94587	95.70	-	-	.027**	-.008**	.017**	
No	4205	4.30	-	-	-.027**	.010**	-.017**	
Number of days waited for appointment	93596	-	5.21	1.70	-.012**	-.085**	-.028**	
Rating of days waited for appointment	93596	-	4.02	.96	.236**	.374**	.125**	
Seen on time								
Yes	90250	91.40	-	-	.078**	.122**	.070**	
No/no appointment	8542	8.60	-	-	-.078**	-.122**	-.070**	
Fiscal Year								
2000	7281	7.40	-	-	.001ns	.001ns	.000ns	
2001	28540	28.90	-	-	-.017**	-.021**	-.005ns	
2002	21994	22.30	-	-	.003ns	.004ns	.001ns	
2003	22107	22.40	-	-	.005ns	.008**	.000ns	
2004	18870	19.10	-	-	.010**	.012**	.004ns	
Fiscal Quarter/Seasonality								
1	21593	21.90	-	-	.000ns	-.001ns	.002ns	
2	23031	23.30	-	-	.011**	.010**	.007*	
3	23179	23.50	-	-	-.003ns	-.001ns	-.006ns	
4	30989	31.70	-	-	-.007*	-.007*	-.002ns	

Note: Correlations: ns=not significant, \* significant at .05 level, \*\* significant at .01 level  
 Rating reliabilities were assessed by Coefficient Alpha and obtained .77 for Y<sub>1</sub> and Y<sub>2</sub>, .62 for Y<sub>1</sub>, Y<sub>2</sub>, and Y<sub>3</sub>, and .94 for the three belief items.

### Factor Analysis

The principal component factor analyses with Varimax rotation identified two major components of patient satisfaction and are presented in Table 13. The three variables associated

with rating beliefs about the hygienist were significant and included in the beliefs factor and allows us to rank the importance of these beliefs. The first construct identified was beliefs about care and all three variables associated with rating satisfaction with the hygienist were significant and included in the beliefs factor. The rotated factor loadings for each of the seven dentist satisfaction questions are as follows: overall quality of care (.956), thoroughness of treatment (.945), and hygienist courtesy and friendliness (.932).

The second factor identified was termed the environment factor and composed of three variables. The rotated factor loadings for each of the four environmental variables are as follows: number of days waited for appointment (.875), scheduled appointment (.658), and rating of number of days waited for appointment (-.658). Beliefs about the care accounted for 46.76% and environmental factors 26.78% of the total variance. Cumulatively, the two factors accounted for 73.54% of the total variance.

Table 13. Principal Components Factor Analysis, Rotation Component Matrix Solution for Belief and Environment Dental Items

Item	Rotated Factor Loadings (Correlation)	
	Factor 1 - Beliefs	Factor 2 - Environment
Overall quality of care received from hygienist	.956	-.025
Thoroughness of hygiene treatment	.945	-.026
Hygienist courtesy and friendliness	.932	-.025
Number of days waited for appointment	.031	.875
Rating of number of days waited	.305	-.658
Was appointment scheduled	.106	.658

Note: N = 98,792 hygiene patients; Varimax Rotation Method



*Regression Analysis*

Hierarchical multiple regression models were created for each of the three dependent variables. Table 14 presents the results of the regression model of the dependent variable overall satisfaction with dental care received during today's visit. All tested effects are significant at the alpha equals .01 level except gender ( $p=.6547$ ), fiscal year ( $p=.5633$ ) and fiscal quarter/seasonality ( $p=.3080$ ). The full regression model accounts for 31.4% of the shared variance with  $F(29, 98791) = 1,393.3, p < .0001$ . The hierarchical regression allowed the identification of the largest contributors to the full model. Beliefs about the care is an aggregation of all 3 questions regarding care received by the hygienist and account for 23.6% of the total variance with  $F(2, 98791) = 8,835.8, p < .0001$ . The belief factor accounts for almost seventy-five percent of the 31.4% of the shared variance. Held in isolation, each individual belief does not describe a large percentage of the variation. Person characteristics and environmental factors are all significant individually and in aggregate, except fiscal year, but do not describe a large portion of the shared variation. This would indicate that satisfaction levels do not change according to an individuals demographic variables and that satisfaction levels have not changed over the past four years.



Table 14. Hierarchical Multiple Regression Analyses of Hypotheses associated with Y<sub>1</sub> Overall Satisfaction With Care Received During Today's Visit

Effects tested	R <sup>2</sup> Full	R <sup>2</sup> Reduced	R <sup>2</sup> Change	df <sub>1</sub>	df <sub>2</sub>	F	p
<b>Full Model Regression</b>	.31368529	.00000000	.31368529	29	98791	1396.3	.0000
<i>Person Characteristics</i>	.31368529	.31287048	.00081481	15	98791	16.0	.0000
Age Group Categories	.31368529	.31359225	.00009304	5	98791	31.6	.0000
Gender	.31368529	.31348799	.00019730	1	98791	0.2	.6547
Beneficiary Categories	.31368529	.31356546	.00011983	2	98791	22.2	.0000
Military Rank Categories	.31368529	.31347877	.00020652	3	98791	11.4	.0005
Service Branch Categories	.31368529	.31361823	.00006706	4	98791	6.0	.0001
<i>Beliefs About the Care Itself</i>	.31368529	.07816391	.23552138	2	98791	8835.8	.0000
Thoroughness of hygiene treatment	.31368529	.30669936	.00698593	1	98791	741.7	.0000
Overall quality of care from hygienist	.31368529	.30463797	.00904732	1	98791	412.0	.0000
Hygienist courtesy and friendliness	.31368529	.31011753	.00356776	1	98791	350.6	.0000
<i>Environmental Factors</i>	.31368529	.30066093	.01302436	11	98791	964.1	.0000
Scheduled appointment	.31368529	.31317300	.00051229	1	98791	54.9	.0000
Number of days waited for appointment	.31368529	.31248158	.00120371	1	98791	255.7	.0000
Rating of days waited for appointment	.31368529	.30321411	.01047118	1	98791	8611.9	.0000
Seen on time	.31368529	.31200928	.00167601	1	98791	646.8	.0000
Fiscal Year	.31368529	.31366216	.00002313	4	98791	2.3	.0563
Fiscal Quarter/Seasonality	.31368529	.31364571	.00003958	3	98791	1.2	.3080

Note: N = 98,792 hygiene patients

The second regression model utilized overall satisfaction with the clinic's ability to take care of the dental needs as the dependent variable. All tested effects are significant at the alpha

equals .01 level except age ( $p=.1910$ ), service ( $p=.0477$ ), fiscal year ( $p=.5249$ ) and fiscal quarter/seasonality ( $p=.1272$ ). The full model  $F(29, 98791) = 1,556.5$ ,  $p < .0001$  accounts for 29.1% of the shared variance. Similar to the first model, beliefs about the care itself  $F(2, 98791) = 16,946.0$ ,  $p < .0001$  is the single largest predictor of satisfaction accounting for 12.7% of the shared variance. Environmental factors  $F(11, 98791) = 170.4$ ,  $p < .0001$  accounted for 7.6% of the shared variance. Of the environmental factors, the rating of days waited for the appointment seemed to be the most salient factor accounting for 6.2% of the shared variance and reported in Table 15. This is in contrast to the first regression model where the rating of days waited for an appointment only accounted for approximately 1% of the shared variance. This finding suggests that the qualitative assessment of rating the number of days waited for an appointment is important to overall satisfaction with the clinic, but not as important when a patient rates one particular visit.



Table 15. Hierarchical Multiple Regression Analyses of Hypotheses associated with Y<sub>2</sub> Overall Satisfaction With Clinic's Ability To Take Care of Dental Needs

Effects tested	R <sup>2</sup> Full	R <sup>2</sup> Reduced	R <sup>2</sup> Change	df <sub>1</sub>	df <sub>2</sub>	F	p
<b>Full Model Regression</b>	.29078746	.00000000	.29078746	29	98791	1556.5	.0000
<i>Person Characteristics</i>	.29078746	.28905923	.00172823	15	98791	7.8	.0000
Age Group Categories	.29078746	.28965194	.00113552	5	98791	2.7	.0191
Gender	.29078746	.29078582	.00000164	1	98791	28.4	.0000
Beneficiary Categories	.29078746	.29046840	.00031906	2	98791	8.6	.0002
Military Rank Categories	.29078746	.29054133	.00024613	3	98791	9.9	.0000
Service Branch Categories	.29078746	.29061521	.00017225	4	98791	2.4	.0477
<i>Beliefs About the Care Itself</i>	.29078746	.16388670	.12690076	2	98791	16946.0	.0000
Thoroughness of hygiene treatment	.29078746	.28546155	.00532591	1	98791	1005.3	.0000
Overall quality of care from hygienist	.29078746	.28782922	.00295824	1	98791	1301.9	.0000
Hygienist courtesy and friendliness	.29078746	.28826999	.00251747	1	98791	513.4	.0000
<i>Environmental Factors</i>	.29078746	.21462867	.07615879	11	98791	170.4	.0000
Scheduled appointment	.29078746	.29039309	.00039437	1	98791	73.7	.0000
Number of days waited for appointment	.29078746	.28895116	.00018363	1	98791	173.2	.0000
Rating of days waited for appointment	.29078746	.22894528	.06184218	1	98791	1506.8	.0000
Seen on time	.29078746	.28614256	.00464490	1	98791	241.2	.0000
Fiscal Year	.29078746	.29072189	.00006557	4	98791	0.8	.5249
Fiscal Quarter/Seasonality	.29078746	.29076235	.00002511	3	98791	1.9	.1272

Note: N = 98,792 hygiene patients

Patient behavioral intent was utilized as the dependent variable for the third regression model and results are presented in Table 16. The behavioral intent was assessed from the question of whether patients would return to the dental facility for future care. All tested effects are significant at the alpha equals .01 level except age group, gender, number of days waited for the appointment, fiscal year and fiscal quarter/ seasonality. The full model  $F(29, 98791) = 227.2$ ,  $p < .0001$  explains 7.3% of the shared variance. The largest contributor to the model is the aggregate of the beliefs about dental care and accounts for 4.7% of the shared variance.

This model is not very explanatory based on the low coefficient of determination (.0728). This finding is also supported by the seemingly uniform satisfaction responses when the question was stratified by demographics as previously discussed. These findings suggest an investigation into whether this question is truly needed on future versions of the questionnaire.

Table 16. Hierarchical Multiple Regression Analyses of Hypotheses associated with Y<sub>3</sub> Behavioral Intent: Would Return To This Dental Facility For Dental Care Needs

Effects tested	R <sup>2</sup> Full	R <sup>2</sup> Reduced	R <sup>2</sup> Change	df <sub>1</sub>	df <sub>2</sub>	F	p
<b>Full Model Regression</b>	.07275338	.00000000	.07275338	29	98791	227.2	.0000
<i>Person Characteristics</i>	.07275338	.07097509	.00177829	15	98791	12.6	.0000
Age Group Categories	.07275338	.07275338	.00000000	5	98791	0	-
Gender	.07275338	.07275167	.00000171	1	98791	0.2	.6547
Beneficiary Categories	.07275338	.07177603	.00097735	2	98791	52.0	.0000
Military Rank Categories	.07275338	.07233011	.00042327	3	98791	15.0	.0000
Service Branch Categories	.07275338	.07251840	.00023498	4	98791	6.3	.0000
<i>Beliefs About the Care Itself</i>	.07275338	.02617362	.04657976	2	98791	2480.6	.0000
Thoroughness of hygiene treatment	.07275338	.07208400	.00066938	1	98791	71.3	.0000
Overall quality of care from hygienist	.07275338	.06873734	.00401604	1	98791	427.8	.0000
Hygienist courtesy and friendliness	.07275338	.07261869	.00013469	1	98791	14.3	.0000
<i>Environmental Factors</i>	.07275338	.06494448	.00780890	11	98791	75.6	.0000
Scheduled appointment	.07275338	.07115652	.00159686	1	98791	170.1	.0000
Number of days waited for appointment	.07275338	.07275338	.00000000	1	98791	0	-
Rating of days waited for appointment	.07275338	.06988661	.00286677	1	98791	305.3	.0000
Seen on time	.07275338	.06933191	.00342147	1	98791	364.4	.0000
Fiscal Year	.07275338	.07275045	.00000293	4	98791	0.1	.9825
Fiscal Quarter/Seasonality	.07275338	.07270506	.00004832	3	98791	1.7	.1647

Note: N = 98,792 hygiene patients

Cronbach's alpha was used to test the inter-item reliability of the three questions aggregated into the beliefs about care from the hygiene provider. The Cronbach's alpha was .944 which suggests



extremely high inter-item reliability of the three questions explaining why the aggregate beliefs variable accounted for large proportions of the shared variance versus each individual effect tested. The conceptual model for satisfaction with the hygiene provider is presented below in Figure 4.

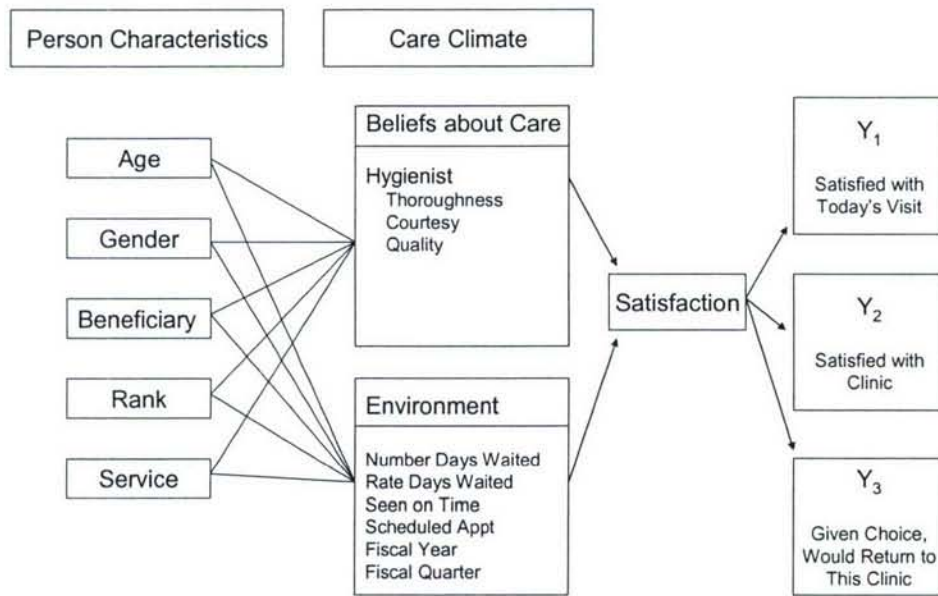


Figure 4. Hygiene Patient Satisfaction Conceptual Model

To assess the representativeness of the hygienist sample, frequencies and means of included and excluded cases were examined. There were 32,009 cases not included in the hygienist data set as at least one variable was missing for each of the cases. These excluded cases were compared to the included cases (n=98,792) for differences in demographics and mean satisfaction scores. Table 17 shows demographic comparisons of included and excluded cases the dentist data set. Generally the excluded cases and included cases do not differ drastically although a greater percentage of active duty service members, males, and those in the age group seventeen and under completely filled out the survey.

Table 17. Demographic comparisons of included and excluded cases for the hygienist data set

	Included Cases		Excluded Cases	
	Number	Percentage	Number	Percentage
<b>Age Groups</b>				
17 and under	310	0.3%	888	3.2%
18 - 19	7425	7.5%	3273	11.6%
20 - 29	50377	51.0%	12970	46.1%
30 - 39	29972	30.3%	7645	27.2%
40 - 49	9583	9.7%	2508	8.9%
50 and over	1125	1.1%	827	2.9%
<b>Beneficiary</b>				
Active Duty	97370	98.6%	19729	76.0%
Family Member	1212	1.2%	5348	20.6%
Retiree	210	0.2%	869	3.3%
<b>Military Rank</b>				
E1 - E4	34939	35.4%	9006	42.0%
E5 - E9	45203	45.8%	9097	42.4%
Warrant	1827	1.8%	433	2.0%
Officer	16823	17.0%	2924	13.6%
<b>Military Service</b>				
Army	28891	29.2%	7687	28.9%
Navy	24411	24.7%	7448	28.0%
Marine Corps	13826	14.0%	3939	14.8%
Air Force	30945	31.3%	7123	26.8%
Other	719	0.7%	372	1.4%
<b>Gender</b>				
Male	75700	76.6%	17303	62.9%
Female	23092	23.4%	10202	37.1%

To assess if satisfaction differs for included and excluded cases, an assessment of mean values was performed and presented in Table 18. The mean values of the three questions regarding satisfaction with the hygienist (beliefs about the care itself) are not practically different between the included and excluded cases. All three measures of satisfaction with the hygiene provider are .04 higher, on a five-point scale, as compared to excluded cases. The ANOVA





results for all three-belief questions does indicate that there are statistically significant differences between the groups, but this is due to the extremely large sample size. Even though statistically there are differences between the two samples, practically there are not differences. Satisfaction levels of the three independent variables are also presented. Satisfaction with today's visit is 6.61 for included cases as compared to 6.54 for excluded cases. Similarly, overall satisfaction with the clinic for included cases is 6.44 for included cases and 6.38 for excluded cases. Both included and excluded cases rated satisfaction as being high and the small differences indicate a minor increase in satisfaction for included cases, but no practical difference. The ANOVA did show that there are statistical differences between  $Y_1$  and  $Y_2$  for included versus excluded cases, but as earlier mentioned there is no clinical or practical difference between the samples based on these mean values.

Table 18. Comparison of hygienist mean satisfaction values of included and excluded cases

	Included Cases		Excluded Cases	
	Mean	SD	Mean	SD
<b>Satisfaction with Hygienist</b>				
Courtesy	4.74	0.56	4.70	0.61
Thoroughness	4.73	0.57	4.69	0.61
Overall quality	4.75	0.55	4.71	0.6
<b>Independent Variables</b>				
$Y_1$ - Satisfaction with today's visit	6.61	0.79	6.54	0.88
$Y_2$ - Overall satisfaction with the clinic	6.44	0.82	6.38	0.92
$Y_3$ – Behavioral intent to return to the clinic	1.97	0.19	1.96	0.24

Table 19 presents the mean satisfaction for today's visit, overall satisfaction and the intent to return to the clinic stratified by the demographic variables. Similar to the dentist findings, there are no practical differences in the intent to return to the clinic (Y<sub>3</sub>) for any of the demographic groupings. There are some differences amongst groups for Y<sub>1</sub> and Y<sub>2</sub>. For satisfaction with today's visit and overall clinic satisfaction, the data show a trend that older, active duty, senior personnel (E5 – E9 and officers), and Air Force personnel exhibit higher satisfaction levels.

Table 19. Mean satisfaction of the three independent variables stratified by demographics

Demographic Variables	Mean (SD) Satisfaction with Today's Visit (Y1)	Mean (SD) Overall Satisfaction with Clinic (Y2)	Mean (SD) Intent to Return to Clinic (Y3)
Age Group Categories			
17 years and under	6.49 (.93)	6.30 (1.03)	1.96 (.21)
18-19 years	6.52 (.78)	6.39 (.81)	1.96 (.21)
20-29 years	6.58 (.79)	6.41 (.82)	1.97 (.21)
30-39 years	6.64 (.78)	6.47 (.83)	1.98 (.19)
40-49 years	6.72 (.77)	6.57 (.80)	1.98 (.15)
50 years and above	6.77 (.73)	6.66 (.80)	1.98 (.15)
Gender			
Male	6.61 (.78)	6.45 (.81)	1.98 (.18)
Female	6.59 (.78)	6.41 (.86)	1.97 (.22)
Beneficiary Categories			
Active Duty	6.61 (.78)	6.45 (.82)	1.97 (.19)
Family Member /Active Duty	6.42 (1.1)	6.18 (1.13)	1.91 (.38)
Retiree	6.66 (.74)	6.46 (.88)	1.95 (.30)
Military Rank Categories			
E1 – E4	6.55 (.82)	6.41 (.83)	1.97 (.22)
E5 – E9	6.64 (.77)	6.46 (.82)	1.98 (.17)
Warrant Officer	6.59 (.85)	6.37 (.92)	1.96 (.24)
Officer	6.65 (.75)	6.47 (.81)	1.98 (.19)
Service Branch Categories			
Army	6.58 (.88)	6.39 (.91)	1.97 (.20)
Navy	6.61 (.76)	6.47 (.77)	1.98 (.17)
Marine Corps	6.60 (.76)	6.43 (.80)	1.97 (.20)
Air Force	6.63 (.74)	6.48 (.79)	1.97 (.20)
Other Service	6.64 (.84)	6.49 (.82)	1.97 (.20)

## Discussion

This study is seminal in nature as it is the first in the dental literature to assess patient satisfaction with the hygiene provider. While there are many articles in the literature on hygienist job satisfaction, education satisfaction and satisfaction with procedures or adjunctive devices, there appears to be a vacuum of evidence for patient satisfaction with the dental hygienist.

The results clearly indicate that military members are highly satisfied with both the dental and hygiene care they receive at military dental clinics. Though no direct comparisons of the hygiene findings are possible due to a lack of literature, the findings are consistent with the limited literature on military dental satisfaction. There are differences in the perception of satisfaction based on demographics. Generally older, male and senior ranking individuals are more satisfied with the care they receive. Most of these differences are actually very small and thus it is interesting to note that even though the military services provide dental care to a diverse group of patients, satisfaction does not differ greatly amongst those groups.

The three regression models for satisfaction with the hygiene provider and the dentist allow the assessment of satisfaction during the visit and after the visit. The regression models strongly suggest that patient beliefs about received care are the primary drivers of patient satisfaction. Beliefs about care were defined as the patient assessment of items such as thoroughness, amount of time provider spent with patient, assessment of overall quality. This finding is also consistent with what has been reported in the literature. Patients do not typically have the ability to assess the technical competence of providers and thus use the interpersonal exchanges as a surrogate for technical competence. The overall satisfaction of the visit and the clinic are assessments during the visit while the behavioral intent is a functional attitude created by the patient and assessed after the visit. The regression models have identified that



interpersonal experiences with the providers are the most important facets to hygiene satisfaction. The interpersonal experiences, as denoted from beliefs about the care itself, are the largest single contributor to the model for each of the three regression models. When one particular belief was removed, it made little change to the overall variance accounted for as the three items are highly intercorrelated. The third model utilized intent to return to the clinic as the independent variable. This study suggests that the variable has little predictive value and the question should be rephrased in future editions of the questionnaire.

It is important to note that different effects are significant in each of the models. Gender and age groups are significant predictors of care for satisfaction with today's dental care but not for overall quality of the clinic. Satisfaction with today's visit and overall satisfaction models describe 28-34% of the shared variance while the behavioral intent model only describes 6 - 8% of the shared variance. The single largest contributor to each of these models continues to be beliefs about the care itself.

The validity of the results are enhanced by utilizing only cases that had no missing data since there are no differences between excluded and included cases. This methodology did not force the researchers to make assumptions about the missing data. Reliability of the study is enhanced by analyzing 17 fiscal quarters of data. This is an extremely large sample and thus statistical significance can be based solely on sample size and caution must be exercised to determine statistical versus clinical/practical significance. The results of this study do have some limitations as to the generalizability. A major limitation is that this survey assessed satisfaction of dental clinic users as opposed to all eligible beneficiaries. This effect may be mitigated by policy requiring all military members to have an yearly dental examination. Representativeness of respondents is a concern as the DoD reported that the active military force was comprised of

83.1% enlisted in September of 2004. Of the 1,426,836 service members, 35% were Army, 27% Air Force, 26% Navy and 12% Marine Corps (Department of Defense, 2004). This would indicate that the surveys are representative of the enlisted-officer ratio that comprises the military, but the Army and Navy are underrepresented, while the Air Force is over-represented. The high proportion of Air Force respondents may skew the data.

### **Conclusion**

This study has demonstrated that the interpersonal experiences with the dentist and hygienist are the largest single predictors of patient satisfaction. These findings have important implications for military and civilian dental providers. The findings validate the viability of the interpersonal interactions and suggest opportunities for potential behavior modification. The mere knowledge of these attributes is essential to improve the patient-provider interaction.

The Graduate Management Project is comprehensive in nature. In an effort to educate providers on the nature of satisfaction, two journal articles have been created. An article titled "Patient Satisfaction with Dental Hygiene Providers in US Military Clinics" has been accepted for publication by the Journal of Dental Hygiene and is presented in Appendix D. Another article focusing on satisfaction with the dentist titled "The Development of a Conceptual Model for Evaluating Dental Patient Satisfaction" is currently undergoing peer review in the journal Military Medicine and is presented in Appendix E.

### **Recommendations**

The two major areas of recommendations focus on provider training and survey distribution methods. For institutional settings such as military clinics, a training vehicle should be developed to educate providers of the importance of patient beliefs about the care and methods of how the providers can use this information to provide patients with increased

satisfaction with their dental encounters. This training vehicle should focus on how to maximize patient satisfaction from a personal and military readiness level. To overcome the problem of response bias, a new method of survey distribution should be developed. The new system should survey all beneficiaries of the healthcare system and not only users. I suggest that the military dental services use an electronic format for ease of administering and analyzing the survey. I would also recommend deleting the question about the intent of returning to the clinic for future care. This project has demonstrated that the question has little value in assessing satisfaction.





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Appendix A. Survey

DoD Dental Patient Satisfaction Survey

USE NO. 2 PENCIL ONLY

Correct Mark:

Incorrect Marks:



DD-HA (AR) 2040  
Exp: 10/28/01

This survey asks you about **TODAY'S** dental visit. Please answer all questions unless directed otherwise. **THANK YOU FOR YOUR TIME!**

1. What was the **MAIN** purpose of **TODAY'S** visit? (*Choose Only One*)

- Exam Only
- Cleaning Only
- Exam and Cleaning
- Emergency Care
- General Dentistry (fillings)
- Oral Surgery
- Endodontics (root canal)
- Periodontics (gums)
- Prosthodontics (crowns/bridges)
- Orthodontics (braces)

2. Who did you see during **THIS** visit? (*Choose Only One*)

- Dentist Only
- Hygienist/Prophy Tech. Only
- Both Dentist and Hygienist/Prophy Tech.

Thinking about **TODAY'S** dental visit, please rate the services you received.

**Satisfaction With Your Dentist** (*Answer 3 thru 9 Only if you saw a Dentist*)

- 3. Friendliness and courtesy of the dentist
- 4. Attention given to what you had to say
- 5. Thoroughness of treatment and/or exam you received
- 6. Explanation of dental procedures
- 7. Amount of time you had with the dentist during your visit
- 8. How much you were helped by the care you received from the dentist
- 9. Overall quality of care and services you received from dentist

	Poor	Fair	Good	Very Good	Excellent
3. Friendliness and courtesy of the dentist	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Attention given to what you had to say	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Thoroughness of treatment and/or exam you received	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Explanation of dental procedures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Amount of time you had with the dentist during your visit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. How much you were helped by the care you received from the dentist	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Overall quality of care and services you received from dentist	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Satisfaction With Your Hygienist/Prophy Technician** (*Answer 10 thru 12 Only if you saw a Hygienist/Prophy Tech.*)

- 10. Friendliness and courtesy of the hygienist/prophy tech.
- 11. Thoroughness of the treatment you received
- 12. Overall quality of care received from the hygienist/prophy tech.

13. All things considered, how satisfied are you with the dental care you received during **TODAY'S** visit?

- Completely Dissatisfied
- Very Dissatisfied
- Somewhat Dissatisfied
- Neither Satisfied nor Dissatisfied
- Somewhat Satisfied
- Very Satisfied
- Completely Satisfied

14. Did you have a scheduled appointment for **TODAY'S** visit?

- Yes
- No

Please Continue on Other Side >



15. How many days were there between the day your appointment was made and **TODAY'S** visit?  
 No Appointment; Walked In     2-3 Days     15-21 Days  
 Same Day     4-7 Days     22-30 Days  
 1 Day     8-14 Days     More Than 30 Days
16. How do you rate the number of **DAYS** you waited for your appointment?  
 Poor                      Fair                      Good                      Very Good                      Excellent
17. Were you seen at your scheduled appointment time?  
 No (**GO to Question 18**)     Yes (**GO to Question 21**)     No Appointment; Walked In (**GO to Question 21**)
18. Did anyone explain the reason for the delay?  
 Yes                               No
19. How many minutes did you wait past your scheduled appointment time?  
 1-15 minutes                       31-45 minutes                       More than 60 minutes  
 16-30 minutes                       46-60 minutes
20. How do you rate the number of **MINUTES** you waited past your appointment time?  
 Poor                      Fair                      Good                      Very Good                      Excellent
21. All things considered, how satisfied are you with the clinic's ability to take care of your dental needs?  
 Completely              Very                      Somewhat              Neither Satisfied              Somewhat              Very                      Completely  
 Dissatisfied              Dissatisfied              Dissatisfied              nor Dissatisfied              Satisfied              Satisfied              Satisfied
22. Are you Male or Female?  
 Male                               Female
23. What type of beneficiary are you?  
 Active duty                       Family member of active duty                       Retiree
24. If active duty, what is your current rank?  
 E-1 to E-4                               Warrant Officer  
 E-5 to E-9                               Officer
25. What is your (or, your sponsor's) current military service?  
 Army                               Marine Corps                               Other  
 Navy                               Air Force
26. How old are you?  
 17 yrs and under                       20-29 yrs                               40-49 yrs  
 18-19 yrs                               30-39 yrs                               50 yrs and above
27. If you had a choice, would you return to this dental facility for your dental care needs?  
 Yes                               No                               Don't Know

**Do Not Write Below This Line. Clinic Staff Will Enter Clinic ID Number in Box Below.**

Clinic ID					
1	(1)	4	(4)	1	(1)
2	(2)	2	(2)	2	(2)
3	(3)	3	(3)	3	(3)
4	(4)	4	(4)	4	(4)
5	(5)	5	(5)	5	(5)
6	(6)	6	(6)	6	(6)
7	(7)	7	(7)	7	(7)
8	(8)	8	(8)	8	(8)
9	(9)	9	(9)	9	(9)
0	(0)	0	(0)	0	(0)

SCANTRON<sup>®</sup> FORM NO. F-13330-TSC

© SCANTRON CORPORATION 1999 Scantron asks that you please RECYCLE this product. M1 2300 172 12 11 10 9 8 7 6 5 4 3 2 1

Return survey to: Tri-Service Center for Oral Health Studies, PMB/AFRR/LOG, USUHS, 4301 Jones Bridge Rd., Bethesda, MD, 20814-4799





## Appendix B. Code Sheet for Data Set 1 – Satisfaction with the Dentist

<u>Independent Variable &amp; SPSS Variable Code</u>	<u>Description</u>	<u>SPSS Data Codes</u>
<b>Dependent Variable 1: Satisfaction with dental care from TODAY'S visit (a_Y1_PtSatVisit)</b>	Assessment of satisfaction of today's visit on a bi-polar adjective rating scale	1 = Completely Dissatisfied 2 = Very Dissatisfied 3 = Somewhat Dissatisfied 4 = Neither Satisfied nor Dissatisfied 5 = Somewhat Satisfied 6 = Very Satisfied 7 = Completely Satisfied
<b>Dependent Variable 2: Overall Satisfaction with clinic (a_Y2_PtSatClinic)</b>	Assessment of overall satisfaction with the dental clinic	1 = Completely Dissatisfied 2 = Very Dissatisfied 3 = Somewhat Dissatisfied 4 = Neither Satisfied nor Dissatisfied 5 = Somewhat Satisfied 6 = Very Satisfied 7 = Completely Satisfied
<b>Dependent Variable 3: Likelihood of Returning to Clinic (a_Y3_Bhvrintent)</b>	Assessment of likelihood of returning to clinic (Recoded)	0 = No 1 = Don't Know 2 = Yes
AGE – 6 dummy variables (b1_age17_under; b1_age18_19; b1_age20_29; b1_age30_39; b1_age40_49; b1_age50_over)	<b>PERSON Characteristic;</b> Age in years by category	1 = 17 yrs and under 2 = 18 – 19 yrs 3 = 20-29 yrs 4 = 30-39 yrs 5 = 40-49 yrs 6 = 50 yrs and above
Gender (b2_Gender)	<b>PERSON Characteristic;</b> Gender	0 = Female 1 = Male
Beneficiary – 3 dummy variables (b3_Ben_AD; b3_Ben_DEP; b3_Ben_RET)	<b>PERSON Characteristic;</b> Self-reported beneficiary status – (AD) active duty; (DEP) family member; (RET) retiree	1 = Active Duty 2 = Family Member of Active Duty 3 = Retiree
Grade Category (b4_E1_E4; b4_E5_E9; b4_WarrantOfficer; b4_Officer)	<b>PERSON Characteristic;</b> Military Designation of Enlisted Soldier, Non-Commissioned, Warrant Officer or Commissioned Officer	1 = E1-E4 2 = E5-E9 3 = W01-W05 4 = 01-010
Military Service (B51_Army; B52_Navy; B53_USMC; B54_AirForce; b55_SvsOther)	<b>PERSON Characteristic;</b> Designates the military service of the sponsor. Other Service most likely are civilians or foreign nationals	1 = Army 2 = Navy 3 = Marine Corps 4 = Air Force 5 = Other
Dentist Thoroughness (c1_q5Thorough)	<b>BELIEF Characteristic;</b> Belief of thoroughness of treatment provided by dentist	1 = Poor 2 = Fair 3 = Good 4 = Very Good 5 = Excellent
Dentist Explanation (c2_q6Explain)	<b>BELIEF Characteristic;</b> Belief that the dentist properly explained the dental procedures	1 = Poor 2 = Fair 3 = Good 4 = Very Good 5 = Excellent

Dentist Quality (c3_q9Quality)	<b>BELIEF Characteristic;</b> Overall quality of care and services provided by the dentist	1 = Poor 2 = Fair 3 = Good 4 = Very Good 5 = Excellent
Dentist Help (c4_q8Help)	<b>BELIEF Characteristic;</b> How much you were helped by the care you received from the dentist	1 = Poor 2 = Fair 3 = Good 4 = Very Good 5 = Excellent
Dentist Attention (C5_q4Attention)	<b>BELIEF Characteristic;</b> the attention given to what the patient had to say by the dentist	1 = Poor 2 = Fair 3 = Good 4 = Very Good 5 = Excellent
Dentist Courtesy (C6_q3Courtesy)	<b>BELIEF Characteristic ;</b> perceived friendliness and courtesy of the dentist	1 = Poor 2 = Fair 3 = Good 4 = Very Good 5 = Excellent
Dentist Time (C7_q7Time)	<b>BELIEF Characteristic;</b> rating of the amount of time the dentist spent with the patient	1 = Poor 2 = Fair 3 = Good 4 = Very Good 5 = Excellent
Scheduled Appointment (e1_Scheduled)	<b>ENVIRONMENT Characteristic;</b> scheduled appt or not	0 = No 1 = Yes
Days Waited for Appointment (e2_DaysWait)	<b>ENVIRONMENT Characteristic;</b> number of days between the day the appointment was made and Today's visit	1 = No Appointment, Walked in 2 = Same Day 3 = 1 Day 4 = 2-3 Days 5 = 4-7 Days 6 = 8-14 Days 7 = 15-21 Days 8 = 22-30 Days 9 = More Than 30 Days
Rating of Days Waited for Appointment (e3_RateDays)	<b>ENVIRONMENT Characteristic;</b> rating of the days waited between making the appointment and today's visit	1 = Poor 2 = Fair 3 = Good 4 = Very Good 5 = Excellent
Seen on Time (e4_SeenOnTime)	<b>ENVIRONMENT Characteristic;</b> Was patient seen at scheduled time	0 = No 1 = Yes 2 = No Appointment, Walked in
Fiscal Year – 5 dummy variables (e5_FY2000; e5_FY2001; e5_FY2002; e5_FY2003; e5_FY2004)	<b>ENVIRONMENT Characteristic;</b> Fiscal year (October 1 to September 30)	0 = FY not of interest 1 = FY of interest (For each particular dummy variable)
Fiscal Quarter/ Seasonality – 4 dummy variables (e6_Qtr1; e6_Qtr2; e6_Qtr3; e6_Qtr4)	<b>ENVIRONMENT Characteristic;</b> Fiscal quarter (FQ1– Oct to Dec; FQ2 – Jan to Mar;; FQ3 – Apr to Jun; FQ4 – Jul to Sep)	0 = FQ not of interest 1 = FQ of interest (For each particular dummy variable)



## Appendix C. Code Sheet for Data Set 2 – Satisfaction with the Hygienist

<u>Independent Variable &amp; SPSS Variable Code</u>	<u>Description</u>	<u>SPSS Data Codes</u>
<b>Dependent Variable 1: Satisfaction with dental care from TODAY'S visit (a_Y1_PtSat)</b>	Assessment of satisfaction of today's visit on a bi-polar adjective rating scale	1 = Completely Dissatisfied 2 = Very Dissatisfied 3 = Somewhat Dissatisfied 4 = Neither Satisfied nor Dissatisfied 5 = Somewhat Satisfied 6 = Very Satisfied 7 = Completely Satisfied
<b>Dependent Variable 2: Overall Satisfaction with clinic (a_Y2_PtSat)</b>	Assessment of overall satisfaction with the dental clinic	1 = Completely Dissatisfied 2 = Very Dissatisfied 3 = Somewhat Dissatisfied 4 = Neither Satisfied nor Dissatisfied 5 = Somewhat Satisfied 6 = Very Satisfied 7 = Completely Satisfied
<b>Dependent Variable 3: Likelihood of Returning to Clinic (a_Y3_Bhvrl)</b>	Assessment of likelihood of returning to clinic	0 = No 1 = Don't Know 2 = Yes
AGE – 6 dummy variables (b1_age17_under; b1_age18_19; b1_age20_29; b1_age30_39; b1_age40_49; b1_age50_over)	<b>PERSON Characteristic;</b> Age in years by category	1 = 17 yrs and under 2 = 18 – 19 yrs 3 = 20-29 yrs 4 = 30-39 yrs 5 = 40-49 yrs 6 = 50 yrs and above
Gender (b2_Gender)	<b>PERSON Characteristic;</b> Gender	0 = Female 1 = Male
Beneficiary – 3 dummy variables (b3_Ben_A; b3_Ben_D; b3_Ben_R)	<b>PERSON Characteristic;</b> Self-reported beneficiary status – (A) active duty; (D) family member; (R) retiree	1 = Active Duty 2 = Family Member of Active Duty 3 = Retiree
Grade Category (b4_E1_E4; b4_E5_E9; b4_WarrantOfficer; b4_Officer)	<b>PERSON Characteristic;</b> Military Designation of Enlisted Soldier, Non-Commissioned, Warrant Officer or Commissioned Officer	1 = E1-E4 2 = E5-E9 3 = W01-W05 4 = O1-O10
Military Service (B51_Army; B52_Navy; B53_USMC; B54_AirForce; b55_SvsOther)	<b>PERSON Characteristic;</b> Designates the military service of the sponsor. Other Service most likely are civilians or foreign nationals	1 = Army 2 = Navy 3 = Marine Corps 4 = Air Force 5 = Other
Hygiene Courtesy (C1_q10Courtesy_Friendliness)	<b>BELIEF Characteristic;</b> perceived friendliness and courtesy of the hygienist	1 = Poor 2 = Fair 3 = Good 4 = Very Good 5 = Excellent
Hygiene Thoroughness (c2_q11_Thoroughness)	<b>BELIEF Characteristic;</b> Belief of thoroughness of treatment provided by hygienist	1 = Poor 2 = Fair 3 = Good 4 = Very Good 5 = Excellent
Hygienist Quality	<b>BELIEF Characteristic;</b> Overall	1 = Poor

(c3_q12_OverallQuality)	quality of care and services provided by the hygienist	2 = Fair 3 = Good 4 = Very Good 5 = Excellent
Scheduled Appointment (e1_ScheduledAppt)	<b>ENVIRONMENT Characteristic;</b> scheduled appt or not	0 = No 1 = Yes
Days Waited for Appointment (e2_DaysWaited)	<b>ENVIRONMENT Characteristic;</b> number of days between the day the appointment was made and Today's visit	1 = No Appointment, Walked in 2 = Same Day 3 = 1 Day 4 = 2-3 Days 5 = 4-7 Days 6 = 8-14 Days 7 = 15-21 Days 8 = 22-30 Days 9 = More Than 30 Days
Rating of Days Waited for Appointment (e3_RateDaysWaited)	<b>ENVIRONMENT Characteristic;</b> rating of the days waited between making the appointment and today's visit	1 = Poor 2 = Fair 3 = Good 4 = Very Good 5 = Excellent
Seen on Time (e4_SeenOnTime)	<b>ENVIRONMENT Characteristic;</b> Was patient seen at scheduled time	0 = No 1 = Yes 2 = No Appointment, Walked in
Fiscal Year – 5 dummy variables (e5_FY2000; e5_FY2001; e5_FY2002; e5_FY2003; e5_FY2004)	<b>ENVIRONMENT Characteristic;</b> Fiscal year (October 1 to September 30)	0 = FY not of interest 1 = FY of interest (For each particular dummy variable)
Fiscal Quarter/ Seasonality – 4 dummy variables (e6_Qtr1; e6_Qtr2; e6_Qtr3; e6_Qtr4)	<b>ENVIRONMENT Characteristic;</b> Fiscal quarter (FQ1– Oct to Dec; FQ2 – Jan to Mar;; FQ3 – Apr to Jun; FQ4 – Jul to Sep)	0 = FQ not of interest 1 = FQ of interest (For each particular dummy variable)

**Appendix D. Journal Article Submission to the Journal of Dental Hygiene**

**Patient Satisfaction with Dental Hygiene Providers in US Military Clinics**

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**Disclaimer: The views expressed in this article are those of the authors and do not reflect the official policy of the U.S. Department of Defense or other departments of the U.S. Government.**

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## Abstract

**Purpose:** Military service members receive their dental care from military dental clinics. The purposes of this study were to assess satisfaction and to identify predictors of patient satisfaction with the hygiene provider in military dental treatment facilities.

**Methods:** Standardized surveys were administered from 2000 through 2004 by the Tri-Service Center for Oral Health Studies. Dependent variables were overall satisfaction with today's visit and overall satisfaction with the clinic's ability to take care of your needs. Independent variables were grouped by environment of care, beliefs about the care and demographic characteristics. Principal component factor analysis and hierarchical multiple linear regression were used to test the hypotheses.

**Results:** A total of 98,792 surveys, with no missing data, were analyzed. Patients treated by hygiene providers were highly satisfied with dental care as the mean score for satisfaction with today's visit was 6.61 and overall satisfaction with the clinic was 6.44 on a 7-point bi-polar adjective rating scale. Factor analysis revealed that beliefs about care (46.7%) and environment (26.8%) were the most important factors to satisfaction. Both regression models developed for patient satisfaction achieved statistical significance. Model one, overall satisfaction with today's visit, obtained  $R^2=.311$ , with  $F(6, 98785) = 8923, p<.0001$ . Model two, overall satisfaction with the clinic, obtained  $R^2=.284$  with  $F(6, 98785) = 7848, p<.0001$ .

**Conclusions:** This study demonstrated that beliefs about the care along with interpersonal experiences with the hygiene provider are the most important factors associated with patient satisfaction. These findings validate the importance of these attributes and can be used to train hygiene providers about the relationship of satisfaction with the interpersonal experience.



## **Introduction**

Customer satisfaction with the hygiene provider appears to be lacking in the dental literature. An existing Department of Defense (DoD) patient satisfaction survey monitors the satisfaction of military beneficiaries who receive treatment in military clinics throughout the world, but the data have never been analyzed in aggregate to identify trends or predictors of satisfaction. Patient satisfaction in military dental treatment facilities has not been formally assessed in over a decade. Additionally, previous assessments have focused on satisfaction with the overall dental experience, and not the hygiene provider.

Active duty service members of the U.S. Air Force, Army, Marines and Navy receive the bulk of their dental treatment from one of 300 worldwide military dental treatment facilities. Clinics are located on ships, military bases, and in deployment environments. Hygiene services are provided by Registered Dental Hygienists (RDHs) and prophy technicians in military dental clinics. The bulk of hygiene services are provided by RDHs who attended accredited U.S. schools. RDHs who work for the military are required to maintain a current state license and follow the state's guidelines for continuing education requirements .

## **Review of the Literature**

Traditionally, the clinician's technical competence and mechanical precision were important factors in the assessment of dental satisfaction; lay opinions played no role in this method of measuring quality.<sup>1</sup> Consumerism forced dental professionals to compete for patients and traditional patient satisfaction became an important part of providing dental services once consumerism became an integral part of the dental patient mindset.<sup>2</sup>

A large body of work in the field of patient satisfaction exists in the medical literature. Medical care patient satisfaction studies have consistently shown that the quality of the



interpersonal interactions between the provider and the patient play a large role in defining patient satisfaction.<sup>3-5</sup> A similar body of research exists for the dental field. Ross and Duff found that patients return to the dentist for subsequent care due to satisfaction with the interpersonal component of the dental relationship rather than the technical quality of the care received.<sup>6</sup> Evidence for both medical and dental patient satisfaction studies show that desirable interactions lead to more satisfied patients who better understand and more accurately follow prescribed regimens.<sup>7-8</sup> A satisfied patient may have a different set of behaviors that ultimately manifest both into a healthier patient and a more satisfied customer. Newsome and Wright (1999) reviewed 46 studies of patient satisfaction and found the factors most commonly identified with dental patient satisfaction were technical competence, interpersonal factors, convenience, costs, and facilities. <sup>9</sup>

Dental patient satisfaction among active duty service members has not been widely studied. Chisick conducted two studies of satisfaction on active duty military members.<sup>10-11</sup> Similar to the civilian studies, Chisick focused on access, availability/convenience, interpersonal skills, and pain control as predictors of satisfaction. He concluded that active duty personnel were generally very satisfied with military dental care and satisfaction did not vary significantly across demographics. Access was a consistent predictor of decreased satisfaction levels.

Two recent studies have identified models to predict patient satisfaction with military medical care. Mangelsdorff and Finstuen identified that attitudes and beliefs about the care were the most salient factors in the prediction model.<sup>12</sup> Waiting time as a measure of access and age, health status, and gender demographic variables were also significant predictors of satisfaction. A refinement of the model was recently published and validated the method.<sup>13</sup> Military beneficiary status (active duty, retired or family member), the reason for the visit, and variables

regarding beliefs about the care and waiting time were added to the model and are predictive of patient satisfaction in the military setting. These previous studies are precursors to this project.

Dentists have become very aware that the interpersonal dynamics between the provider and the patient is an important determinant in perceived satisfaction. A study by O'Shea, Corah, and Ayer displayed that US dentists recognize that patient dissatisfaction has a significant impact on care-seeking behavior, and in particular, on decisions to seek a new dentist.<sup>14</sup> With all the importance placed on dental satisfaction, there do not appear to be any published articles on consumer satisfaction with care given by the dental hygiene providers. Ovid lists 29,065 journal articles on patient satisfaction, 1,386 articles on dental patient satisfaction, and 114 articles on dental hygiene patient satisfaction. The articles on dental hygiene satisfaction focus on job satisfaction of the hygiene provider, satisfaction with the dental hygiene school/curriculum, satisfaction with independent hygiene practice and satisfaction with varying dental hygiene procedures. Additional searches using EBSCO and Google proved fruitless. One abstract has been published on patient satisfaction with the hygiene provider. Johnson reported on a pilot test of a survey instrument aimed at assessing patient satisfaction at the Idaho State University Dental Hygiene Clinic.<sup>15</sup>

The purposes of this project were to identify levels and predictors of satisfaction with the hygiene provider in military dental treatment facilities.

## **Methods**

This project is a secondary analysis of dental patient satisfaction data collected in military dental clinics. The data are anonymous and do not contain patient identifiers. The surveys are administered in the clinics with the use of the Random Appointment Time Slot Generator



system, which generates the patients who are to receive the survey. All patients that seek treatment on the randomized day are asked to complete the survey.

### *Survey Instrument*

The dental satisfaction survey was composed of twenty-seven questions focusing on access, quality, interpersonal relationships, overall satisfaction, and demographic data and was approved by the DoD Institutional Review Board to ensure patient privacy. The surveys analyzed for this project were administered from the fourth quarter of fiscal year 2000 through the fourth quarter of 2004. Seventeen digitized text files of data were received directly from the Tri-Service Center for Oral Health Studies, located in Bethesda, Maryland.

### *Data*

The seventeen text files were imported into SPSS v. 12 resulting in one master file with 658,443 cases. Respondents indicated whether they saw a dentist, hygienist, or both during their visit. Those who responded affirmative to receiving treatment only from a hygienist only during the visit were kept in the study resulting in 130,801 surveys. Questions pertaining to satisfaction with the dentist were deleted. Subjects were only included in the final sample if all questions were answered which resulted in a data set of 98,792 with no missing data.

### *Dependent Variables*

The study examined two dependent variables.  $Y_1$  was defined as the assessment of satisfaction with the dental care for **today's visit** and  $Y_2$  was defined as overall satisfaction with the **clinic's ability** to take care of the patient's dental needs. The two dependent variables were based on responses to a seven-point bi-polar adjective rating scale as follows: Completely

dissatisfied (1) Very dissatisfied (2) Somewhat dissatisfied (3) Neither satisfied nor dissatisfied (4) Somewhat satisfied (5) Very satisfied (6) or Completely satisfied (7).

### *Independent variables*

The independent variables were divided into three major categories: demographics, beliefs about the care itself, and environmental factors. The demographic variables included on the survey are age, gender, beneficiary category (active duty, family member, or retiree), military rank and military service. Patients responded to seven belief questions regarding the care provided by the dentist and were rated on a five-point scale as follows: Poor (1), Fair (2), Good (3), Very Good (4), Excellent (5). Environmental factors included whether the appointment was scheduled or not, number of days waiting for appointment, rating of the number of days waited for an appointment, whether the patient was seen on time for the appointment.

### *Statistical Methods*

A principal component factor analysis with a Varimax rotation was used to assess the nature of dental satisfaction. The goal of this portion of the project was to identify the main components of satisfaction. Factor analyses allowed data reduction and increased the stability of the model. The variables identified in the factor analysis were included in the hierarchical multiple linear regression analysis to assess the predictive effects of the dependent variables on the satisfaction with today's visit. This methodology focused on the analyses of reduced and full regression models to estimate the individual and unique contribution of each independent variable. Hierarchical regression accounts for correlations among variables and allowed examination of each variable's effect on the model. Cronbach's alpha was used to assess inter-item reliability; alpha level was set at  $p=.01$ .

## Results

Surveys with no missing data (n=98,792) from the last quarter of fiscal year 2000 through the fourth quarter of fiscal year 2004 were analyzed for this portion of the project. The surveys analyzed for this project constitute 75.5% of all returned questionnaires that indicated the visit was for hygiene care only. The majority of subjects were male (76.6%, n=75,700) and reported being an active duty service member (98.6%, n=97,370). The service affiliations of respondents were as follows; Air Force - 31.3 % (n = 30,945), Army - 29.2% (n = 28,891), Marines - 14.0%(n = 13,826), Navy - 24.7%. The majority of active duty respondents were enlisted personnel (81.2%, n=80,142) with the remaining subjects being officers.

Descriptive statistics, including means and correlations, for the independent and dependent variables are presented in Table I. Overall satisfaction was rated high as the mean score for overall satisfaction with today's visit was 6.61 (SD .79) and overall satisfaction with the clinic's ability take care of the needs was rated 6.44 (SD .82) on the seven-point bi-polar adjective rating scale. Among the respondents, 97.5% noted that they would return to the clinic for care if they were given that choice. The ratings of the beliefs about care were high as well. The courtesy and friendliness of the hygiene provider was rated highest receiving a mean score of 4.79 and thoroughness of the hygiene treatment received a mean score of 4.73 which was the lowest rating of the three beliefs about care ratings. Satisfaction for the two dependent variables, satisfaction with today's visit ( $Y_1$ ) and overall satisfaction with the clinic ( $Y_2$ ) are presented for each of the demographic variables and differences in satisfaction are minor across the demographic variables presented. Older individuals and those who had scheduled appointments



have higher levels of satisfaction. The longer wait times associated with 'walk in' patients may describe lower levels of satisfaction for those patients with no appointment.

The principal component factor analyses with Varimax rotation identified two major components of patient satisfaction and are presented in Table II. The three variables associated with rating beliefs about the hygienist were significant and included in the beliefs factor; allows us to rank the importance of these beliefs. The first construct identified was termed beliefs about care and all three variables associated with rating satisfaction with the hygienist were significant and included in the beliefs factor. The rotated factor loadings (correlations) for each of the seven dentist satisfaction questions were as follows: overall quality of care (.956), thoroughness of treatment (.945), and hygienist courtesy and friendliness (.932).

The second factor identified was termed the environment factor and it was composed of three variables. The rotated factor loadings for each of the four environmental variables were as follows: number of days patient waited for appointment (.875), scheduled appointment (.658), a rating of number of days patient waited for appointment (-.658). Beliefs about the care accounted for 46.76% and environmental factors 26.78% of the total variance. Cumulatively, the two factors accounted for 73.54% of the total variance in dental satisfaction.

Hierarchical multiple regression models were created for each of the two dependent variables using the variables identified by factor analysis. Table III presents the results of the regression model of the dependent variable overall satisfaction with dental care received during today's visit ( $Y_1$ ). All tested effects, except scheduled appointment, are significant at the alpha equals .01 level. The full regression model accounts for 31.1% of the shared variance, with  $F(6, 98785) = 8,923$ ,  $p < .0001$ . The hierarchical regression allowed the identification of the largest contributors to the full model. Beliefs about the care is an aggregation of all three questions

regarding care received by the hygienist and account for 24.4% of the total variance with a  $F$  statistic  $(3, 98785) = 11,681, p < .0001$ . The belief factor accounts for almost seventy-eight percent of the 31.1% of the shared variance. Held in isolation, each individual belief does not describe a large percentage of the variation. Cronbach's alpha was .944 which suggests high inter-item reliability of the three questions which may explain why the aggregate beliefs variable accounted for large proportions of the shared variance versus each individual effect tested. The environmental factor and three variables that comprise the factor were all statistically significant but only describe 1.1% of the shared variation. Though these areas may be important to practice management, they do not seem to play a large role in patient satisfaction with the hygiene provider.

The second regression model utilized overall satisfaction with the clinic's ability to take care of the dental needs as the dependent variable. The full model  $F(6, 98785) = 7,848.7, p < .0001$  accounts for 28.4% of the shared variance. Similar to the first model, beliefs about the care itself  $F(3, 98785) = 6,256.1, p < .0001$  is the single largest predictor of satisfaction accounting for 13.6% of the shared variance. Environmental factors  $F(3, 98785) = 3343.2, p < .0001$  accounted for 7.2% of the shared variance. Of the environmental factors, the rating of days waited for the appointment seemed to be the most salient factor accounting for 6.5% of the shared variance and reported in Table IV. Respondents rated waiting time as more important for the overall assessment of the clinic versus the assessment of today's satisfaction

## **Discussion**

This study is seminal in nature as it is the first in the literature to assess levels of dental satisfaction with the hygiene provider. While there are many articles in the literature on hygienist job satisfaction, education satisfaction and satisfaction with procedures or adjunctive devices,



there appears to be a vacuum of evidence for patient satisfaction with the dental hygienist. The results clearly indicate that military members are highly satisfied with the hygiene care they receive at military dental clinics. Though no direct comparisons of the findings are possible due to a lack of literature, the findings are consistent with the limited literature on military dental satisfaction. The regression models strongly suggest that patient beliefs about received care are the primary drivers of patient satisfaction. Patients do not typically have the ability to assess the technical competence of providers and thus use the interpersonal exchanges as a surrogate for technical competence. Patient's perceptions of the appointing process are also important to satisfaction. Respondents indicated that the "rating of the number of days waited for an appointment" was more important than the actual "number of days waited" suggesting that individuals do not always equate waiting for an appointment as negative, but rather base their decision on other factors as well. These findings suggest that providers and administrators cannot focus on one aspect of the interpersonal exchange or appointing process as patients tend to rate these areas in aggregate.

It may be of interest to note that none of the demographic variables achieved significance and were therefore excluded from the models. The military has a highly diverse population and there were no practical satisfaction differences based on the available demographic information. Race, educational level and income were not captured in this survey, but the rank structure and income potentially serve as a surrogate for education.

The methodology utilized increased validity as the researchers were not forced to make assumptions about the missing data. Reliability of the study is enhanced by analyzing 17 fiscal quarters of data. This is an extremely large sample and thus statistical significance can be based solely on sample size and caution must be exercised to determine statistical versus

clinical/practical significance. The results of this study do have some limitations as to the generalizability. A major limitation is that this survey assessed satisfaction of dental clinic users as opposed to all eligible beneficiaries. This effect may be mitigated by policy requiring all military members to have yearly dental examinations. Representativeness of respondents is a concern as the DoD reported that the active military force was comprised of 83.1% enlisted in September of 2004. Of the 1,426,836 service members, 35% were Army, 27% Air Force, 26% Navy and 12% Marine Corps.<sup>16</sup> This would indicate that the surveys are representative of the enlisted-officer ratio that comprises the military, but the Army and Navy are underrepresented, while the Air Force is over-represented.

### **Conclusion**

This study has demonstrated that the interpersonal experiences with the hygienist are the largest single predictor of patient satisfaction. These findings have important implications for military and civilian dental hygiene providers. The findings validate the viability of the interpersonal interactions and suggest opportunities for potential behavior modification. The mere knowledge of these attributes is essential to improve the patient-provider interaction. For institutional settings, a training vehicle could be developed to make providers aware of the importance of patient beliefs about the care and methods of how the hygienist can use this information to provide patients with increased satisfaction with their dental encounters.

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Table I. Descriptive Statistics: Patient Satisfaction, Independent and Dependent Variables

	n	%	Mean (SD)	Mean (SD) Today's Visit Satisfaction (Y <sub>1</sub> )	Mean (SD) Clinic's Ability to Meet Needs (Y <sub>2</sub> )
<b>Dependent Variables</b>					
Y <sub>1</sub> – Overall satisfaction with care received today's visit	98792	-	6.61 (.79)	-	-
Y <sub>2</sub> – Overall satisfaction with clinic's ability to meet needs	98792	-	6.44 (.82)	-	-
<b>Independent Variables</b>					
Age Group Categories					
17 years and under	310	.30	-	6.49 (.93)	6.30 (1.0)
18-19 years	7425	7.50	-	6.52 (.78)	6.39 (.81)
20-29 years	50377	51.00	-	6.58 (.79)	6.41 (.82)
30-39 years	29972	30.30	-	6.64 (.78)	6.47 (.83)
40-49 years	9583	9.70	-	6.72 (.77)	6.57 (.80)
50 years and above	1125	1.10	-	6.77 (.73)	6.63 (.80)
Gender					
Male	75700	76.60	-	6.56 (.84)	6.45 (.81)
Female	23092	23.40	-	6.53 (.90)	6.41 (.86)
Beneficiary Categories					
Active Duty	97370	98.60	-	6.61 (.78)	6.45 (.82)
Family Member of Active Duty	1212	1.20	-	6.42 (1.1)	6.18 (1.1)
Retiree	210	.20	-	6.66 (.74)	6.46 (.88)
Military Rank Categories					
E1 – E4	34939	35.40	-	6.55 (.82)	6.41 (.83)
E5 – E9	45203	45.80	-	6.64 (.77)	6.64 (.82)
Warrant Officer	1827	1.80	-	6.59 (.85)	6.37 (.92)
Officer	16823	17.00	-	6.65 (.75)	6.47 (.81)
Service Branch Categories					
Army	28891	29.20	-	6.58 (.88)	6.39 (.91)
Navy	24411	24.70	-	6.61 (.76)	6.47 (.77)
Marine Corps	13826	14.00	-	6.60 (.76)	6.43 (.80)
Air Force	30945	31.30	-	6.63 (.74)	6.48 (.79)
Other Service	719	.70	-	6.64 (.84)	6.49 (.82)
Thoroughness of hygiene treatment	98792	-	4.73 (.57)	-	-
Overall quality of care received from hygienist	98792	-	4.75 (.55)	-	-
	98792	-	4.79	-	-



Hygienist courtesy and friendliness				(.56)		
Scheduled appointment						
Yes	94587	95.70	-	6.61 (.78)	6.44 (.82)	
No	4205	4.30	-	6.51 (.78)	6.48 (.89)	
Days waited for appointment	93596	-	5.21	-	-	
			(1.7)			
Rating of days waited for appointment	93596	-	4.02	-	-	
			(.96)			
Seen on time						
Yes	90250	91.40	-	6.63 (.75)	6.47 (.79)	
No/no appointment	8542	8.60	-	6.34 (.97)	6.15 (.92)	



Table II. Principal Component Factor Analysis, Rotation Component Matrix Solution for Belief and Environment Dental Items

Item	Rotated Factor Loadings (Correlation)	
	Factor 1 - Beliefs	Factor 2 - Environment
Overall quality of care received from hygienist	.956	-.025
Thoroughness of hygiene treatment	.945	-.026
Hygienist courtesy and friendliness	.932	-.025
Number of days waited for appointment	.031	.875
Rating of number of days waited	.305	-.658
Was appointment scheduled	.106	.658

Note: N = 98,792 hygiene patients; Varimax Rotation Method



Table III. Hierarchical Multiple Regression Analyses of Hypotheses associated with Y<sub>1</sub> Overall Satisfaction with Care Received during Today's Visit

Effects tested	R <sup>2</sup> Full	R <sup>2</sup> Reduced	R <sup>2</sup> Change	df <sub>1</sub>	df <sub>2</sub>	F	p
<b>Full Model Regression</b>	.31112540	.00000000	.31112540	6	98785	8923.2	.0000
<i>Beliefs About the Care Itself</i>	.31112540	0.0667548	.24437038	3	98785	11681.1	.0000
Thoroughness of hygiene treatment	.31112540	0.3039518	.00717334	1	98785	1028.7	.0000
Overall quality of care from hygienist	.31112540	0.3019055	.00921969	1	98785	1322.1	.0000
Hygienist courtesy and friendliness	.31112540	0.3075245	.00360061	1	98785	516.3	.0000
<i>Environmental Factors</i>	.31112540	0.2994066	.01171856	3	98785	560.2	.0000
Scheduled appointment	.31112540	0.3111002	.00002492	1	98785	3.6	.0572
Number of days waited for appointment	.31112540	0.3099445	.00118062	1	98785	169.3	.0000
Rating of days waited for appointment	.31112540	.29975200	.01137318	1	98785	1630.9	.0000

Note: N = 98,792 hygiene patients



Table IV. Hierarchical Multiple Regression Analyses of Hypotheses associated with Y<sub>2</sub> Overall Satisfaction with Clinic's Ability to Take Care of Dental Needs

Effects tested	R <sup>2</sup> Full	R <sup>2</sup> Reduced	R <sup>2</sup> Change	df <sub>1</sub>	df <sub>2</sub>	F	p
<b>Full Model Regression</b>	.28431221	0	.28431221	6	98785	7848.7	.0000
<i>Beliefs About the Care Itself</i>	.28431221	.14833840	.13597381	3	98785	6256.1	.0000
Thoroughness of hygiene treatment	.28431221	.27869435	.00561786	1	98785	775.4	.0000
Overall quality of care from hygienist	.28431221	.28121291	.00309930	1	98785	427.8	.0000
Hygienist courtesy and friendliness	.28431221	.28165087	.00266134	1	98785	367.3	.0000
<i>Environmental Factors</i>	.28431221	.21164914	.07266307	3	98785	3343.2	.0000
Scheduled appointment	.28431221	.28415807	.00015414	1	98785	21.3	.0000
Number of days waited for appointment	.28431221	.28238394	.00192827	1	98785	266.2	.0000
Rating of days waited for appointment	.28431221	.21897851	.06533370	1	98785	9018.0	.0000

Note: N = 98,792 hygiene patients

**Appendix E. Journal Article Submission to Military Medicine**

The Development of a Conceptual Model for Evaluating Dental Patient Satisfaction

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### **Abstract**

The purpose of this study is to identify levels and predictors of patient satisfaction and develop a conceptual model for dental patient satisfaction in military treatment facilities.

Respondents completed 658,443 surveys during seventeen fiscal quarters, beginning with the fourth quarter of 2000. The final data set contained 309,261 surveys, with no missing data.

Principle component factor analysis was utilized for data reduction and hierarchical multiple linear regression to assess the predictive effects of the dependent variables on the two independent variables: (1) overall satisfaction with today's visit, (2) overall satisfaction with the clinic. On a seven-point, bi-polar adjective rating scale, patients' mean score was 6.53 regarding satisfaction with visit, suggesting that patients are highly satisfied. Patients' beliefs about care received and environment of care were the most important satisfaction attributes. These findings are useful in educating providers about the relationship of consumer satisfaction with the interpersonal experience.

## **Introduction**

The purpose of this project was to identify levels and predictors of patient satisfaction and to develop a conceptual model for dental patient satisfaction in military dental treatment facilities. A valid model describing the tenets of satisfaction would allow providers to modify their patient interactions to maximize patient satisfaction in military and civilian dental clinics. Active duty service members of the U.S. Air Force, Army, Marines and Navy receive the bulk of their dental treatment from one of 300 worldwide military dental treatment facilities. Clinics are located on ships, military bases, and in deployment environments. Oral health is extremely important for military members as dental providers are not always readily available in the deployed environment. An existing Department of Defense (DoD) patient satisfaction survey monitors the satisfaction of military beneficiaries who receive treatment in military clinics throughout the world, however the data have never been analyzed in aggregate to identify trends or predictors of satisfaction.

Chisick's 1994 study was the last formal assessment of military dental patient satisfaction.<sup>1</sup> Major changes have occurred in the military over the eleven-year time period suggesting that previous satisfaction research may no longer be valid. Since the last assessment of patient satisfaction, the military has completed a major reduction in force due to the end of the Cold War. Both the number of dental providers and clinics were significantly reduced in conjunction with the military downsizing however, there have been dramatic increases in the number of deployments and operational tempo due to the current Global War on Terrorism. Oral health is directly related to dental emergencies during deployments and satisfied patients may exhibit different care seeking behaviors than unsatisfied patients. With the aforementioned



changes in the military and potential relationship between satisfaction and care seeking, it is warranted to revisit military dental patient satisfaction.

### **Literature Review**

Traditionally, the clinician's technical competence and mechanical precision were important factors in the assessment of dental satisfaction; lay opinions played no role in this method of measuring quality.<sup>2</sup> Consumerism forced dentists to compete for patients and traditional patient satisfaction became an important part of providing dental services once consumerism became an integral part of the dental patient mindset.<sup>3</sup>

A large body of work in the field of patient satisfaction exists in the medical literature. Medical care patient satisfaction studies have consistently shown that the quality of the interpersonal interactions between the provider and the patient play a large role in defining patient satisfaction.<sup>4-6</sup> A similar body of research exists for the dental field. Ross and Duff found that patients return to the dentist for subsequent care due to satisfaction with the interpersonal component of the dental relationship rather than the technical quality of the care received.<sup>7</sup> Evidence for both medical and dental patient satisfaction studies show that desirable interactions lead to more satisfied patients who better understand and more accurately follow prescribed regimens.<sup>8,9</sup> A satisfied patient may have a different set of behaviors that ultimately manifest both into a healthier patient and a more satisfied customer.

It has been suggested that patients' satisfaction with their dentists is a primary determinant of whether they proactively seek preventive care.<sup>10,11</sup> Those who are dissatisfied with their dental care and avoid preventive care jeopardize their dental health and defer care until advanced stages of disease. This finding could be very important to the military population as getting soldiers dentally ready for deployment is a primary mission of the Army Dental Care



System. Dental emergencies in deployed military populations have been well documented and have shown that those with untreated emergent conditions suffer emergencies at seven to ten times the rate of orally healthy soldiers.<sup>12,13</sup> If soldiers with the most severe dental disease are dissatisfied with care, they could avoid or limit future dental encounters. Such behavior could potentially lead to decreased levels of oral health and increased deployment dental emergencies.

Dental patient satisfaction among active duty service members has not been widely studied. Chisick conducted two studies of satisfaction on active duty military members. Similar to the civilian studies, Chisick focused on access, availability/convenience, interpersonal skills, and pain control as predictors of satisfaction. He concluded that active duty personnel were generally very satisfied with military dental care and satisfaction did not vary significantly across demographics. Access was a consistent predictor of decreased satisfaction levels.<sup>1,14</sup>

Two recent studies have identified models to predict patient satisfaction with military medical care. Mangelsdorff and Finstuen identified that attitudes and beliefs about the care were the most salient factors in the prediction model.<sup>15</sup> Waiting time as a measure of access and age, health status, and gender demographic variables were also significant predictors of satisfaction. A refinement of the model was recently published and validated the method.<sup>16</sup> Military beneficiary status (active duty, retired or family member), the reason for the visit, and variables regarding beliefs about the care and waiting time were added to the model and are predictive of patient satisfaction in the military setting. These previous studies are precursors to this project and hopefully may lead to the validation of a dental specific model.

The Starfield Model guides the development of this study and focuses upon the characteristics of the practice setting.<sup>17</sup> Starfield relies upon the constructs of structure, process and outcome as introduced by Donabedian and the model is applied in a dental practice setting



for this project. The project focuses on the outcome of patient satisfaction. The Starfield Model has previously been used within the dental community to evaluate patient satisfaction.<sup>18</sup>

There are significant gaps in the literature of military dental satisfaction based on the military paradigm shift and the duration of time since the last assessment formal assessment. The current world paradigm dictates that satisfaction be reassessed. Dental emergencies and the potential for varying levels of prevention seeking treatment are true public health issues for military health care.

## **Methods**

This project is a secondary analysis of dental patient satisfaction data collected in military dental clinics. The data are anonymous and do not contain patient identifiers.

### *Survey Instrument*

The dental satisfaction survey was composed of twenty-seven questions focusing on access, quality, interpersonal relationships, overall satisfaction, and demographic data and was approved by the DoD Institutional Review Board to ensure patient privacy. The surveys analyzed for this project were administered from the fourth quarter of fiscal year 2000 through the fourth quarter of 2004. Seventeen digitized text files of data were received directly from the Tri-Service Center for Oral Health Studies, located in Bethesda, Maryland.

### *Variables/ Statistics*

The seventeen text files were imported into SPSS v. 12 resulting in one master file with 658,443 cases. Respondents indicated whether they saw a dentist, hygienist, or both during their visit. Those who responded affirmative to seeing a dentist were kept in the study resulting in 448,555 cases. Subjects were only included in the final sample if all questions were answered

resulting in a data set of 309,261 with no missing data. Analysis of variance was used to compare the 139,294 excluded cases to the included cases to assess potential bias.

#### *Dependent Variables*

The study examined two dependent variables.  $Y_1$  was defined as the assessment of satisfaction with dental care for today's visit and  $Y_2$  was defined as overall satisfaction with the clinic's ability to take care of the patient's dental needs. Both dependent variables were based on responses to a seven-point bi-polar adjective rating scale as follows:

(1) Completely dissatisfied (2) Very dissatisfied (3) Somewhat dissatisfied (4) Neither satisfied nor dissatisfied (5) Somewhat satisfied (6) Very satisfied (7) Completely satisfied.

#### *Independent variables*

The independent variables were divided into three major categories: demographics, beliefs about the care itself, and environmental factors. The grouping of independent variables were not arbitrary, but based on recent studies of patient satisfaction in military medical treatment facilities.<sup>15,16</sup> A recent study published in the *Journal of Healthcare Management* also found three similar groupings of patient satisfaction attributes: access to care, staff care, and physician care.<sup>19</sup>

The demographic variables included on the survey were age, gender, beneficiary category (active duty, family member, or retiree), military rank, and military service. Patients responded to seven belief questions regarding the care provided by the dentist and were rated on a five-point scale as follows: (1) Poor (2) Fair (3) Good (4) Very Good (5) Excellent. Environmental factors included whether the appointment was scheduled or not, the number of days waiting for appointment, the rating of the number of days waited for an appointment, and whether the patient was seen on time for the appointment.



### *Statistical Methods*

A principal component factor analysis with a Varimax rotation was used to assess the nature of dental satisfaction. The goal of this portion of the project was to identify the main components of satisfaction. Factor analyses allowed data reduction and increased the stability of the model. The variables identified in the factor analysis were included in the hierarchical multiple linear regression analyses to assess the predictive effects of the dependent variables on the satisfaction with today's visit. This methodology focused on the analysis of reduced and full regression models to estimate the individual and unique contribution of each independent variable. Hierarchical regression accounted for correlations among variables and allowed examination of each variable's effect on the model. Cronbach's alpha was used to assess inter-item reliability; alpha level was set at  $p=.01$ .

### **Results**

A total of 309,261 surveys were analyzed for this project. The majority of subjects were male (77.5%,  $n=239,531$ ) and reported being active duty service members (98%,  $n=302,973$ ). The service affiliations of respondents were as follows: Air Force - 45.8 %, Army - 22.3%, Marines - 11.3%, Navy - 19.8%, and other- 0.8%. The bulk of active duty respondents were enlisted personnel (83.3%) with the remaining subjects being officers.

Descriptive statistics for the independent and dependent variables are presented in table 1. Overall satisfaction was rated high as the mean score for overall satisfaction with today's visit was 6.53 ( $SD .83$ ) and overall satisfaction with the clinic's ability take care of the needs was rated 6.42 ( $SD .84$ ) on the seven-point, bi-polar adjective rating scale. Among the respondents, 97.5% noted that they would return to the clinic for care if given that choice. The ratings of the beliefs about the care received were high as well. Mean scores on the seven belief questions



ranged from 4.51 to 4.67 on a five-point scale, indicating high levels of satisfaction with the dental provider. Satisfaction with today's visit ( $Y_1$ ) and satisfaction with the clinics' ability to meet needs ( $Y_2$ ) are presented for each of the demographic variables and differences in satisfaction are minor across the demographic variables presented.

To assess if satisfaction differs for those who completely filled out the survey versus those who did not, an assessment of mean values was performed. The mean values of the seven questions regarding satisfaction with the dentist (beliefs about the care) were not practically different between the included and excluded cases. The largest difference was .05 on a five-point scale, though it did indicate that there was a tendency for included cases to have slightly higher levels of satisfaction. The ANOVA results for all seven-belief questions indicated that there were statistically significant differences between the groups, but this was due to the extremely large sample size. Even though there were statistical differences between the two samples, practically there are no differences. Satisfaction with today's visit is 6.53 for included cases compared to 6.47 for excluded cases. Satisfaction with the clinic's ability to take care of the patient needs was 6.42 for included cases and 6.36 for those excluded. The difference of .06 on a seven-point scale indicated a minor increase in satisfaction for included cases, but no practical difference. The ANOVA indicated that there were statistical differences between  $Y_1$  and  $Y_2$  for included versus excluded cases, but as earlier mentioned, there was no clinical or practical difference between the samples based on these mean values.

### *Factor Analysis*

The principal component factor analysis with Varimax rotation identified two major components of patient satisfaction and is presented in table 2. The first construct identified was beliefs about care; all seven variables associated with rating satisfaction with the dentist were



significant and included in the beliefs factor. The rotated factor loadings (correlations) for each of the seven dentist satisfaction questions were as follows: overall quality of care (.919), thoroughness of treatment (.900), how much the dentist helped you (.896), dentist's attention to what you had to say (.895), courtesy and friendliness of the dentist (.878), amount of time with dentist (.861), and explanation of procedures (.853).

The second factor identified was termed the environment factor and it was composed of four variables. The rotated factor loadings for each of the four environmental variables were: scheduled appointment (.863), number of days patient waited for appointment (.832), a rating of the number of days the patient waited for appointment (-.417), and whether or not the patient was seen at appointed the time (.774). Beliefs about the care accounted for 51.54% and environmental factors 20.09% of the total variance. Cumulatively, the two factors accounted for 71.63% of the total variance in dental satisfaction.

#### *Regression Analysis*

Two hierarchical multiple regression models were created. Table 3 presents the results of the first regression model which utilized satisfaction with dental care from today's visit ( $Y_1$ ). The regression model only includes those variables identified by factor analysis. All tested effects are significant at the alpha equals .01 level. The full regression model accounts for 33.7% of the shared variance, with  $F(11, 309249) = 14,3117, p < .0001$ . Hierarchical regression allows the identification of the largest contributors to the full model. Beliefs about the care is an aggregation of all seven questions regarding care received by the dentist and accounts for 23.8% of the explained variance with  $F(7, 309249) = 5,068.4, p < .0001$ . The belief factor accounts for almost 71% of the 33.7% of the shared variance explained by the full model. Held in isolation, each individual belief does not describe a large percentage of the variation. Cronbach's alpha



was .954 which suggests high inter-item reliability of the seven questions. This explains why the aggregate beliefs variable accounted for large proportions of the shared variance versus each individual effect tested.

Individually, the four variables that compose the environmental factor explained a small amount of model variance but cumulatively, they accounted for 11% of the shared variance. This suggests that these items are highly intercorrelated and that factors associated with appointment and waiting times are important considerations if clinics and providers want to increase patient satisfaction levels.

The second regression model utilized overall satisfaction with the clinic's ability to take care of the dental needs as the dependent variable and is presented in table 4. All tested effects are significant at the alpha equals .01 level. The full model  $F(11, 309249) = 4,768, p < .0001$  accounts for 34.6% of the shared variance. Similar to the first model, the aggregate variable of beliefs about the care itself is the single largest predictor of satisfaction accounting for 16.4% of the shared variance ( $F(7, 309249) = 3,539.8, p < .0001$ ). Though beliefs about care is the largest contributor to this model, the variable has a smaller contribution than in the first model ( $Y_1$ ). Beliefs about the care may be less important on the overall assessment of the clinic's ability to take care of patient needs compared to the satisfaction with today's visit. Environmental factors accounted for 6% of the shared variance in this model. The environment factor variable rating of days waited for the appointment seemed to be the most important variable accounting for 5.1% of the shared variance. This finding suggests that the number of days waited for the appointment is important, but the subjective rating of the days waited is more salient to the patient.

## **Discussion**

The results of this study clearly indicate that military members are highly satisfied with the dental care they receive at military dental clinics. These findings are consistent with the limited literature on military dental satisfaction. The regression models allow identification of patient beliefs about received care and environmental factors surrounding the appointment process as the primary drivers of patient satisfaction. Patients typically do not have the ability to assess the technical competence of providers and thus use the interpersonal exchanges as a surrogate for technical competence. These findings strongly suggest that providers and health care administrators cannot focus on one aspect of the interpersonal exchange or appointment process as patients tend to rate these two areas in aggregate. It may be of interest to note that there was no practical satisfaction differences based on the available demographic information even though the military has a diverse population.

Patient satisfaction is truly a public health concern for the military. Dental emergencies during war/deployments can cause personal morbidity for affected soldiers but also pose serious mortality risks for soldiers in the current engagement in Iraq. If dissatisfied soldiers fail to seek needed dental care and subsequently suffer a preventable dental emergency while deployed, they must travel to the nearest U.S. dental facility in Iraq. Additional travel in this dangerous war-zone puts individual soldiers at great personal risk. It is imperative that the military services assess and address patient satisfaction so that all beneficiaries seek and receive the necessary dental care.

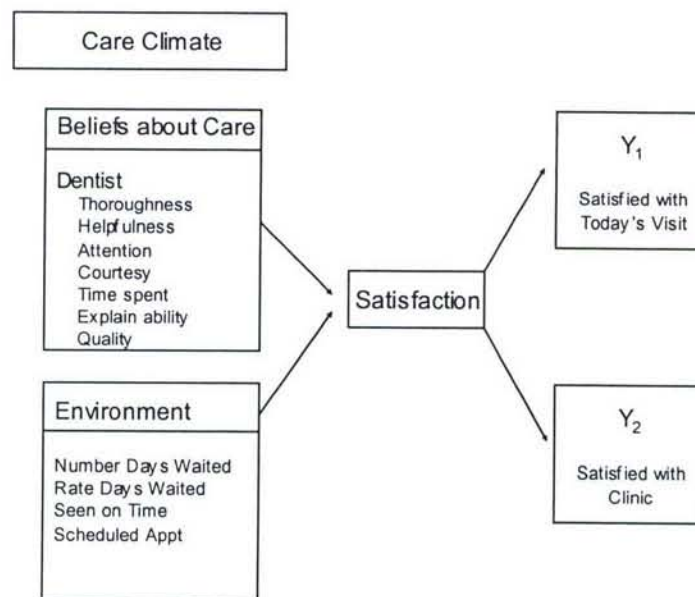
The use of factor analysis has been helpful in data reduction. In the beginning of the project, forty-two variables were identified. Since the sample size was so large, almost all statistical analyses were significant, even utilizing all variables; such a methodology would not



result in the identification of the most important attributes of satisfaction. Factor analysis excluded the non-significant variables resulting in the identification of the salient eleven variables. This methodology allows the development of the conceptual model in Figure 1. The seven variables associated with beliefs about care and the four related to the environment of care are the drivers of satisfaction.

**FIGURE 1**

**Conceptual Model of Dental Patient Satisfaction**



The validity of the results are enhanced by utilizing only cases that had no missing data since there are no differences between excluded and included cases. This methodology did not force the researchers to make assumptions about the missing data. Reliability of the study is enhanced by analyzing seventeen fiscal quarters of data. This is an extremely large sample and thus statistical significance can be based solely on sample size and caution must be exercised to



determine statistical versus clinical/practical significance. The results of this study do have some limitations as to the generalizability. A major limitation is that this survey assessed satisfaction of dental clinic users as opposed to all eligible beneficiaries. This effect may be mitigated by policy requiring all military members to have yearly dental examinations. Representativeness of respondents is a concern as the DoD reported that the active military force was comprised of 83.1% enlisted in September of 2004. Of the 1,426,836 active duty service members, 35% were Army, 27% were Air Force, 26% were Navy and 12% were Marine Corps.<sup>20</sup> This would indicate that the surveys are representative of the enlisted-officer ratio that comprises the military, however the Army and Navy are underrepresented, and the Air Force is over-represented.

### **Conclusions**

This study has demonstrated that the interpersonal experiences with the dentist are the largest single predictors of patient satisfaction. These findings have important implications for military and civilian dental providers. The findings validate the viability of the interpersonal interactions and suggest opportunities for potential behavior modification. The mere knowledge of these attributes is essential to improve the patient-provider interaction. For institutional settings, a training vehicle could be developed to educate providers of the importance of patient beliefs about the care and methods of how the providers can use this information to provide patients with increased satisfaction with their dental encounters.

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**TABLE 1**  
**Descriptive Statistics: Dependent and Independent Variables and Satisfaction for Y<sub>1</sub> and Y<sub>2</sub>**

Dental Patient Satisfaction, Intent, and Predictors	n	%	Mean (SD)	Mean (SD) Today's Visit Satisfaction (Y <sub>1</sub> )	Mean (SD) Clinic's Ability to Meet Needs (Y <sub>2</sub> )
Dependent Variable (Y <sub>1</sub> )– Overall satisfaction with today's visit	309261	-	6.53 (.83)	-	-
Dependent Variable (Y <sub>2</sub> )– Overall satisfaction with clinic's ability to meet needs	309261	-	6.42 (.84)	-	-
Age Group Categories					
17 years and under	1517	.49	-	6.49 (.90)	6.32 (.99)
18-19 years	28697	9.28	-	6.45 (.87)	6.38 (.86)
20-29 years	159823	51.68	-	6.50 (.85)	6.39 (.87)
30-39 years	86590	28.00	-	6.57 (.80)	6.46 (.83)
40-49 years	28478	9.21	-	6.66 (.77)	6.55 (.80)
50 years and above	4156	1.34	-	6.68 (.83)	6.61 (.85)
Gender					
Male	239531	77.42	-	6.53 (.83)	6.43 (.83)
Female	69730	22.58	-	6.53 (.84)	6.41 (.86)
Beneficiary Categories					
Active Duty	30293	97.97	-	6.53 (.83)	6.43 (.83)
Family Member of Active Duty	4910	1.59	-	6.45 (.94)	6.25 (.99)
Retiree	1378	.44	-	6.50 (.90)	6.42 (.97)
Military Rank Categories					
E1 – E4	126660	40.96	-	6.49 (.87)	6.40 (.85)
E5 – E9	130728	42.27	-	6.56 (.81)	6.44 (.83)
Warrant Officer	3883	1.25	-	6.51 (.84)	6.36 (.90)
Officer	47990	15.52	-	6.57 (.79)	6.45 (.83)
Service Branch Categories					
Army	69059	22.33	-	6.49 (.87)	6.38 (.91)
Navy	61160	19.78	-	6.52 (.81)	6.42 (.83)
Marine Corps	34814	11.25	-	6.46 (.87)	6.37 (.87)
Air Force	141672	45.82	-	6.57 (.78)	6.46 (.79)
Other Service	2556	.82	-	6.55 (.85)	6.45 (.85)
Thoroughness of dental treatment	309261	-	4.65 (.63)	-	-
Dentist explanation of procedures	309261	-	4.55 (.73)	-	-

Overall quality of care received	309261	-	4.66 (.62)	-	-
How much the dentist helped you	309261	-	4.57 (.69)	-	-
Dentist attention to what you had to say	309261	-	4.64 (.64)	-	-
Dentist courtesy and friendliness	309261	-	4.67 (.62)	-	-
Amount of time dentist spent with you	309261	-	4.67 (.74)	-	-
Scheduled appointment					
Yes	270541	87.48	-	6.54 (.81)	6.42 (.83)
No	38720	12.52	-	6.45 (.93)	6.43 (.91)
Number of days waited for appointment	309261	-	4.95 (2.11)	-	-
Rating of days waited for appointment	309261	-	4.09 (.97)	-	-
Seen on time					
Yes	253827	82.07	-	6.57 (.79)	6.46 (.79)
No/no appointment		17.92	-	6.35 (.92)	6.24 (.99)
	55434				

**TABLE 2****Principal Component Factor Analysis Matrix Solution for Belief and Environment Dental Items**

<b>Item</b>	<b>Varimax Rotated Factor Loadings</b>	
	<b>(Correlation)</b>	
	<b>Factor 1 - Beliefs</b>	<b>Factor 2 - Environment</b>
Overall quality of care received from dentist	.919	.020
Thoroughness of dental treatment	.900	.002
How much the dentist helped you	.896	.013
Dentist attention to what you had to say	.895	.015
Dentist courtesy and friendliness	.878	.002
Amount of time dentist spent with you	.861	.002
Dentist explanation of procedures	.853	.018
Was appointment scheduled	.042	.863
Number of days waited for appointment	-.001	.832
Rating of number of days waited	.393	-.417
Patient seen at appointed time	.119	.774

TABLE 3

## Hierarchical Multiple Regression Analyses associated with Overall Satisfaction With Dental Care

Received During Today's Visit ( $Y_1$ )

Effects tested	R <sup>2</sup> Full	R <sup>2</sup> Reduced	R <sup>2</sup> Change	df <sub>1</sub>	df <sub>2</sub>	F	p
<b>Full Model Regression</b>	.33733100	.00000000	.33733100	11	309249	14311.2	.0000
<i>Beliefs About the Care Itself</i>	.33733100	.09931887	.23801213	7	309249	5068.4	.0000
Thoroughness of dental treatment	.33733100	.33517653	.00215447	1	309249	321.2	.0000
Dentist explanation of procedures	.33733100	.3362892	.00104180	1	309249	155.3	.0000
Overall quality of care received from dentist	.33733100	.33017331	.00715769	1	309249	1067.0	.0000
How much the dentist helped you	.33733100	.33490937	.00242163	1	309249	361.0	.0000
Dentist attention to what you had to say	.33733100	.33715254	.00017846	1	309249	26.6	.0000
Dentist courtesy and friendliness	.33733100	.33674526	.00058574	1	309249	87.3	.0000
Amount of time dentist spent with you	.33733100	.33552376	.00180724	1	309249	269.4	.0000
<i>Environmental Factors</i>	.33733100	.32550770	.01182330	4	309249	440.6	.0000
Scheduled appointment	.33733100	.33650578	.00082522	1	309249	123.0	.0000
Number of days waited for appointment	.33733100	.33590736	.00142364	1	309249	212.2	.0000
Rating of days waited for appointment	.33733100	.32751522	.00981578	1	309249	1463.2	.0000
Seen on time	.33733100	.33587895	.00145205	1	309249	216.4	.0000



TABLE 4

**Hierarchical Multiple Regression Analyses associated with Overall Satisfaction With the Clinic's Ability to Meet Needs (Y<sub>2</sub>)**

Effects tested	R <sup>2</sup> Full	R <sup>2</sup> Reduced	R <sup>2</sup> Change	df <sub>1</sub>	df <sub>2</sub>	F	p
<b>Full Model Regression</b>	.34681666	.00000000	.34681666	11	309249	4768.1	.0000
<i>Beliefs About the Care Itself</i>	.34681666	.18296681	.16384985	7	309249	3539.8	.0000
Thoroughness of dental treatment	.34681666	.34481432	.00200234	1	309249	302.8	.0000
Dentist explanation of procedures	.34681666	.34639352	.00042314	1	309249	64.0	.0000
Overall quality of care received from dentist	.34681666	.34269310	.00412356	1	309249	623.6	.0000
How much the dentist helped you	.34681666	.34461719	.00219947	1	309249	332.6	.0000
Dentist attention to what you had to say	.34681666	.34660297	.00021369	1	309249	32.3	.0000
Dentist courtesy and friendliness	.34681666	.34660677	.00020989	1	309249	31.7	.0000
Amount of time dentist spent with you	.34681666	.34547819	.00133847	1	309249	202.4	.0000
<i>Environmental Factors</i>	.34681666	.28502700	.06178966	4	309249	2336.1	.0000
Scheduled appointment	.34681666	.34517445	.00164221	1	309249	248.3	.0000
Number of days waited for appointment	.34681666	.34488126	.00193540	1	309249	292.7	.0000
Rating of days waited for appointment	.34681666	.29613857	.05067809	1	309249	7664.0	.0000
Seen on time	.34681666	.34098664	.00583002	1	309249	881.7	.0000