The Impact of HIV on Oral Health and Subsequent Use of Dental Services

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Abstract

Objective: *This study examined differences in health and access to dental services among a nationally representative sample of patients with HIV using Andersen's Behavioral Model of Health Services Use.* ***Methods:*** *This investigation is a longitudinal study that used structural equation modeling to analyze data from the HIV Cost and Services Utilization Study, a probability sample of 2,864 adults under treatment for HIV infection. Key predisposing variables included sex, drug use, race/ethnicity, education, and age. Enabling factors included income, insurance, and regular source of care. Need factors included mental, physical, and oral health. Dependent variables included whether a respondent utilized dental services and number of visits.* ***Results:*** *More education, dental insurance, usual source of dental care, and poor oral health predicted a higher probability of having a dental visit. African Americans, Hispanics, those exposed to HIV through drug use or heterosexual contact, and those in poor physical health were less likely to have a dental visit. Of those who visited dental professionals, older persons, those with dental insurance, and those in worse oral health had more visits. African Americans and persons in poor mental health had fewer visits.* ***Conclusions:*** *Persons with more HIV-related symptoms and a diagnosis of AIDS have a greater need for dental care than those with fewer symptoms and without AIDS, but more pressing needs for physical and mental health services limit their access to dental services. Providers should better attend to the oral health needs of persons with HIV who are in poor physical and mental health. [J Public Health Dent 2003;63(2):78-85]*

Key Words: acquired immunodeficiency syndrome, health services accessibility, oral health, physical health, mental health.

HIV has a significant impact on oral health. More than one-third of people who are seropositive for HIV develop oral lesions (1), and some estimates indicate that more than 90 percent of HIV patients will have at least one oral manifestation (2,3). Untreated oral disease may interfere with talking, chewing, and swallowing, and lead to weight loss and malnutrition (2). Oral health problems in the HIV-positive population are typically more difficult to treat than in the general population, but seven of the 16 identified oral conditions that occur in HIV-infected persons can be suppressed by drug therapy (4). Untreated dental illness does not simply lead to worse oral health; poor dental health also can jeopardize the physical health of individuals who have HIV. For example, periodontal disease in an immunocompromised patient can lead to life-threatening infection (2). In addition, oral health conditions are often indicative of poor immune function in an HIV-infected person (2).

However, the relationship between HIV and subsequent use of dental services is not well understood. Available evidence suggests that some HIV-infected individuals such as the less educated, the elderly, women (5), and the poor (5,6), have high levels of unmet dental needs. Conversely, persons with HIV who are more willing to seek care (7), have physicians who are more willing to provide care (7), have greater availability of dental services (8), and have dental insurance (9) report lower levels of unmet need. However, self-reported unmet need for dental care may lead to underestimates for some populations that are less prone to reporting dental needs (10). Some groups are more likely to identify their need for dental services and report higher perceived needs for dental care; for example, people who are white or who had a past history of oral opportunistic infections are more likely to report infections (10). Estimates of the extent of unmet needs for dental care among people with HIV vary from 9 percent to 40 percent depending on stage of illness, how unmet need is defined, and how representative the samples were of the HIV-infected population (5,9-12).

This longitudinal study examined the impact of a variety of factors on mental, physical, and oral health and subsequent use of dental services. We hypothesized that HIV-positive individuals who had been diagnosed with AIDS and those who exhibited more HIV-related symptoms at baseline would have poorer mental, physical, and oral health at the time of the first follow-up. We further hypothesized that persons with poorer oral health at first follow-up would be *more* likely to use dental services at the time of the second follow-up. However, we also hypothesized that persons with poorer mental and physical health would be *less* likely to use dental serv-

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ices because of more pressing needs for mental and physical health care and less ability to negotiate the system for dental services.

The selection of variables that might be associated with the utilization of dental services was guided by the predisposing, enabling, and need (PEN) characteristics specified in Andersen's Behavioral Model of Health Services Use (13,14). Predisposing characteristics are based on the proposition that factors such as age, sex, and race/ethnicity influence an individual's propensity to use different types of health services. Enabling characteristics include the economic and social resources that facilitate or impede care. Need-related characteristics refer to the presence or severity of illness.

Various predisposing and enabling factors may alter the use of oral health services (15). In general, women, older individuals, African Americans, the least educated, those who obtained HIV from blood transfusions or IV transmission (injection drug use), those with lower incomes, and those who do not have dental insurance have been shown in prior studies to be less likely to use dental services (15).

Earlier access to highly active antiretroviral therapy (HAART) was hypothesized to reduce the severity of HIV, in turn leading to improved oral and physical health status. However, for some individuals the beneficial effects of HAART on oral health may be tempered by side effects such as dry mouth. As a result of their use of HAART, some individuals may use more dental services because they feel better, while others will limit their use because their oral health has improved.

Methods

The HIV Cost and Services Utilization Study (HCSUS) is a nationally representative probability sample of HIV-positive adults receiving care in the contiguous United States. The reference population was limited to persons at least 18 years old with known HIV infection who made at least one visit for regular or ongoing care to a nonmilitary, nonprison medical provider other than an emergency department between January 5 and February 29, 1996. Full details of the design are available elsewhere (16,17).

The HCSUS employed a three-stage sampling design in which geographic areas, medical providers, and patients were sampled (5,18). The HCSUS sampled 4,042 eligible subjects, and 2,864 (71%) completed the interviews. Institutional review boards reviewed all consent forms and informational materials. Baseline interviews began in January 1996 and ended in April 1997 (19). First follow-up interviews were conducted from December 1996 to July 1997 and were conducted with 2,466 respondents (86.1% of baseline). The second follow-up interviews were conducted from August 1997 to January 1998 with 2,267 persons (84.5% of baseline). The median time from baseline to second follow-up was 15.1 months.

Independent Variables. Predisposing characteristics included in this study were sex, education, age, race/ethnicity, and mode of HIV exposure. Education was treated as an ordinal measure ranging from one to four (less than high school, high school diploma, associate degree or some college, and bachelor's degree or higher). Age was treated as an ordinal measure with persons distributed equally into 10 groups (youngest to oldest). Race/ethnicity was characterized as African American, Hispanic, and white/other (Alaskan Native, American Indian, Asian, Pacific Islander, or mixed). Mode of HIV exposure was categorized as heterosexual, IV transmission, men who have sex with other men (MSM), and "other" (related to hemophilia, a contaminated blood transfusion, or no identified source).

Income, dental insurance, whether the resident had a usual source of dental care, and whether the resident had received HAART by December 1996 were included in the study as enabling characteristics. Income was treated as an ordinal measure ranging from one to four (≤$5,000, $5,001–$10,000, $10,001–$25,000, and >$25,000). The dental insurance variable was constructed with information from additional sources because of some missing data; dental insurance data could not be obtained for 38 cases and they were excluded from the analysis (5). Persons who reported more than one type of dental insurance were prioritized according to the following ranking: 1=private coverage, 2=Medicare, and 3=Medicaid.

At baseline, the two measures of need were whether the person had been diagnosed with AIDS, and the intensity of the individual's symptoms due to HIV. This symptom intensity scale was constructed using 13 symptoms for males and 14 symptoms for females. The items included in the scale were the extent to which the individual was bothered (extremely, quite a bit, moderately, very little, not at all/did not have symptom) by the following symptoms in the last six months: (1) headaches; (2) fever, sweats, or chills; (3) pain in your mouth, lips, or gums; (4) white patches in your mouth; (5) painful rashes or sores on your skin or around your anus or vagina/penis; (6) nausea or loss of appetite; (7) trouble with your eyes; (8) a sinus infection; (9) pain in your extremities; (10) abnormal vaginal discharge or irritation; (11) Kaposi's sarcoma; (12) persistent coughing, or difficulty breathing for more than one week; (13) diarrhea or loose stools; and (14) weight loss. Need characteristics at the first follow-up included composite measures for mental and physical health (20). Both were constructed from 10 measures including measures of days in bed because of health, energy, positive effect, freedom from anxiety, freedom from depression, general health, freedom from pain, physical functioning, role functioning, and social functioning.

The oral health composite measure was structured as a latent variable derived from the following six questions asked at the time of the respondent's first follow-up: (1) "In general, would you say your oral health is excellent, very good, good, fair, poor?" (2) "How much of your time did your oral health interfere with your social activities?" (3) "How much of the time did you limit the kinds of foods you ate because of problems with your mouth, tongue, teeth, or gums?" (4) "How often were you worried or concerned about problems with your mouth, tongue, teeth, or gums?" (5) "How much of the time did you have pain or discomfort with your mouth, tongue, teeth, or gums?" (6) "How much of the time did you use medication to relieve pain or discomfort with your mouth, tongue, teeth or gums?" Questions 2–6 were specific to the last four weeks and were rated all, most, some, a little, or none of the time. A latent variable represents the shared variance among correlated measured indicators and is considered to be a construct without measurement error (21).

Dependent Variables. The dependent variable for the first structural equation model (users and nonusers) was determined from the question: "Since [the first follow-up], have you seen a dentist, dental hygienist, dental specialist, or other dental provider?" The dependent variable for the second structural equation model (users) is the log-transformed value of the number of dental visits corrected for days between first and second follow-ups for those persons who did visit a dental provider.

Analysis. We used weighted sample means to estimate population prevalence parameters. We imputed missing values for essential variables using a standard "hot-deck" strategy (22). For each variable being imputed, respondents were classified based on observed values for other variables. For each respondent missing a value for the variable being imputed, we randomly selected a donor value from those respondents in the same imputation class. Less than 3 percent of the data for insurance and income, and less than 0.5 percent for other key variables were imputed (23). Seventeen of the individuals indicated no response for diagnosis of AIDS. These individuals had the mean value of 0.37 substituted for that variable. (A value of 0 indicated the person had not been diagnosed with AIDS and a value of 1 indicated that the person had been diagnosed with AIDS). There were 35 persons with incomplete data who were not included in the analyses (1.5%) since dependent variables and variables with few similar cases were not imputed. Thus, our total sample size for this analysis consisted of 2,233 persons.

To adjust the standard errors and statistical tests for the differential weighting and complex sample design, the HCSUS used the linearization methods (24) available in the SUDAAN and Stata software packages to estimate descriptive statistics (25). Our standard errors are not adjusted for imputation; however, given the slight amount of missing data, any underestimation of the variability should be small. Analytic weights were used in the estimates of the descriptive statistics for each variable used in the analyses.

Using the EQS structural equation modeling program (26), the weighted data were fitted to two structural equation models (SEMs) to identify variables that were independently associated with use of dental services. Unlike the univariate (demographic) table, the bivariate table and the SEMs do not account for the clustering and stratification used in the sampling process, but do include the sampling weight for each subject. However, to test for a possible design effect, intraclass correlations were calculated for the dependent variables based on both clusters and strata, and they were extremely small. Thus, it was concluded that a multilevel design was not required. Also, the robust statistics

TABLE 1
Demographic Characteristics of HCSUS Sample

	Weighted *N* (Pop.)	Weighted % (Pop.)	SE	Unweighted *N*=2,233
Baseline				
Sex				
Male	162,503	77.2	0.03	1,580
Female	48,105	22.8	0.03	653
Education				
<High school	51,772	24.6	0.03	539
HS diploma	58,021	27.5	0.01	614
AA/some college	58,482	27.8	0.02	646
Bachelor's or more	42,333	20.1	0.03	434
Ethnicity				
African American	67,753	32.2	0.03	693
Hispanic	31,710	15.1	0.02	323
White	111,145	52.8	0.03	1,217
Mode of exposure				
IV transmission	51,030	24.2	0.03	523
Heterosexual	39,789	18.9	0.03	464
Other (nonhomosexual)	17,227	8.2	0.01	189
MSM	102,561	48.7	0.05	1,057
Income				
$0–$5,000	41,316	19.6	0.02	449
$5,001–$10,000	52,499	24.9	0.02	554
$10,001–$25,000	54,530	25.9	0.01	588
$25,001+	62,263	29.6	0.03	642
Dental insurance	108,856	51.7	0.08	1,193
No	101,752	48.3	0.08	1,040
Usual dentist	124,519	59.1	0.03	1,354
No	86,089	40.9	0.03	879
HAART	75,165	35.7	0.02	854
No	135,443	64.3	0.02	1,379
AIDS diagnosis	77,581	36.8	0.02	821
No	133,027	63.2	0.02	1,412
	Weighted Mean	Range	SE	
Age (years)	38.8	18–77	0.33	
Symptom intensity	2.35	0–10	0.09	
First follow-up				
Physical health	0.52	0–1	0.01	
Mental health	0.52	0–1	<.01	
Oral health	3.60	0.9–4.3	0.03	
Second follow-up				
Time btwn. 1st & 2nd follow-up (days)	192.1	71–364	3.30	

TABLE 2
Bivariate Correlations among Baseline and Follow-up Variables

	Physical Health	Mental Health	Oral Health	Dental Care (Yes/No) N=2,233	# Dental Visits (N=964)
Baseline					
Predisposing					
Sex (female)	−10†	−13†	−.09†	−.07†	.05
Education	17†	.16†	.16†	.15†	−.06‡
Age	−.05‡	.09†	.07¶	.01	.02
Ethnicity					
African American	.02	.03	−.02	−.10†	−.06‡
Hispanic	−.03	−.08¶	−.08¶	−.05‡	.06‡
White*	.01	.03	.07¶	.13†	−.01
Mode of exposure					
IV transmission	−.20†	−.14†	−.15†	−.04	.07‡
Heterosexual	.01	−.03	−.02	−.10†	−.03
Other (nonhomosexual)	.02	.02	.01	−.02	.06‡
MSM*	.15†	.13†	.14†	.12†	−.07¶
Enabling					
Income	.19†	.15†	.14†	.11†	−.04
Dental insurance	−.04‡	−.03	<.01	.08†	.07‡
Usual dentist	.04	.08†	.08¶	.21†	−.05
HAART	−.04	−.00	.05‡	.07¶	−.03
Need					
AIDS diagnosis	−.23†	−.08†	−.08¶	.05‡	.05
Symptom intensity	−.53†	−.43†	−.41†	.04	.10†
First follow-up					
Need					
Physical health	—	.74†	.51†	.01	−.11†
Mental health	—	—	.48†	.01	−.07‡
Oral health	—	—		−.07¶	−.22†

*Included in table for completeness; excluded in SEM analysis as reference group.
†$P \leq .001$.
‡$P \leq .05$.
¶$P \leq .01$.

used in the analysis help to adjust the standard errors appropriately (27).

SEM compares a hypothetical model of possible relationships in a data set with a set of actual data. The closeness of the variance-covariance matrix implied by the hypothetical model to the empirical variance-covariance matrix is evaluated through various goodness-of-fit indices. The comparative fit index (CFI) and Robust CFI (RCFI), chi-square values (both Maximum Likelihood (ML χ^2) and the adjusted Satorra-Bentler robust χ^2 (S-B χ^2)), and the Root Mean Square Errors of Approximation (RMSEAs) are used as indicators of fit (26,28,29). The CFI and RCFI indicate the proportion of improvement in the overall fit of the hypothesized model relative to a null model in which all covariances between variables are zero. CFI and RCFI values of 0.95 or greater are desirable (29). Robust statistics are more appropriate when the data are multivariately kurtose. The RMSEA is helpful as an additional tool to evaluate fit because it indicates the size of the residuals. Values less than 0.06 indicate a relatively good fit between the hypothesized model and the observed data (29).

Results

Respondent Characteristics and Bivariate Dental Utilization. Table 1 shows the distributions of the PEN factors, and utilization of dental services for the 2,233 subjects (representing 210,608 persons) included in this study. The weighted data show that the majority of the population was male, white, MSM, had not received HAART by December 1996, and had been diagnosed with AIDS. The mean age of the respondents was approximately 39 years. The number of visits to dental providers ranged from 0 to 90 (mean=1 visit) over a period of time from 71 to 364 days (mean time from first to second follow-up=192 days).

Table 2 shows that of the predisposing characteristics, people with more education and MSMs were in better mental, physical, and oral health, while women, those who were exposed to HIV through drug use, those with AIDS, those with more symptoms, and those with less income reported worse health in all three areas.

Traditionally underserved groups (African Americans, Hispanics, and women) were less likely to have received care between the first and second follow-up. People exposed to HIV through heterosexual contact were less likely to have received dental care, while MSMs were more likely.

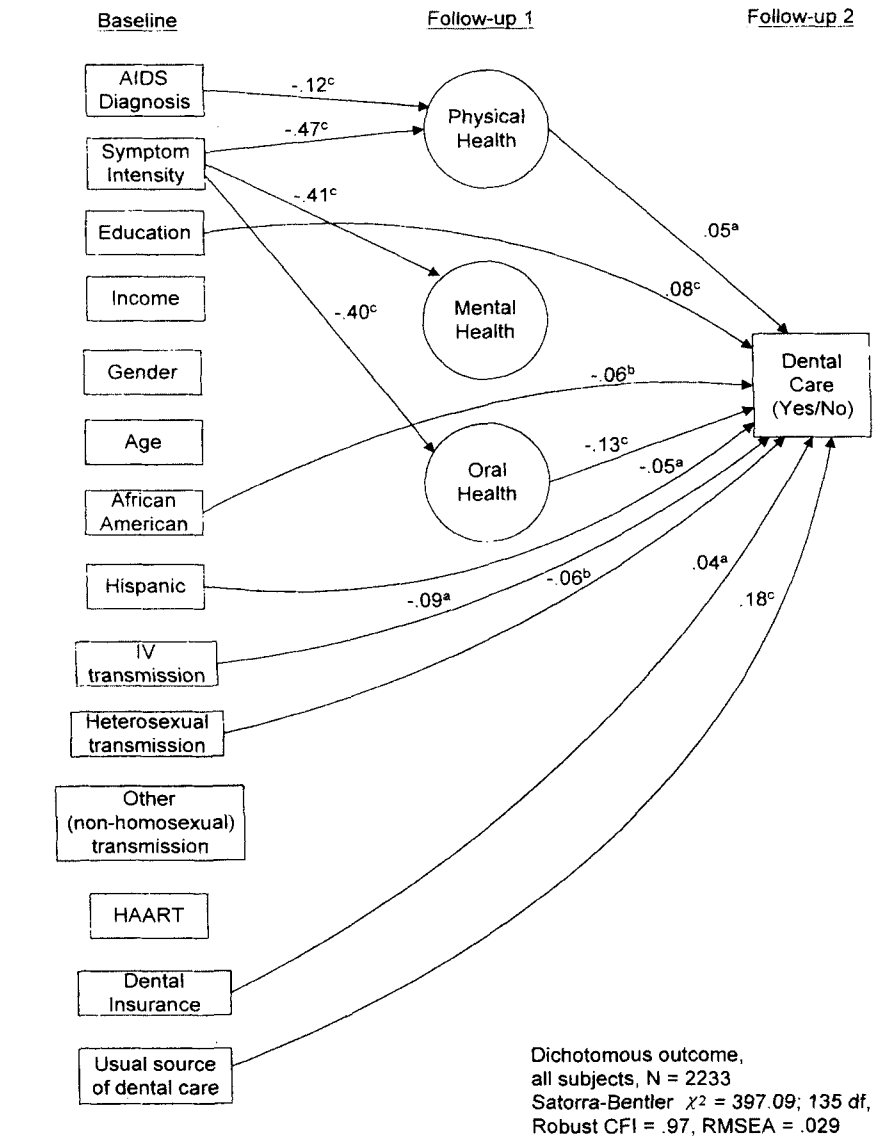
Persons who received HAART before December 1996, and those with dental insurance or a usual source of dental care were also more likely to have received dental care. In addition, many of the predisposing (sex, education, age, IV transmission, MSM), enabling (income), and need (AIDS, symptoms) characteristics were associated with the individual's physical, mental, and oral health.

Of those who received dental care, persons who were exposed to HIV through drug use and those with more severe symptoms visited a dental provider more often. The need characteristics were associated with the extent of dental care; persons in worse mental, physical, or oral health had fewer visits to dental care professionals.

Structural Equation Models. The predictive SEMs were used to estimate the strongest determinants of dental use. Model fit indexes were excellent, both for the maximum likelihood solution and the robust solution. Because the robust solution adjusts for the nonnormality in the data, we report it in the figures.

Figure 1 presents a graphical representation of the statistically significant direct paths from the PEN factors to whether the respondent received dental care between the first and second follow-up periods. Figure 1 also shows statistically significant paths from AIDS diagnosis and symptom intensity to health at the first follow-up. Of the predisposing characteristics, people with more education were more likely to have visited a dentist. African Americans and Hispanics were less likely to have received dental services. Persons who were exposed through drug use or heterosexual sex were less likely to have received dental care. The enabling factors of having dental insurance and a usual place of dental care were directly associated with dental use. Certain need characteristics were associated with the receipt of dental care. Persons in worse physical health and better oral health were less likely to have obtained dental care.

FIGURE 1
Significant Predictors of Receipt of Any Dental Care; Significant Relationships Between AIDS Diagnosis, Symptom Intensity and Physical, Mental, and Oral Health

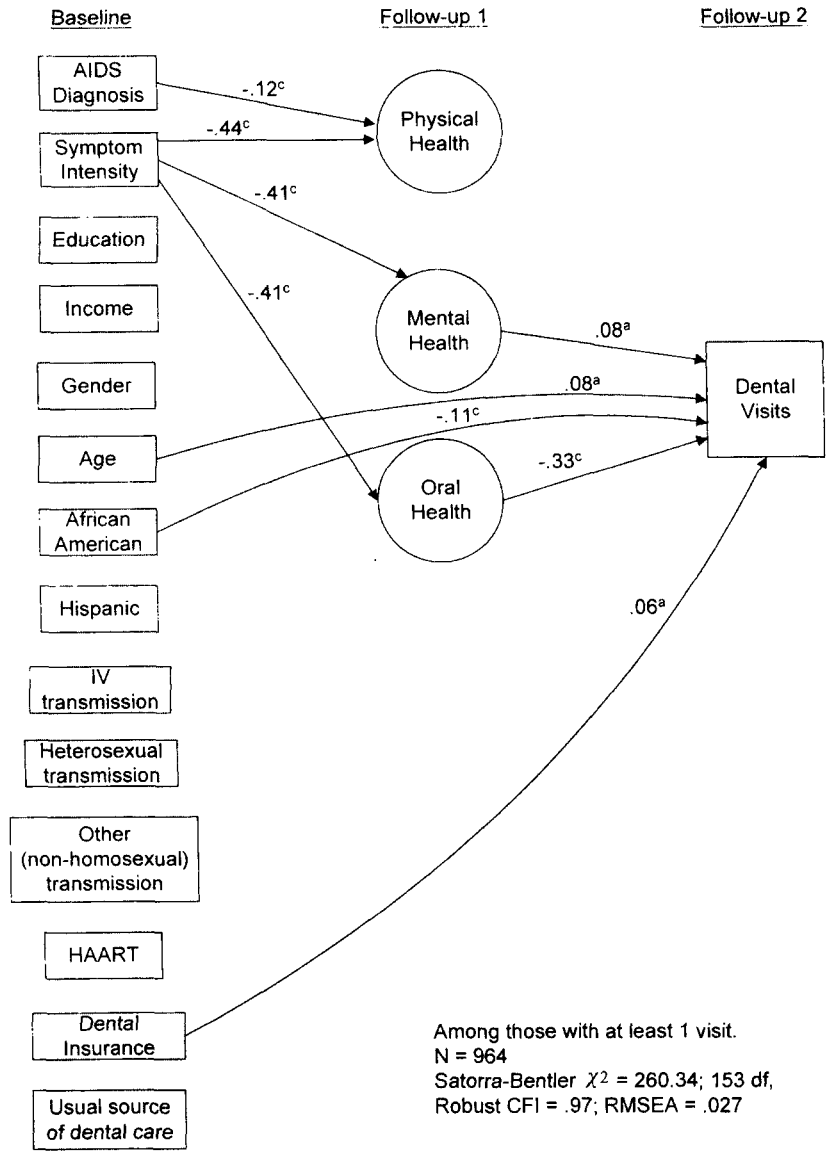


$^{a}p \leq .05$; $^{b}p \leq .01$; $^{c}p \leq .001$.

Figure 2 presents a graphical representation of the statistically significant direct paths from the PEN factors to the log of the number of dental visits for those who received care. Figure 2 also shows statistically significant paths from AIDS diagnosis and symptom intensity to health at the first follow-up. Fewer predisposing and enabling factors were associated with the extent of the dental care received by the respondents than in the bivariate analyses. Older persons had more visits to a dental provider, while African Americans had fewer visits. Dental insurance, an enabling factor, was associated with more visits. As for the need characteristics, persons in worse mental health had fewer visits to a dental provider, while those in worse oral health had more visits.

Table 3 shows significant predictors of the intervening variables of mental, physical, and oral health. Persons with more education had better mental, physical, and oral health. Older persons had worse physical health, but better mental and oral health than younger persons. Women, individuals

FIGURE 2
Significant Predictors of Number of Dental Visits; Significant Relationships Between AIDS Diagnosis, Symptom Intensity and Physical, Mental, and Oral Health



[a] $p \leq .05$; [b] $p \leq .01$; [c] $p \leq .001$.

with more HIV symptoms, and those who were exposed to HIV through drug use had worse health in all three domains.

Discussion

Few previous studies have examined the adequacy of dental care among persons with HIV, and none have examined the relationship between oral health needs for dental services and contending mental and physical health needs. The results indicate that persons with more severe HIV have poorer oral health and thus a greater need for dental care, but that physical and mental health may interfere with their use of dental services. Individuals with poorer physical health were less likely to have received any dental care, and of those who did receive dental services, persons with poorer mental health had fewer visits. These findings support our hypothesis that poorer mental and physical health would lead to less dental use.

Interestingly, physical but not mental health was associated with whether a person received any dental care; persons in poorer physical health were less likely to have received any dental care. In contrast, mental health predicted how much dental care the person received; persons in poorer mental health had fewer visits to dental professionals. This finding suggests that physical health needs may have a higher priority than oral health needs since physical health as well as oral health is correlated with whether a person receives any dental care. Similarly, mental health needs also may have a higher priority than oral health needs (although perhaps less so than physical health needs) since mental health status is correlated with the extent of dental care that a person receives. Perhaps physical health serves as a barrier to receipt of any dental care due to a perceived greater need for more immediate treatment, whereas mental health motivates an individual to receive, or discourages him or her from receiving, a full course of necessary treatments spanning multiple dental visits. These findings are also in accord with prior studies suggesting that more individuals report unmet need for dental care than other health services (5,10).

Poor oral health led to an increased likelihood of dental use, and more visits for those who did receive care. Both findings support our hypothesis that poor oral health would lead to more dental use, and suggest that the physical and mental burdens on persons with HIV compete with contemporaneous effects of oral health problems on dental use. Thus, persons with HIV who are in poorer physical and mental health may not be receiving appropriate levels of dental care.

Our hypothesis that earlier use of HAART would reduce the severity of HIV and lead to improved oral and physical health status was partially supported. Persons with early use of HAART did show improved oral health, indicating the relevance of appropriate treatment of HIV for functional oral health. Physical health was not statistically different for this group.

The findings underscore the need for dental insurance since individuals with dental insurance were not only more likely to have received care, but also had more visits to the dentist than those without it. This is potentially confounded by selection bias in terms of who chooses or has access to dental insurance. However, given the likeli-

TABLE 3
Significant Predictors of Follow-up 1 Variables

Predicted Variable	Predictor	Regression Coefficient: Full Sample (N=2,233)	Regression Coefficient: Utilizers (N=964)
Physical health	Symptom intensity	-.47*	-.44*
	AIDS diagnosis	-.12*	-.12*
	Sex	-.08*	-.10*
	Education	.10*	.11*
	Age	-.07*	-.07†
	African American	.07*	.06‡
	Hispanic	.05†	—
	Income	.09*	.15*
	IV transmission	-.07*	-.06†
	Usual place dental	.04†	—
Mental health	Symptom intensity	-.41*	-.41*
	Sex	-.08*	-.09†
	Education	.07*	.11*
	Age	.06†	—
	African American	.07*	.06‡
	Income	.04‡	.08†
	IV transmission	-.07*	—
	Usual place dental	.07*	.10*
Oral health	Symptom intensity	-.40*	-.41*
	Sex	-.04‡	-.07‡
	Education	.07*	.08‡
	Age	.05†	.06‡
	IV transmission	-.09*	-.07†
	HAART	.06†	.10†
	Dental insurance	.04‡	—
	Usual place dental	.06†	.08†
	Hispanic	—	-.06‡

*$P \leq .001$.
†$P \leq .01$.
‡$P \leq .05$.

hood of oral manifestations for persons with HIV, there would seem to be substantial incentive for persons to choose to obtain dental insurance if they are able to afford it.

Persons who were exposed to HIV through IV or heterosexual transmission were less likely to have visited a dental provider, although there were no statistically significant differences in their number of dental visits. This may represent unwillingness among these groups to seek dental care after contracting HIV, or greater difficulty negotiating the dental system.

We found that dental use for racial and ethnic minorities (African Americans and Hispanics) is lower than for whites. This finding suggests the possibility of underlying discriminatory practices, lower perceived need for dental care, or greater perceived barriers to receipt of dental care among members of these groups. Hispanic heritage was associated with not obtaining any dental care, which might suggest lower perceived need among this group. In contrast, African American heritage was associated with fewer visits, suggesting that this difference in realized access may be due to variations in treatment patterns once they seek care.

Our findings indicate that AIDS diagnosis and symptom intensity have no direct effect on receipt of any dental care, and that AIDS diagnosis has no effect on frequency of use. Still, the direct effect of certain modes of HIV transmission on receipt of any dental care suggests that the nature of the chronic condition may have important secondary considerations—for example, stigmatizationthat impact dental use.

There are limitations to this study. The sample consisted of patients receiving medical care, since one of the goals of HCSUS was to examine the medical costs of treating HIV. Thus, some people who were not receiving medical care were excluded. This may have resulted in an overestimation of the use of dental care among persons with HIV since persons with HIV who are not receiving medical care also may be low utilizers of dental care. Furthermore, these excluded persons may experience barriers to care that are not representative of the respondents in this study.

The symptom intensity scale has two indicators of oral health (oral pain and white patches). Thus, a relationship exists between this scale and the oral health latent variable. However, the remaining 11 variables for males or 12 variables for females included in the symptom intensity scale do not overlap with the oral health variable. In addition, the symptom intensity scale is obtained at baseline, whereas the oral health variable is measured at the time of the respondent's first follow-up and most of the questions comprising this variable are explicitly concerned with the four weeks prior to the time of the first follow-up.

The length of time between the components of the survey (baseline to first follow-up and first follow-up to second follow-up) may have impacted the strength of the relationships we observed. The shorter periods between follow-ups for some individuals may not have allowed sufficient time for longitudinal effects to manifest themselves.

The results of this study have important implications for the provision of dental services for people with HIV in the United States. This study suggests that more attention to the oral health needs of people with HIV is warranted, particularly for those persons who are in worse mental and physical health. Concerns regarding the provision of adequate, appropriate treatment for the physical health

needs of persons with HIV should not preclude attention to dental needs. Although dental care may be provided for some persons as oral health declines, this study suggests that some individuals may not be receiving the care they should, or that they are receiving less care than may be appropriate. This is of particular concern given the potential for life-threatening periodontal infection in persons with HIV. Furthermore, the use of dental services previously has been shown to be a good predictor of general health (4). Thus, this inattention to oral health needs likely leads to poorer overall quality of life for persons with HIV (4). This is particularly distressing since the results suggest that the most physically and mentally ill persons are those most likely to receive inadequate dental care. Therefore, it is important that greater attention be paid to the oral health needs of persons with HIV who are in poor mental and physical health.

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