

## Time since Last Dental Clinic Visit and Self-Reported Health among the Elderly

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### Abstract

**Background.** This study determined the association between time since last dental clinic visit and self-reported health among the elderly (age  $\geq 65$  years).

**Methods.** Data were from the 2010 Behavioral Risk Factor Surveillance System. A logistic regression analysis was conducted to identify factors that affect the self-reported general health of the elderly. Additionally, a negative binomial regression analysis was conducted to explore the association of time since last dental clinic visit and the self-reported number of physically unhealthy, mentally unhealthy, and sad days during the past 30 days.

**Results.** Six predictors were identified affecting the self-reported general health of the elderly. Respondents were more likely to self-report “good, very good, or excellent” general health if they: visited the dental clinic within the past year, were non-Hispanic, had healthcare coverage, had fewer permanent teeth removed, received better education and were younger. A larger lapse of time since respondents’ last dental clinic visits was associated with increased number of mentally and physically unhealthy days and an increased number of sad days during the past 30 days.

**Conclusions.** The positive association between better general health, fewer mentally and physically unhealthy days, and fewer sad days during the past 30 days and shorter periods of time between dental visits warrants further investigation to determine a possible causal relationship between overall health and dental visits.

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### Introduction

The American Dental Association (ADA) recommends individuals visit a dentist regularly for an exam and professional teeth cleaning to avoid oral health problems.<sup>1</sup> Professional oral health-care is effective in reducing the number of oropharyngeal bacteria and preventing respiratory infection.<sup>2,3</sup> Though oral health related problems usually are not associated with mortality, there are more than 8,000 oral-cancer related deaths in the United States each year, and the elderly (those  $\geq 65$  years) account for more than half of those deaths.<sup>4</sup>

Tooth loss is a nuisance and health hazard for the elderly.<sup>5</sup> Twenty-five to 52.5% of the elderly have lost all of their teeth.<sup>6,7</sup> Tooth loss has many complications including mouth dryness, bleeding gums, social embarrassment,<sup>8,9</sup> eating problems, oral pain,<sup>10</sup> and nutritional deficit<sup>11,12</sup>. Elderly individuals with complete tooth loss are less likely to consume at least 400 grams of fruit and vegetables, which contributes to an increased risk of chronic disease and obesity.<sup>13,14</sup> Those with 20 or more remaining teeth tend to be more active in leisure sports and travel compared to those

with fewer than 20 remaining teeth.<sup>15</sup> Moreover, oral problems are associated with depression among the elderly.<sup>16</sup>

Although poor oral health and tooth loss have negative consequences on the self-reported quality of health for the elderly, the effect of time since their last dental clinic visit has not been explored sufficiently. In this study, the association between time since participants' last dental clinic visit was analyzed with self-reported health and the number of physically unhealthy, mentally healthy, and "sad, blue or depressed" days during the past 30 days.

## Methods

**Participants.** The data in this study were from the 2010 Behavioral Risk Factor Surveillance System (BRFSS). Eligible participants included those who were 18 years or older, had a land-based telephone line, and did not live in an institution such as a nursing home. The population of interest in our study was the elderly (ages 65 years and older). Respondents whose reported ages were "do not know/not sure" or "refused" were excluded from this study.

**Instrument.** The BRFSS survey was designed to collect data regarding health risk behaviors, preventive health behaviors, and access to healthcare relating to chronic diseases and injury. It is a cross-sectional, random-digit dialed telephone survey facilitated by the Centers for Disease Control and Prevention (CDC) in collaboration with state health departments. The core module is a standard set of questions for all states. It includes questions about current health-related perceptions, conditions, and behaviors. This study utilized the oral health module, which belongs to the core module domain. The questionnaire was available in English and Spanish. Cellular telephones were not included as part of the regular 2010 BRFSS survey.

**Procedures.** The BRFSS was administered to one adult per household. Participating states used a Computer-Assisted Telephone Interview (CATI) system to collect responses from individuals. The CDC used the Ci3 WinCATI software package to support the CATI programming and provided guidelines for the state coordinator or interview supervisor to train data collectors. Additionally, all BRFSS surveillance sites monitored the interviewers for quality control. The data were transmitted to the CDC for editing, processing, weighting, and analyzing. The Human Subjects Committee at the University of Kansas School of Medicine-Wichita approved this study.

**Statistical analysis.** All analyses were conducted using SAS for Windows version 9.3 (Cary, North Carolina). Frequencies and percentages were presented for categorical variables and means and standard deviations were presented for continuous variables.

**Dependent variables (Outcomes).** The dependent variables in this study were: (a) self-reported general health (*excellent, very good, good, fair, and poor*), (b) number of days physical health was not good during the past 30 days (*continuous variable*), (c) number of days mental health was not good during the past 30 days (*continuous variable*), and (d) number of sad, blue, or depressed days during the past 30 days (*continuous variable*). Responses to self-reported general health were stratified into a dichotomous variable ("*excellent, very good, or good*" or "*fair or poor*").

**Independent variables (Predictors).** There were six independent variables. The primary independent variable was "time since last dental clinic visit." Possible responses included: *within the past year, one year but less than two years ago, two years but less than five years ago, five or more years ago, and never*. Additional independent variables included ethnicity

(*Hispanic, non-Hispanic*), healthcare coverage (*yes, no*), number of permanent teeth removed (*none, 1 to 5, 6 or more, and all*), education, and age (*in years*). The four possible education responses included: *Did not graduate High School, Graduated from High School, Attended College or Technical School, and Graduated from College or Technical School*.

A logistic regression analysis was conducted to identify predictors for the perceived general health of the elderly. The selected factors included time since last dental clinic visit, ethnicity, and healthcare coverage, number of permanent teeth removed, education, and age. These six factors were selected specifically because they were the dental-related questions in the oral health core of the BRFSS.

A negative binomial regression analysis was conducted to determine the association between time since last dental clinic visit and the number of physically unhealthy days, mentally unhealthy days, and sad days during the past 30 days. The selection of variables included in the final logistic regression model was conducted in a stepwise fashion. Survey weight and strata were used in the statistical analysis to account for sampling bias. All statistical analyses were two-sided. A  $p$ -value  $\leq 0.05$  was considered significant.

## Results

Of the 451,075 respondents to the 2010 BRFSS survey, 152,096 (34.0%) were 65 years or older. Among the elderly, more than half (57.4%) were female, most (92.6%) were non-Hispanic, and more than half (53.1%) attended or graduated from college or technical school (Table 1). The average age was 75 years. The majority (75.6%) of respondents reported having lost at least one permanent tooth. Additionally, 16.5% reported having lost all of their permanent teeth. Approximately two-thirds

of respondents (67.5%) reported having visited a dental clinic within the last year.

Poor general health was reported more frequently by those who never visited a dental clinic (17%) than those who visited a dental clinic within the past year (5.6%; Table 2). A Chi-square analysis revealed a significant correlation between the self-reported general health and time since last dental clinic visit ( $p < 0.0001$ ).

A logistic regression analysis was conducted to identify predictors affecting the self-reported general health. Six significant predictors are presented in Table 3. Respondents who visited a dental clinic within the last year had increased odds (odds ratio (OR) = 1.72, 95% confidence interval (CI) [1.50, 1.97]) of rating their general health as “*good, very good, or excellent*” than those who never visited a dental clinic.

There was a linear effect of “time since last dental clinic visit” on self-reported general health. Respondents were more likely to report their general health as being “*good,*” “*very good,*” or “*excellent*” with shorter periods of time between dental visits. Non-Hispanics had increased odds (OR = 2.02, 95% CI [1.92, 2.14]) to report their general health as being “*good,*” “*very good,*” or “*excellent*” compared to Hispanics. Respondents with healthcare coverage were more likely (OR = 1.14, 95% CI [1.04, 1.25]) to report their general health as “*good,*” “*very good,*” or “*excellent*” compared to those without healthcare coverage.

The fewer permanent teeth removed, the more likely the respondents’ self-reported general health was “*good,*” “*very good,*” or “*excellent.*” The better education participants received, the more likely they self-reported general health as “*good,*” “*very good,*” or “*excellent.*” For every five years increase in age, respondents had decreased odds (OR = 0.92, 95% CI [0.91, 0.93]) to

report their general health as “good, very good, or excellent”.

Among those who reportedly visited a dental clinic within the last year, the average number of self-reported physically unhealthy, mentally unhealthy, and sad days during the past 30 days were 4.6, 2.0, and 2.0 days, respectively (Figure 1). Additionally, respondents who reportedly never visited a dental clinic, the average number of

self-reported physically unhealthy, mentally unhealthy, and sad days during the past 30 days were 7.6, 3.2, and 0.3 days, respectively. A negative binomial regression analysis revealed a significant overall association of time since the last dental clinic visit and the number of physically and mentally unhealthy and sad days during the past 30 days ( $p < 0.001$  for all three outcomes).

Table 1. Demographic characteristics (N = 152,096).

	Frequency	Percent	Weighted Percent*
<b>Sex</b>			
Male	54044	35.5	42.6
Female	98052	64.5	57.4
<b>Race</b>			
White	1391	67.1	65.2
Black or African American	165	8.0	11.6
Asian	119	5.7	3.1
Native Hawaiian or Other Pacific Islander	172	8.3	4.3
American Indian, Alaska Native	174	8.4	11.5
Other	51	2.5	4.4
<b>Ethnicity</b>			
Hispanic/Latino	6699	4.5	7.4
Not Hispanic/Latino	143910	95.6	92.6
<b>Number of Permanent Teeth Removed</b>			
1 to 5	49918	34.0	34.9
6 or more, but not all	34908	23.8	24.1
All	26821	18.3	16.5
None	34981	23.9	24.4
<b>Education</b>			
Did not graduate High School	20446	13.5	13.8
Graduated from High School	53414	35.3	33.1
Attended College or Technical School	36756	24.3	23.7
Graduated from College or Technical School	40844	27.0	29.4

\*Percentages are calculated based on the sampling weight of survey items to correct for sampling bias.

Table 2. Time since last dental clinic visit and general health.

	Self-Reported General Health					P-value
	Excellent	Very Good	Good	Fair	Poor	
Time since Last Dental Clinic Visit						< 0.0001
Within the Past Year	14,074 (14.3%)	30,858 (31.4%)	32,900 (33.5%)	14,964 (15.2%)	5,457 (5.6%)	
Between 1 and 2 Years Ago	1,226 (9.2%)	3,167 (23.8%)	4,704 (35.3%)	2,876 (21.6%)	1,345 (10.1%)	
Between 2 and 5 Years Ago	1,004 (8%)	2,663 (21.3%)	4,365 (34.9%)	2,980 (23.8%)	1,494 (12%)	
5 or More Years Ago	1,628 (6.7%)	4,569 (18.9%)	7,824 (32.3%)	6,291 (26%)	3,921 (16.2%)	
Never	70 (7.1%)	161 (16.3%)	317 (32.1%)	273 (27.6%)	168 (17%)	

Table 3. Odds Ratios estimate of the self-reported general health as “Good”, “Very Good,” or “Excellent”.

	Unadjusted OR [95% CI]	Adjusted OR [95% CI]
<b>Time since Last Dental Clinic Visit</b>		
Within the Past Year	3.07 [2.7,3.48]	1.72 [1.50,1.97]
Between 1 and 2 Years Ago	1.73 [1.52,1.98]	1.27 [1.10,1.46]
Between 2 and 5 Years Ago	1.45 [1.27,1.65]	1.15 [1.00,1.32]
5 or More Years Ago	1.11 [0.97,1.26]	1.04 [0.91,1.20]
Never	1	1
<b>Ethnicity</b>		
Non-Hispanic	2.58 [2.45,2.71]	2.02 [1.92,2.14]
Hispanic	1	1
<b>Healthcare coverage</b>		
Yes	1.58 [1.45,1.71]	1.14 [1.04,1.25]
No	1	1
<b>Number of Permanent Teeth Removed</b>		
None	3.66 [3.53,3.8]	1.98 [1.89,2.07]
1 To 5	2.7 [2.62,2.79]	1.57 [1.50,1.63]
6 or More	1.46 [1.41,1.5]	1.01 [0.97,1.05]
All	1	1
<b>Education</b>		
Did not graduate High School	1	1
Graduated High School	2.38 [2.3,2.46]	1.83 [1.77,1.90]
Attended College or Technical School	3.26 [3.14,3.38]	2.24 [2.15,2.33]
Graduated College or Technical School	5.56 [5.35,5.78]	3.21 [3.07,3.35]
<b>Age (based on a five-year increment)</b>	0.89 [0.89,0.9]	0.92 [0.91,0.93]

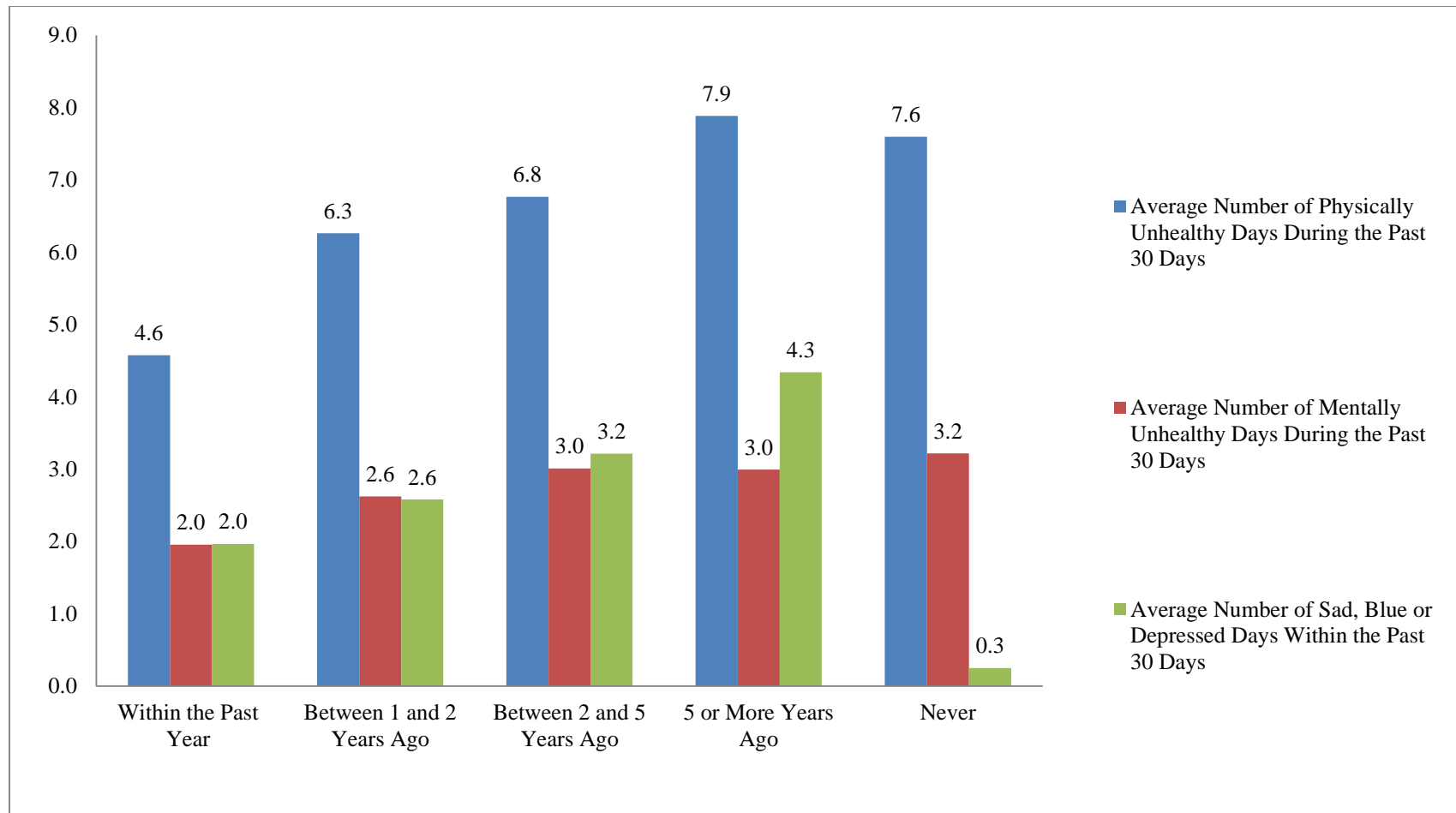


Figure 1. The average number of physically and mentally unhealthy and sad days within the past 30 days.

## Discussion

A positive association was identified between shorter time period between dental clinic visits and fewer self-reported mentally and physically unhealthy days, and fewer sad days during the past 30 days. This study is unique in that no previous research systematically had explored the association between time since last dental clinic visits and self-reported mentally unhealthy, physically unhealthy, and sad days during the past month. Further, previous research suggested that tooth loss causes disorders in quality of life, including psychological discomfort, physical pain, psychological disability, physical disability, functional limitation, and social disability.<sup>17</sup>

Additionally, the current study suggests that “good,” “very good,” or “excellent” general health was associated with more frequent dental clinic visits, being non-Hispanic, having healthcare coverage, having fewer permanent teeth removed, having received better education, and being younger. Though many factors are associated with self-reported general health, this study concluded that more frequent dental clinic visits are associated with better self-reported general health. Non-Hispanics are more likely to report better general health compared to Hispanics.<sup>18</sup> Healthcare coverage is associated with regular dental clinic visits.<sup>19-22</sup> As respondents’ age increases, a negative association exists with reporting their general health as “good, very good, or excellent”.<sup>23</sup>

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Limitations. This study has several limitations, one of which is self-reported data. The results were based on subjective responses from participants, which do not guarantee accuracy. However, this study was designed to identify individuals’ perceptions of their health. As such, the self-reported nature of these data is appropriate. Second, respondents could experience survey fatigue as there were more than 200 items in the survey. This could lead to missing answers to survey items. Lastly, race was not included in the statistical analysis. The majority of respondents (98.6%) did not answer the race question in the BRFSS survey. However, the focus of our study was to determine the effect of time since last dental clinic visit on the general health, number of mentally unhealthy, physically unhealthy, and sad days during the past month.

## Conclusions

A positive association was identified between a better self-reported general health, having fewer mentally and physically unhealthy days, and having fewer sad days during the past 30 days and shorter time period between dental clinic visits. Therefore, a recommendation for the elderly to seek regular dental care may be warranted, pending further research into the relationship between these five variables.

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