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# Assessing Factors Influencing Dental Visits: An Application of the Theory of Planned Behavior

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## Abstract

**Background:** Regular dental examinations are a fundamental component in maintaining optimal oral health. The transitional period from adolescents to young adulthood frequently brings about shifts in one's dental hygiene practices. The Theory of Planned Behavior (TPB) underscores the importance of intentionality in health-related actions, suggesting a direct correlation between the strength of one's intent and the likelihood of performing the behavior. This study aims to measure the effectiveness of TPB in explaining dental visit behaviors.

**Methods:** An instrument was adapted for a college student population which examined constructs of the TPB, oral health knowledge, and expected social outcomes. The survey was administered electronically and available for a 3-week period.

**Results:** A total of 370 individuals completed the survey. All constructs of the TPB displayed univariate significance. However, only subjective norms and perceived behavioral control were significant predictors of dental visits when accounting for other predictors in the model. Oral health knowledge and expected social outcomes were not significant predictors.

**Conclusion:** Dental hygiene behaviors among college students progressively decline throughout college. Universities should carefully consider improving availability of dental hygiene resources on-campus. Dental health education can be enhanced to promote the importance of dental hygiene throughout one's time in college.

**Keywords:** Dental Visits; Dental Examinations; Theory of Planned Behavior; College Students; Dental Health; Oral Health

**Abbreviation:** TPB: Theory of Planned Behavior.

## Introduction

The complexity of the oral cavity and the multitude of anatomic structures make the mouth highly susceptible to many diseases. Oral diseases are illnesses present in the oral cavity [1]. Individuals who do not regularly practice dental hygiene behaviors are at a much greater risk of developing oral diseases. Unwanted bacteria and other foreign substances can manifest and spread when dental hygiene is not practiced, resulting in severe dental diseases [1].

Symptoms of oral diseases can range from mild discomfort to permanent disfigurement, depending on the level and type of disease. Most oral health diseases develop slowly and go unnoticed until symptoms are present or until a dental check-up. Oral diseases are most treatable in the early stages before symptoms are present, making early diagnosis crucial.

The mouth reflects the body's overall state, including the health of various organs [2]. The focal infection theory postulates that bacteria can enter systemic circulation from a localized infected area and travel to various organs, which contributes to the development of diseases [3]. Harmful bacteria may enter from the mouth through inflamed gums and by inhaling bacteria containing saliva. Periodontal disease facilitates the development of systemic diseases [4]. Diseases and associated risks include, but are not limited to, atherosclerotic diseases, coronary artery disease, stroke, peripheral vascular disease, pneumonia, chronic obstructive pulmonary disease, sepsis, diabetes, adverse pregnancy outcomes, and severity of COVID-19 infection.

Oral diseases can lead to a variety of sociological issues for afflicted individuals. Poor oral health-related outcomes were associated with worsened social and emotional well-being. Individuals reported increased anxiety, depression, suicide risk, and a lowered mental health state [5]. Dental diseases may increase social withdrawal rates, social isolation, and low self-esteem depending on the severity of the disease [6].

### Economic Considerations

In 2022, the U.S. spent roughly $165 billion on dental healthcare expenditures [7]. Thirty-four million school hours are lost each year because of unplanned or emergency dental care [8,9]. Costs associated with oral health diseases include provider fees and insurance copayment; additional services may be needed, including surgery, pharmacological expenses, orthodontic treatment, and restorative dental procedures [10]. To be officially diagnosed with a dental disease, there must be an official diagnosis from a dentist. Data from the CDC suggests that nationally only 66.5% of adults aged 18 and over have seen a dentist or dental clinic in the past year [11].

Dental insurance coverage rates have improved with the passing of a Medicaid bill. For children (aged 2 - 18), 51.3% have private dental benefits, 38.5% get their benefits through Medicaid or Children's Health Insurance Program, and 10.3% do not have dental coverage. Among adults (aged 19-64), 59.0% have private dental benefits, 7.4% have dental benefits through Medicaid, and 33.6% do not have dental coverage. A strong demand exists for more dentists to accept Medicaid patients. In response to this pressing concern, the government took decisive action by amplifying its program spending by a substantial 7.3% from 2021 to 2022. This increase was primarily driven by the expansion of Medicare [7].

Nearly one in three young adults (aged 19-29) are uninsured [12]. Dental insurance coverage for college students largely depends on their insurance coverage provided by their parents and their institution. Some college students can stay on their parent's insurance plan until the age of 26 in the U.S. and those that are uninsured may receive health insurance through their institution [13]. Universities and colleges' health insurance typically do not include dental insurance coverage. Additionally, most college and university health centers do not offer dental services.

### Theoretical Framework

The Theory of Planned Behavior (TPB) aims to explain behaviors over which people can exert self-control. The TPB posits that behavioral intention is the immediate antecedent of behavior; intention influences behavioral action. The constructs of the TPB are attitudes towards the behavior, subjective norms, and perceived behavior control. Attitudes towards the behavior refer to the positive or negative evaluation of the specified behavior. Subjective norms refer to the individual's belief in how others perceive specific behaviors. Perceived behavioral control is the perception of the ease or difficulty associated with performing the specified behavior. Intentions assess motivational factors that influence behavior [14].

The TPB assumes that human behavior is rational, and people consider the implications of their actions before engaging with the behavior. This assumption indicates that modification of negative beliefs associated with health behaviors can improve unhealthy behaviors. The purpose of this study is to assess the mediating factors that affect dental visits among college students at a large Southeastern University.

## Methods

### Instrumentation

The researcher adapted a survey using the guidelines set forth by Dr. Buunk-Werkhoven YAB, et al. [15]. The researcher incorporated a pilot test to improve the instrument's feasibility, comprehensibility, and time requirement. Primary data collection determined the internal consistency and stability of the collected data. Statistical analyses included logistic regression, frequencies, odds ratios, and descriptive statistics that assessed predictive variables. Frequencies and descriptive status were used to analyze all collected demographic data and determine dental hygiene behavior utilization. Logistic regression and odds ratios evaluated significant predictors of dental visits.

Dental visits were examined using the TPB constructs, oral health knowledge, and expected social outcomes. Oral health knowledge was defined as one's capacity to obtain,

process, and understand basic oral health information and services needed to make appropriate health decisions. Expected social outcomes refer to the anticipated results involved with dental examinations. Demographic variables include age, biological sex, race, degree (major), school year, insurance coverage. Statistical analyses include logistic regression to assess odds ratios and p-values on the behavior. Dental visits were dichotomized based on recommendations from the American Dental Association [16]. Individuals who visited the dentist twice a year met the recommendation.

### Population and Sample

This study incorporated a non-experimental, cross-sectional design. The selected population for this study included college students at a large southeastern university. Institutional review board approval was obtained prior to the dissemination of the survey. The study examined students between the ages of 18 to 24 enrolled at the university. To be eligible for this study, each participant was required to read English. A screening question, which required participants to read English and indicate their age, was administered at the beginning of the survey to ensure participants met the inclusion criteria. The survey was administered electronically and was available for a three-week period.

## Results

A total of 373 completed the survey. Three participants were removed since their age exceeded the inclusion criteria. Consequently, the final sample consisted of 370 college students. Table 1 displays the demographic information for the sample population. Table 2 exhibits the responses related to dental insurance coverage.

| Characteristics | N | % |
|---|---|---|
| **Age** | | |
| 18 | 23 | 6.20% |
| 19 | 49 | 13.20% |
| 20 | 74 | 20.00% |
| 21 | 124 | 33.50% |
| 22 | 57 | 15.40% |
| 23 | 26 | 7.10% |
| 24 | 17 | 4.60% |
| | 370 | 100% |
| **Biological Sex** | | |
| Male | 33 | 8.90% |
| Female | 337 | 91.10% |
| | 370 | 100% |
| **Race** | | |
| Non-Hispanic White | 294 | 79.50% |
| Non-Hispanic Black | 38 | 10.30% |
| Hispanic or Latino | 15 | 4.10% |
| Asian | 10 | 2.70% |
| American Indian | 4 | 1.10% |
| Native Hawaiian | 2 | 0.50% |
| Other (Mixed) | 7 | 1.80% |
| | 370 | 100% |
| **Degree (Major)** | | |
| Health-Related | 239 | 64.60% |
| Non-Health Related | 131 | 35.40% |
| | 370 | 100% |

| Student Classification | | |
|---|---|---|
| Freshman | 34 | 9.20% |
| Sophomore | 58 | 15.70% |
| Junior | 107 | 28.90% |
| Senior | 123 | 33.20% |
| Graduate Student | 48 | 13.00% |
| | 370 | 100% |

**Table 1:** Demographic Characteristics of Sampled College Students (n = 370).

| Dental Insurance | | |
|---|---|---|
| Yes | 320 | 86.5% |
| No | 38 | 10.3% |
| Do not know | 12 | 3.2% |
| | 370 | 100% |

**Table 2:** Dental Insurance Coverage for Sampled College Students (n = 370).

Dental visits were measured using the survey item, "as a college student, how often do you visit the dentist?" Responses included twice a year, once a year, and no visits per year. Results were dichotomized based on the recommendations set by the American Dental Association [16]. An individual must visit a dentist twice per year to meet the criteria.

The univariate significance of each predictor for dental visit behaviors was analyzed using an alpha level of 0.05. Attitudes, subjective norms, and perceived behavioral control produced a *p*-value of < 0.001, which indicates significance. Expected social outcomes (0.090) and oral health knowledge (0.198) displayed a non-significant relationship.

## Logistic Regression

The results of the iteration history display that a solution was found in 6 steps. The Omnibus test had an observed p-value of < 0.001, indicating that the model is statistically significant. The Nagelkerke R-square value of the model was 0.402, and this displays the predictors explain approximately 40.2% of the variance in the model. Next, the Hosmer-Lemeshow test produced a p-value of 0.242, indicating that the model fit.

Attitudes towards tooth brushing behaviors produced a p-value of 0.775, which indicates a non-significant relationship with brushing behaviors when accounting for other variables in the model. The coefficient value for attitudes was –0.019; this displays a negative linear relationship between dental visits and attitudes. The odds ratio was valued at 0.982, and the confidence interval was 0.864 to 1.115.

Subjective norms towards tooth brushing behaviors produced a p-value of < 0.001, which displays a significant relationship. The coefficient value was 0.273; this indicates a positive linear relationship. The odds ratio was valued at 1.314, and the confidence interval was 1.167 to 1.480.

Perceived behavioral control for tooth brushing behaviors produced a p-value of < 0.001, which indicates a significant relationship. The coefficient value was 0.344; this displays a positive linear relationship with dental visits. The odds ratio was valued at 1.411, and the confidence interval was 1.203 to 1.655.

Expected social outcomes obtained a p-value of 0.601, which indicates a non-significant relationship. The coefficient value was –0.021; this displays a negative linear relationship with dental visits. The odds ratio was valued at 0.979, and the confidence interval was 0.906 to 1.059.

Oral health knowledge had a p-value of 0.355, which indicates a non-significant relationship. The coefficient value was 0.103; this displays a positive linear relationship with dental visits. The odds ratio was valued at 1.108, and the confidence interval was 0.891 to 1.379. Table 3 displays statistical findings regarding dental visit behaviors.

| Predictors | OR | 95% CI | Wald | p-value |
|---|---|---|---|---|
| TPB Constructs | | | | |

| | | | | |
|---|---|---|---|---|
| Attitudes | 0.98 | 0.864 - 1.115 | 0.082 | 0.775 |
| Subjective Norms | 1.31 | 1.167 - 1.480 | 20.31 | <0.001 |
| Perceived Behavioral Control | 1.41 | 1.203 - 1.655 | 17.92 | <0.001 |
| **Additional Predictors** | | | | |
| Expected Social Outcomes | 0.98 | 0.906 - 1.059 | 0.274 | 0.601 |
| Oral Health Knowledge | 1.11 | 0.891 - 1.379 | 0.856 | 0.355 |
| Notes. $R^2 = 0.242$ ($p < 0.05$). | | | | |

**Table 3:** Dental Visit: Logistic Regression Analyses Among College Students (n=370) Dental Visits–Behavior.

## Discussion

Subjective norms and perceived behavioral control were significant predictors of dental visits; when accounting for all predictors in the model, attitudes, expected social outcomes, and oral health knowledge were not predictors. Insurance coverage and year in school significantly predicted dental visits.

Previous research concluded that dental visits decline for the targeted population as they progress through college [17]. Findings in the study support this claim; as participants' year in school increased, their ability to meet dental visit recommendations decreased.

Most participants were female (91%; n = 337), and predominately Non-Hispanic White (79.5%; n = 294). Previous research indicates that females are more likely to practice dental hygiene behaviors than males [18]. These factors may have contributed to the large percentage of female respondents. The age and student classification of the sample was evenly distributed; the slightly larger number of respondents were 21 (33.5%, n = 124) and seniors (33.2%; n = 123). Approximately 64.6% of participants sought a health-related degree, indicating that a sizeable portion of the sample is interested in health; individuals studying health typically display better hygiene behaviors than their counterparts [19].

A large majority of the students had dental insurance (86.5%, n = 320). The large percentage of insured participants may be attributed to the age of the population, as individuals under the age of 26 can remain on their parents' insurance. This value is noteworthy when considering barriers to receiving care, as prior research suggested that many individuals are unable to receive dental care due to a lack of insurance coverage [20]. This is associated with perceived behavioral control related to dental visits. The inability to deal with associated costs and find a dentist may affect one's self-efficacy towards dental visits.

Survey results indicate that approximately 48.6% (n=180) of surveyed individuals met the criteria for dental visits. However, 80.5% (n=298) of participants claimed to have met the requirements before college, representing a 31.9% decrease in dental visits upon entry into college. College presents a time when many students are placed in a transitional state between insurance coverage or a great distance from their regular dentist. Additionally, many colleges do not offer dental insurance or on-campus dental services. College students have a lack of access and transportation difficulties associated with dental visits [21]. Additionally, rural areas display lower utilization of dental services than urban areas [22]. Based on the location of the examined university, it is likely that being in a rural area affected results regarding dental visits among the examined population.

Demographic data displays that insurance coverage was significantly associated with dental visits. Respondents who had dental insurance were more likely to visit the dentist than individuals who were not insured or unsure about their insurance coverage. This is consistent with data which suggests financial concerns are the largest barriers to dental visits [23]. Dental insurance significantly reduces costs and often provides patients with a multitude of provider options. Individuals without dental insurance must pay out-of-pocket, which can be quite costly. Individuals who do not have dental insurance will often avoid treatment until the symptoms become more severe, which leads to worsened health outcomes [24].

Respondent's year in school significantly predicts dental visits among this population. Findings from the current study display that 7.8% of freshmen, 20.6% of sophomores, 33.9% of juniors, 30% of seniors, and 7.8% of graduate students met the recommendations for dental visits. This study shows the most apparent decrease in dental visits occurs between senior year and graduate school.

Subjective norms and perceived behavioral control were significant predictors of dental visits. The current study incorporated the subjective normative beliefs of family, friends, and dentists, which indicates the importance of the influence friends and family's perceptions have toward dental visits for college students. Perceived behavioral control is

paramount regarding scheduling the visit. One must have the ability to navigate through their insurance coverage, find a dentist, and take time from their busy schedules as college students to receive a cleaning.

Attitudes were not considered a significant predictor of dental visits behaviors which is inconsistent with prior research [25]. Although attitudes were not significant, it is essential to note that 25.4% of sampled individuals indicated highly positive attitudes towards dental visits (n=94). Prior literature stated dental visits are avoided due to negative attitudes, such as dental fear, anxiety, and stimuli of the dentist's office [26,27]. Future research should consider addressing additional barriers that may negatively affect dental visits among this population.

Previous research found that oral health knowledge significantly affected affective and cognitive attitudes towards dental visits [28]. In the current study, attitudes did not significantly predict dental visits which may contribute to oral health knowledge not being a significant predictor. Prior findings suggest that those who display high levels of oral health knowledge generally hold more favorable attitudes toward dental visits which improves behavior [29]. Expected social outcomes were not significant predictors of dental visits.

## Conclusions

The frequency of dental visits declines as individuals progress through college. Although data collected in this study suggested that students have high intentions toward dental visits, some barriers prevent this behavior. Removing barriers such as costs and time commitment while providing education on the associated benefits may promote the benefits and improve maintenance of dental visits.

There are many barriers to dental visits. While many colleges and universities have a student medical center, it is less common to have dental services available [17]. At the examined university, there are no on-campus dental resources. The lack of services places the student in a precarious position as they must seek treatment from outside sources, which are primarily dependent on their insurance coverage. If students cannot find a provider in the area, they must travel, resulting in a rather considerable time commitment and increasing the overall costs. Otherwise, college students must receive dental care in their hometown during a break between semesters. This situation is unfavorable for students who must then travel back to campus and may be unable to obtain follow-up treatment if needed.

Additionally, students should be educated on proper oral health preventative measures, specifically related to dental health. Many students often delay dental health services until an emergency or their routine checkup. This can create a difficult insurance situation in which services, namely x-rays, can be performed, and could increase overall costs. This may also conflict with services provided from their hometown dentist, resulting in differing treatment approaches. Health educators can provide college students with information on how to visit a dentist or oral healthcare professional while away from their primary providers. Furthermore, colleges and universities should consider incorporating dental healthcare services in their health centers.

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