

AMERICAN JOURNAL OF HEALTH BEHAVIOR™

VOLUME 38 NUMBER 5 SEPTEMBER/OCTOBER 2014

Relationship between Perceived Discrimination and Sedentary Behavior in Adults

Veronica Y. Womack, Hongyan Ning, Cora E. Lewis, Eric B. Loucks, Eli Puterman, Jared Reis, Juned Siddique, Barbara Sternfeld, Linda Van Horn, Mercedes R. Carnethon

Impact of Expectations on the Effects of Exercise on Psychological Distress

Björg Helgadóttir, Örjan Ekblom, Yvonne Forsell

Does Culture or Illness Change a Smoker's Perspective on Cessation?

Iraj MN. Poureslami, Jessica Shum, Natalie Cheng, J. Mark FitzGerald

Novel Incentives and Messaging in an Online College Smoking Intervention

Carla J. Berg, Erin Stratton, Michael Sokol, Andrew Santamaria, Lawrence Bryant, Rolando Rodriguez

Smiles Count but Minutes Matter: Responses to Classroom Exercise Breaks

Erin K. Howie, Roger D. Newman-Norlund, Russell R. Pate

Stigma and Health Literacy: An Agenda for Advancing Research and Practice

Michael Mackert, Erin Donovan, Amanda Mabry, Marie Guadagno, Patricia A. Stout

Predicting Illness Behavior: Health Anxiety Mediated by Locus of Control

Jay R. Skidmore, Sara J. Dyson, Amy E. Kupper, Dena Calabrese

Does Adolescent Weight Status Predict Problematic Substance Use Patterns?

H. Isabella Lanza, Christine E. Grella, Paul J. Chung

Physical Activity of Preschool-aged Latino Children in Farmworker Families

Joseph G. Grzywacz, Cynthia K. Suerken, Martha I. Zapata Roblyer, Grisel Trejo, Thomas A. Acury, Edward H. Ip, Wei Lang, Sara A. Quandt

Food-shopping Environment Disparities in Texas WIC Vendors: A Pilot Study

Christine A. Tisone, Selina A. Guerra, Wenhua Lu, E. Lisako J. McKyer, Marcia Ory, Diane Dowdy, Suojin Wang, Jingang Miao, Alexandria Evans, Deanna M. Hoelscher

Knowledge, Attitudes, and Beliefs of Patients with Chronic Liver Disease

Brett Burnham, Sherrie Wallington, Irene A. Jillson, Holta Trandafili, Kirti Shetty, Judy Wang, Christopher A. Loffredo

Factors Related to Hepatitis B Screening among Africans in New York City

Pathu Sriphanlop, Lina Jandorf, Clement Kairouz, Linda Thelemaque, Hari Shankar, Ponni Perumalswami

Women's Perspectives on Smoking and Pregnancy and Graphic Warning Labels

Denise M. Levis, Brenda Stone-Wiggins, Michelle O'Hegarty, Van T. Tong, Kara N. D. Polen, Cynthia H. Cassell, Mary Council

Weight Misperception and Health Risk Behaviors in Youth: the 2011 US YRBS

Yongwen Jiang, Marga Kempner, Eric B. Loucks

Barriers to Dental Services for Older Adults

Theresa Montini, Tuo-Yen Tseng, Helly Patel, Donna Shelley

Barriers to Dental Services for Older Adults

Theresa Montini, MSW, PhD; Tuo-Yen Tseng, MA; Helly Patel, RDH; Donna Shelley, MD, MPH

Objective: To explore barriers to older adults' accessing dental care. **Methods:** We performed oral exams on 184 community-dwelling older adults; those who needed dental care were contacted 6-12 weeks later to determine if they were able to access treatment. Those who could not access care were interviewed regarding barriers. **Results:** Of those examined, 89% needed dental treatment. After 6 weeks, 52% had received treatment, 48% had not. Those unable to access treatment had fewer teeth, were more likely

to be referred regarding dentures, and were less likely to have a dentist. Reasons cited for not accessing care among the 35 participants we interviewed included a lack of finances, transportation, or assistance in navigating dental service. **Conclusions:** Older adults have a high burden of oral disease and access barriers remain.

Key words: dentistry, community outreach, oral health policy, older adults

Am J Health Behav. 2014;38(5):781-788

DOI: <http://dx.doi.org/10.5993/AJHB.38.5.15>

The oral health care system is facing an unprecedented need to expand capacity to provide services to older adults, especially as life expectancy increases and those who are living longer retain more of their natural teeth. According to the 2000 Surgeon General's Report on *Oral Health in America*, improved oral care among the elderly would improve general health, treatment outcomes, nutritional status, and quality of life.¹

The relationship between oral health and general health is particularly strong among older adults.² Many older adults suffer from severe periodontal disease and there is evidence that periodontal disease is associated with cardiovascular disease,³⁻¹² poor diabetic control,¹³⁻¹⁸ and respiratory disease.¹⁹ Furthermore, poor oral health and the loss of teeth are associated with lower intakes of nutrient rich foods and dietary fiber.^{1,20} Also, chronic diseases and the side effects of medications to treat these diseases affect oral health and may lead to reduced salivary flow, altered sense of taste and smell, and oral and facial pain.²¹ Some older adults with impaired dentition may have trouble sleeping because of dental pain.^{22,23} Finally, there are psychological and social impacts of oral disease, such as avoiding social contacts and conversation, and being too embarrassed to laugh or smile. These are

important concerns given the positive effects that social relations have on general health.²⁴⁻²⁶

Health policy analysts agree that the key to maintaining oral health in the geriatric population is timely access to dental care; yet, older adults face significant barriers to accessing oral health services.²⁷ These include a lack of insurance (there is no dental coverage under Medicare, and limited adult dental coverage in some states under Medicaid), unaffordable co-pays for the underinsured, lack of transportation, perceived lack of need on the part of patients, and relatively few geriatric dentists.^{1,28,29} An additional barrier is lack of knowledge about dental insurance benefits. A recent survey of adults who attend senior centers in New York City found that 20% to 40% were not aware of New York's Medicaid coverage of dental services for adults.³⁰ Given the barriers to accessing care, it is not surprising that older adults have the lowest rate of dental visits compared with all other adults over 18 years old.^{27,31}

The goal of this study was to determine the barriers that prevent community-dwelling older adults from accessing needed dental care. We did this by identifying the unmet dental needs of a group of older adults who frequent senior centers associated with NORCs. We chose this population because we wanted to focus on the unique needs of older adults living in the community who are supported by some degree of social services (NORC social workers and visiting nurses). We followed the older adults who needed dental treatment to determine whether they were able to access care. We interviewed those who were not able to access dental care regarding their barriers to getting needed dental services. Whereas the problem of poor oral

Theresa Montini, Assistant Medical Professor, The Sophie Davis School of Biomedical Education, City College of New York, New York, NY. Tuo-Yen Tseng, Senior Research Coordinator, New York University School of Medicine, New York, NY. Helly Patel, MPH candidate, University of California, Los Angeles, CA. Donna Shelley, MD, MPH, Associate Professor, New York University School of Medicine, New York, NY.
Correspondence Dr Montini; TMontini@med.cuny.edu

health in the elderly is known,³² this study contributes by providing additional information on the magnitude of the problem, and further examination of the barriers that prohibit access to dental treatment, especially among community-dwelling older adults.

METHODS

Site Selection

Our goal was to generate a study sample of older adults living in the community who are supported by some degree of social services, such as social workers and visiting nurses. Therefore, we selected 8 senior centers associated with naturally occurring retirement communities (NORCs). We chose these 8 sites because we believed that the participants they would yield would be varied with respect to socioeconomic status, the proportion of seniors who are Medicaid eligible serving as a proxy for low income, and for dental insurance coverage, that is, those with only Medicare serving as a proxy for not having dental benefits. Another variable was distance from the NYU dental clinic (the largest safety net dental provider in New York City), which in an urban area is complicated by public transit routes. For example, the Stanley Isaacs senior center was 4.34 miles from the university dental clinic, but it was located on the same street as NYU and serviced by a direct express bus. However, the Jacob Riis senior center was geodesically closer (3.73 miles), but with no direct public transportation route to the university clinic that was in a different borough across a river.

We also selected sites to maximize the languages spoken by participants. In 4 of the sites English and Spanish were spoken with equal frequency; in 2 sites Chinese was the primary language; in one site English and Russian were spoken with equal frequency; and one site was frequented predominantly by English speakers. Although we acknowledge that language concordance is important to consider when studying barriers, it is not necessarily a barrier in New York City. English, Spanish, Chinese, Russian, and other languages are spoken at the university dental clinics. When we compiled lists of community dentists specific to each NORC, we found many primary care dentists, many of whom are immigrants themselves, who offered treatment in a plethora of languages. Table 1 lists the 8 sites including number of study participants from each site and their health insurance status, plus distance from the NYU dental clinic.

For each of the 8 sites, we developed a site-specific community referral list from the New York State Dental Association's membership database. The site-specific lists gave contact information for local dentists, the distance of the dentists' office from the senior center, which languages in addition to English were spoken in the office, which dental insurances were accepted (especially noted was whether Medicaid was accepted), and whether the treatment fees were negotiable.

Recruitment of Participants

The investigators worked with senior center administrators to set up a dental screening event at a time and on a day that would maximize the number of older adults who could attend. At some centers, 2 separate events were scheduled on different dates and times. The senior centers publicized the events by putting the event on their calendars, publishing notices in their newsletters, posting flyers, and making announcements at senior center events (such as at meals). Adults who wished to be examined by a team of a supervising faculty dentist and multi-lingual dental students attended the events. Overall, 184 older adults volunteered to be examined.

Data Collection

Older adults who volunteered to be examined sat in common chairs and dentists wearing headlamps used gingival probes, dental explorers, mirrors and penlights to examine the older adults. An assisting dental student recorded clinical findings electronically, using software developed specifically for this study.

If those examined needed some form of dental care, for example, untreated dental caries, periodontal problems, oral pathology, or needed dentures or partials (or repair if broken or no longer fit), the language concordant faculty and student dentists explained to the older adult that treatment was needed. The faculty and student dentists made a referral, and with the language concordant research assistant, discussed with the older adult the various options for obtaining care, including going to their own private dentist, going to a dentist on the community list we developed, or going to the NYU dental clinic to continue care with the dental student or faculty dentist who had examined them at the senior center. The research assistants asked those who needed treatment for consent to contact them 6 weeks later to determine if they were able to access dental care. If they consented to be followed, they gave us their name, address, and telephone number. Compared to the 125 participants who consented to be followed, we found that the 39 participants who declined to be in the study were more likely to be immigrants (.04); had a higher number of cavities for which they were referred for dental treatment (.02); and, were less likely to plan to go to NYU for treatment (.001) and more likely to plan to access a community dentist from the referral list we developed specific to the NORC (.01). We believe these differences could be attributed to the disproportionate number of mono-lingual Chinese speakers in the decline group – 60% of those who declined to be in the study were from 2 Chinatown sites at which Chinese was the predominant language spoken, whereas 37% of those who consented to be followed were from these 2 sites. We developed a community dentist resource list specific to each NORC, and for the 2 Chinatown sites we featured the Charles B. Wang dental clinic

Table 1
Site Characteristics

	Jacob Riis	Confucius Plaza	Queens-view	Stanley Isaacs	Ravens-wood	Chinese CBA	Village View	Elliot & Chelsea
Number of participants	20	40	5	34	15	38	18	14
Health insurance								
% Medicare only	40	55	100	65	53	42	67	36
% Medicaid + Medicare	45	18		21	40	42	11	43
% Private insurance ^a	5	13		6		11	6	
% Uninsured ^b	5			9	7	3	6	14
% Medicaid only	5	10				3	11	7
Miles from NYU dental clinic	3.73	2.23	4.59	4.34	4.42	2.21	1.16	1.68

Note.

a Some participants were between 60 and 65 years old

b Some participants were between 60 and 65 years old; other participants were not eligible for Medicare because they were not yet citizens or permanent legal residents, or had not paid enough Medicare taxes during their working years.

as the community resource; we even distributed Charles B. Wang dental clinic brochures at our Chinatown screenings. We believe that the immigrants who spoke only Chinese may have preferred to seek treatment at Charles B. Wang because all clinic personnel are bilingual, versus the NYU dental clinics, where only the associate student dentists could be guaranteed to be fluent in Mandarin, Cantonese, Fuzhou dialect, etc.

Six to 12 weeks after they were examined at the senior center, we contacted the participants who needed dental treatment and consented to be followed. We asked the older adults if they were able to get the dental care they needed. If they said yes, they had accessed dental services, we thanked them for participating in our study and wished them well. If they had not received dental care, we requested to interview them about their experiences trying to access care. Individual interviews were conducted by language concordant members of the research team, either in-person at the senior center or by telephone. Interviews were unstructured and open-ended, beginning with the interviewer saying: "I understand that the dentist who examined you at the senior center believed that you would benefit from dental care, but you were not able to obtain dental care. Please tell me about all the barriers (conditions, causes, reasons) that made it difficult for you to access dental care." The interviewers took notes, and if the participant allowed audio recording, we recorded the interview. After closing the interview, the research team worked with the older adult to secure needed dental treatment.

Data Analysis

Quantitative analysis consisted of a t-test for continuous variables and chi-square test for cat-

egorical variables. We used an alpha level of .05 for all statistical tests.

The 35 interviews were coded using content analysis. The first and third authors independently reviewed the transcripts and interview notes and inductively developed a coding scheme. They met after every 3 transcripts were coded to discuss codes, achieve consensus, and resolve coding differences. The codebook was revised if needed. Coding was assisted by qualitative data analysis software (<http://www.maxqda.com/>). Face validity was assessed by a blinded reviewer (senior author) who was presented with all the interview passages that had been coded with one particular code (eg, "transportation difficulties"), and was asked to determine what all the passages had in common. If she offered a code identical to the code used by the qualitative analysts, we considered the use of the code to describe these passages as valid.

RESULTS

As delineated in Table 2, the average age of the adults examined was 75 years; 68% were female and 32% male; 49% were Asian-American, 23% white, 17% African-American, and 10% were Hispanic/Latino; 64% were immigrants who had been in the US for an average of 37 years. Regarding health insurance, 53% had Medicare only, 34% had Medicaid (which in New York State includes dental benefits), 7% had private insurance, and 5% were uninsured. Those examined reported on average that it had been >4-1/2 years since they last saw a dentist (ranging from one week to 5 people who had never seen a dentist). The participants had an average of 16 (of 28 examined) teeth; and 47% experienced ongoing or occasional dental pain. Forty-seven percent wore dentures or par-

Table 2
Summary of Quantitative Results

	Full Sample N = 184	Referred for Tx Able to Access N = 55	Referred for Tx Unable to Access N = 50	Comparing those who did and did not access treatment ^a
	% (N), or mean (±SD)	% (N), or mean (±SD)	% (N), or mean (±SD)	p value
Age	75.1 (±8.3)	73.6 (±7.3)	74.8 (±9.2)	.45
Sex				
Female	68% (126)	72.7% (40)	62.0% (31)	.30
Male	32% (58)	27.3% (15)	38.0% (19)	
Racial Ethnicity				
Asian American	49% (92)	47.3% (26)	48.0% (24)	.82
White	23% (43)	27.3% (15)	20.0% (10)	
African American	17% (29)	12.7% (7)	18.0% (9)	
Hispanic/Latino	10% (18)	10.9% (6)	10.0% (5)	
Other	1% (1)	0.0% (0)	2.0% (1)	
Nativity				
immigrants to USA	64% (117)	58.2% (32)	62.0% (31)	.69
mean years living in the USA	36.6 (±16.1)	32.3 (±14.4)	33.5 (±16.7)	.78
Health insurance				
Medicare only	53% (98)	49.1% (27)	52.0% (26)	.93
Medicaid + Medicare	29% (53)	29.1% (16)	26.0% (13)	
Private health insurance ^b	7% (13)	9.1% (5)	8.0% (4)	
Uninsured ^c	5% (9)	7.3% (4)	6.0% (3)	
Medicaid only	5% (9)	5.5% (3)	6.0% (3)	
Number of days since saw dentist^d	1707.07 (±3955.17)	886.6 (±1512.5)	2147.24 (±4833.5)	.09
Number of teeth	16.3 (±10.0)	18.8 (±9.0)	14.6 (±10.0)	.03
Experiencing Dental Pain	47% (87)	50.9% (28)	46.0% (23)	.62
Dentures				
wear dentures/partials	47% (87)	41.8% (23)	56.0% (28)	.15
age of dentures/partials (years)	9.2 (±7.9)	10.0 (±7.2)	8.5 (±7.8)	.50
denture/partials cause discomfort ^e	40% (35)	47.8% (11)	46.4% (13)	.92
Referred for^f				
number of untreated caries		1.95 (±2.39)	2.34 (±2.67)	.43
needed periodontics		78.2% (43)	72.0% (36)	.46
oral pathology		18.2% (10)	12.0% (6)	.38
dentures/partials need/repair/adjust		38.2% (21)	58.0% (29)	.04
Plans for accessing dental treatment^g				
NYU dental clinic		74.5% (41)	76.0% (38)	.86
Community dentist on list		21.8% (12)	20.0% (10)	.82
Own dentist		10.9% (6)	14.0% (7)	.63
(those who reported having their own dentist)		50.9% (28)	26.0% (13)	.01

Notes.

- a T-test was used for continuous variables and Chi-square test was used for categorical variables. We used an alpha level of .05 for all statistical tests.
- b Some participants were between 60 and 65 years old.
- c Some participants were between 60 and 65 years old; other participants were not eligible for Medicare because they were not yet citizens or permanent legal residents, or had not paid enough Medicare taxes during their working years.
- d Five participants reported never having been to the dentist. Their values were calculated by taking their age, subtracting 21, and multiplying the result by 365.
- e Calculated only for those who had dentures or partials.
- f Some participants were referred for more than one need for dental treatment.
- g Some participants relayed intentions to access treatment in more than one way.

tials; the average age of the denture was 9 years old, and 40% of the dentures/partials caused pain or discomfort.

We found a tremendous need for oral health care. Eighty-nine percent of those who volunteered to be examined (164 of 184) needed some form of dental care for untreated dental caries, periodontal problems, oral pathology, or need for dentures or partial dentures, or repair/realignment of dentures/partials that were broken or no longer fit. We found an average of 2 untreated dental caries per mouth examined.

We asked those who needed care what their plans were for accessing dental services. Seventy-seven percent said they would seek care from the New York University faculty or the associate student dentist who examined them at the senior center; 22% said they would seek care from a community dentist near the senior center (from the site-specific referral list we developed); and even though 39% said they had a dentist, only about one-third of those who had a dentist said they would seek care from their own dentist. One hundred and twenty-five older adults who needed care consented to be followed (76%).

Six weeks after participants were examined at their senior center, we began to contact those who needed care and had consented to be followed by sending letters to their residence, telephoning them, and/or returning to the senior center to encounter them in person. We were not able to reach 20 of the 125 who had consented to be contacted, either because they had been hospitalized, moved out of the area, had given us erroneous contact information, or they never returned to the senior center. Of the 105 participants we were able to contact, 55 (52%) were able to get dental care, and 50 (48%) did not yet access care. Those who were not able to access dental treatment averaged significantly fewer teeth (14.6 versus 18.8; $p = .03$), were significantly more likely to be referred to acquire new or repair old dentures or partials (58% versus 38%; $p = .04$), and were significantly less likely to report having their own dentist (26% versus 51%; $p = .01$).

Of the 50 who did not access needed dental care within 3 months from the date of their initial examination, 35 agreed to be interviewed about why they were not able to access care. Of those who did not get needed dental services, 60% of the older adults reported that financial constraints prevented them from accessing care; 31% lacked adequate transportation; and 20% lacked someone who could help them make an appointment, transit to an appointment, or navigate the dental services system.

DISCUSSION

We found a great need for dental treatment; almost 90% of the community-dwelling older adults who we examined at the senior centers needed dental care for untreated dental caries, periodon-

tal problems, oral pathology, or needed to acquire new, or repair old, dentures or partials. We also found a high rate of self-reported oral pain. Yet, just over half of those contacted were able to access dental care. Those not able to access dental care reported that their barriers included financial constraints, lack of transportation, and need for assistance. With respect to finances, when we compared those who were able to access treatment with those who were not able to, we found that those who were not able to access care had significantly fewer teeth and were significantly more likely to be referred to dental treatment to acquire new, or repair old, dentures or partials. A complete set of dentures costs an average of \$3000, which without dental insurance coverage is likely out of reach for many older adults.³³ Regarding the need for assistance, in our comparison of those who were able to access treatment with those who were not, we found that half of those who were able to access treatment reported having their own dentist, which was significantly more than those who were not able to access treatment. We did not interview those who did access treatment, so we do not know from whom they received dental treatment. However, we can postulate that those who define themselves as “having a dentist” may have more experience making dental appointment, transiting to an appointment, and navigating the dental services system.

Our findings have several policy implications. First, Medicare covers the health needs of adults over 65 years, but does not include a comprehensive dental benefit. This gap in coverage is an important barrier to accessing care among older adults and should be addressed in the context of healthcare reform.^{34,35}

Second, comprehensive Medicaid adult dental benefits are not universal. Of the states that include dental benefits in Medicaid coverage, rolling back or eliminating adult dental benefits is often considered a way to contain state costs. Recently Wallace et al³⁶ studied the impact of eliminating Medicaid dental insurance benefits in Oregon. They found that without dental insurance benefits, poor people suffer costs in the form of unmet need, increased out-of-pocket costs, and use of inappropriate care settings for dental needs.³⁶ Advocates for older adults need to protect Medicaid’s dental benefit in the states that do cover dental services, and work to secure Medicaid dental insurance benefits in the states that do not cover dental treatment. Of particular importance is coverage for dentures. Currently, Medicaid covers dentures in 33 states,³⁷ however the limitations are formidable. For example, of the 33 states that do provide denture benefits, some exclude the elderly from getting dentures (eg, California, Texas, Utah); most states limit how often a beneficiary can get a replacement set of dentures (eg, Wyoming provides one set per lifetime), and some states have reimbursement limitations (eg, Indiana will reimburse \$600 of the

cost of dentures). Realignment and repairs of the dentures are typically not covered. Finally, even those who do have Medicaid dental care coverage have substantial out-of-pocket expenditures;³⁸ therefore, financial barriers exist even for beneficiaries.

New York is a state that includes dental care in Medicaid benefits, and has excellent denture benefits: one set every 4 years for any adult. However, we found that many of the older adults who participated in our study were eligible for Medicaid, but were not enrolled. When we identified their dental needs, senior center social workers and visiting nurses conceptualized their need for dental treatment as a reason to consider enrolling in the Medicaid program. Low income adults who are dually eligible for Medicare and Medicaid in states that cover dental services should be made aware of the benefit so that they may utilize Medicaid to maintain their oral health.

Third, another barrier to access was the lack of transportation to dental clinics. Whereas transportation services do exist, they are typically available only to people who meet eligibility criteria, such as those who have a disability that limits mobility. Local government and social service agencies need to be apprised of the need for wider eligibility for transportation to a broader array of healthcare services. With coordination, transportation to high quality and reduced-cost dental treatment (such as that provided by dental school clinics) could be developed.

Fourth, local agencies and social services could coordinate with local dental schools to regularize dental screening and referral programs at senior centers, either as part of an existing externship requirement for students, or an optional volunteer activity. Community health workers, nurses, and social workers who work with older adults in community settings such as senior centers need to be trained to recognize the oral health needs of older adults and to facilitate access to dental services, such as assisting with making appointments. Burr and Lee³⁹ found that older adults who lacked social support were less likely to access dental care. The nurses and social workers at the senior centers who were involved in this study were willing and able to assist older adults in accessing dental treatment, once the need was identified.

The Institute of Medicine and the National Research Council report, *Improving Access to Oral Health Care for Vulnerable and Underserved Populations*⁴⁰(p. 230) concludes that: "Improving access to oral health care will necessarily require multiple solutions that use an array of providers in a variety of settings." With respect to our findings, policy implications include amending state regulation to enable dentists to screen and treat older adults in their homes or at the community centers that they frequent, utilizing mid-level dental providers,⁴¹ and training and encouraging non-dental professionals (such as visiting nurses assigned to

senior centers or NORCs) to do oral health screenings and make appropriate referrals.

In conclusion, we imagine that if we found this degree of unmet dental need and substantial barriers among older adults who frequent a NORC-associated senior center, then it is possible that the situation of community-dwelling older adults who are not integrated within a network of community services (such as the social work, nursing, and transportation services available at NORC-associated senior centers) may be more dire. This is a topic for further study and our findings can possibly serve as a comparison for subsequent research on older adults not connected to community services. We believe that the barriers older adults face when accessing dental services may be persistent, but are not insurmountable. Our hope is that this evidence will be used to inform policy advocacy to remediate the situation.

Limitations

The sample selection procedure was non-random; we screened study volunteers who attended senior center programs in New York City. Even though 89% of those in the study needed dental treatment, we do not know how representative this rate of occurrence is in the general population of elderly. Therefore we counsel caution about the lack of generalizability of these results given the small, non-random sample. Regardless of these limitations, we went forward with our study because we believed that taking a more qualitative approach that would be narrower in scope, but have more depth, would allow us to produce an evidence base that could be used to inform policy change. Our goal in doing this study was to further understanding of the impact of a social structure that prevents older adults from acting on the knowledge that they are in need of dental services, and to produce a data analysis that could illuminate health programs that could facilitate the restoration of older adults' oral health.

Human Subjects Statement

We received IRB approval from New York University's University Committee on Activities Involving Human Subjects on September 28, 2010.

Conflict of Interest Statement

The authors have no affiliations, funding sources, or financial holdings that may be at odds with unbiased presentation of data or analysis.

Acknowledgments

This study was funded by the United Hospital Fund (Grant Number 100230S). We could not have done this work were it not for the intellectual, material, and social support of Mark S. Wolff, DDS, PhD, our chair, dean, and mentor. His commitment to the oral health of community-dwelling older adults is without equal. Many thanks to our NYU colleagues Walter A. Bretz, DDS, PhD,

Danuta Clemmens, RN, PhD, and Stefanie Russell, DDS, MPH, PhD for scientific advice on study design and data collection. We thank our colleague, Harry G. Meeker, DMD, for his generous clinical supervision of the associate student dentists in the field. We thank Dengtao Yuan, MS-EE, MS-CFRM, for developing the software application that the dentists used to collect demographic and clinical information when examining older adults in senior centers. We thank Dengtao Yuan, Liney C. Espinosa, and Erika A. Venegas Aponte for translation and for research assistance. We thank Ling Chan, Christie Clarke, Deborah Dong, and Kimberly Szu Mai Kan for research assistance. Special thanks to all the administrators, social workers, and nurses at the NORC senior centers; without their cooperation this study would not have been possible.

References

1. US Department of Health and Human Services. *Oral Health in America: A Report of the Surgeon General*. Rockville, MD: US Department of Health and Human Services, National Institute of Dental and Craniofacial Research, National Institutes of Health; 2000.
2. Petersen PE. *The World Oral Health Report 2003: Continuous Improvement of Oral Health in the 21st Century - The Approach of the WHO Global Oral Health Programme*. Geneva, Switzerland: World Health Organization; 2003.
3. Andriankaja O, Trevisan M, Falkner K, et al. Association between periodontal pathogens and risk of nonfatal myocardial infarction. *Community Dent Oral Epidemiol*. 2011;39(2):177-185.
4. Andriankaja OM, Genco RJ, Dorn J, et al. Periodontal disease and risk of myocardial infarction: the role of gender and smoking. *Eur J Epidemiol*. 2007;22(10):699-705.
5. Blaizot A, Vergnes JN, Nuwwareh S, et al. Periodontal diseases and cardiovascular events: meta-analysis of observational studies. *Int Dent J*. 2009;59(4):197-209.
6. Buhlin K, Gustafsson A, Andersson K, et al. Validity and limitations of self-reported periodontal health. *Community Dent Oral Epidemiol*. 2002;30(6):431-437.
7. Cotti E, Dessi C, Piras A, Mercurio G. Can a chronic dental infection be considered a cause of cardiovascular disease? A review of the literature. *Int J Cardiol*. 2011;148(1):4-10.
8. Meurman JH, Sanz M, Janket SJ. Oral health, atherosclerosis, and cardiovascular disease. *Crit Rev Oral Biol Med*. 2004;15(6):403-413.
9. Offenbacher S, Beck JD, Moss K, et al. Results from the periodontitis and vascular events (PAVE) study: a pilot multicentered, randomized, controlled trial to study effects of periodontal therapy in a secondary prevention model of cardiovascular disease. *J Periodontol*. 2009;80(2):190-201.
10. Papapanou PN, Trevisan M. Periodontitis and atherosclerotic vascular disease: what we know and why it is important. *J Am Dent Assoc*. 2012;143(8):826-828.
11. Scannapieco FA, Bush RB, Paju S. Associations between periodontal disease and risk for atherosclerosis, cardiovascular disease, and stroke. A systematic review. *Ann Periodontol*. 2003;8(1):38-53.
12. Slavkin HC, Baum BJ. Relationship of dental and oral pathology to systemic illness. *JAMA*. 2000;284(10):1215-1217.
13. Chavarry NG, Vettore MV, Sansone C, Sheiham A. The relationship between diabetes mellitus and destructive periodontal disease: a meta-analysis. *Oral Health Prev Dent*. 2009;7(2):107-127.
14. Lamster IB, Lalla E, Borgnakke WS, Taylor GW. The relationship between oral health and diabetes mellitus. *J Am Dent Assoc*. 2008;139(Suppl):19S-24S.
15. Loe H. Periodontal disease. The sixth complication of diabetes mellitus. *Diabetes Care*. 1993;16(1):329-334.
16. Santacroce L, Carlaio RG, Bottalico L. Does it make sense that diabetes is reciprocally associated with periodontal disease? *Endocr Metab Immune Disord Drug Targets*. 2010;10(1):57-70.
17. Taylor GW. Bidirectional interrelationships between diabetes and periodontal diseases: an epidemiologic perspective. *Ann Periodontol*. 2001;6(1):99-112.
18. Teeuw WJ, Gerdes VE, Loos BG. Effect of periodontal treatment on glycemic control of diabetic patients: a systematic review and meta-analysis. *Diabetes Care*. 2010;33(2):421-427.
19. Scannapieco FA, Ho AW. Potential associations between chronic respiratory disease and periodontal disease: analysis of National Health and Nutrition Examination Survey III. *J Periodontol*. 2001;72(1):50-56.
20. Schoenberg NE, Coward RT, Gilbert GH, Mullens RA. Screening community-dwelling elders for nutritional risk: determining the influence of race and residence. *J Appl Gerontol*. 1997;16(2):172-189.
21. Turner MD, Ship JA. Dry mouth and its effects on the oral health of elderly people. *J Am Dent Assoc*. 2007;138(Suppl):15S-20S.
22. Gilbert GH, Heft MW, Duncan RP. Oral signs, symptoms, and behaviors in older Floridians. *J Public Health Dent*. 1993;53(3):151-157.
23. Locker D, Grushka M. The impact of dental and facial pain. *J Dent Res*. 1987;66(9):1414-1417.
24. Berkman LF, Glass T, Brissette I, Seeman TE. From social integration to health: Durkheim in the new millennium. *Soc Sci Med*. 2000;51(6):843-857.
25. Holt-Lunstad J, Smith TB, Layton JB. Social relationships and mortality risk: a meta-analytic review. *PLoS Med*. 2010;7(7):e1000316. doi:10.1371/journal.pmed.
26. Uchino BN, Cacioppo JT, Kiecolt-Glaser JK. The relationship between social support and physiological processes: a review with emphasis on underlying mechanisms and implications for health. *Psychol Bull*. 1996;119(3):488-531.
27. Dolan TA, Atchison K, Huynh TN. Access to dental care among older adults in the United States. *J Dent Educ*. 2005;69(9):961-974.
28. Alfaro DP, Ahluwalia KP. Oral care needs, barriers and challenges among community dwelling elderly in New York State and northern Manhattan. *NY State Dent J*. 2010;76(5):38-41.
29. Institute of Medicine. *Retooling for an Aging America: Building the Health Care Workforce*. Washington, DC: National Academies Press; 2008.
30. Shelley D, Russell S, Parikh NS, Fahs M. Ethnic disparities in self-reported oral health status and access to care among older adults in NYC. *J Urban Health*. 2011;88(4):651-662.
31. Dye BA, Tan S, Smith V, et al. Trends in oral health status: United States, 1988-1994 and 1999-2004. *Vital Health Stat 11*. 2007(248):1-92.
32. Ahluwalia KP, Sadowsky D. Oral disease burden and dental services utilization by Latino and African-American seniors in northern Manhattan. *J Community Health*. 2003;28(4):267-280.
33. Ramraj C, Quinonez CR. Self-reported cost-prohibitive dental care needs among Canadians. *Int J Dent Hyg*. 2013;11(2):115-120.
34. Moeller JF, Chen H, Manski RJ. Investing in preventive dental care for the Medicare population: a preliminary analysis. *Am J Public Health*. 2010;100(11):2262-2269.
35. Rubinstein HG. Access to oral health care for elders: mere words or action? *J Dent Educ*. 2005;69(9):1051-

Barriers to Dental Services for Older Adults

- 1057.
36. Wallace NT, Carlson MJ, Mosen DM, et al. The individual and program impacts of eliminating Medicaid dental benefits in the Oregon Health Plan. *Am J Public Health*. 2011;101(11):2144-2150.
37. Kaiser Commission on Medicaid and the Uninsured. Medicaid Benefits: Dentures (on-line). Available at: <http://kff.org/medicaid/state-indicator/dentures/>. Accessed January 17, 2014.
38. Manski RJ, Moeller J, Chen H, et al. Dental care expenditures and retirement. *J Public Health Dent*. 2010;70(2):148-155.
39. Burr JA, Lee HJ. Social relationships and dental care service utilization among older adults. *J Aging Health*. 2013;25(2):191-220.
40. Institute of Medicine and National Research Council. *Improving Access to Oral Health Care for Vulnerable and Underserved Populations*. Washington, DC: The National Academies Press; 2011.
41. Shaefer HL, Miller M. Improving access to oral health care services among underserved populations in the US: is there a role for mid-level dental providers? *J Health Care Poor Underserved*. 2011;22(3):740-744.