Dental Fear and Delayed Dental Care in Appalachia-West Virginia

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Abstract

Purpose: The people of Appalachia-West Virginia are culturally unique and are known to have oral health disparities. The purpose of this study was to evaluate dental fear in relation to delayed dental care as a factor influencing oral health behaviors within this culture.

Methods: A cross sectional study design was used. Participants were urgent care patients in a university dental clinic. The sample included 140 adults over age 18 years. The Dental Fear Survey was used to determine dental fear level. Self-report of delayed dental care was provided by the participants. The Dental Fear Survey was dichotomized at score 33, with higher scores indicating dental fear.

Results: The prevalence of dental fear was 47.1% (n=66). There was a significant association of dental fear and dental delay. The unadjusted odds ratio was 2.87 (95% CI: 1.17, 7.04; p=0.021). The adjusted odds ratio was 3.83 (95%CI: 1.14, 12.82; p=0.030), controlling for tobacco use, perceived oral health status, pain, and last dental visit. A difference in dental delay between men and women was not present in this sample. The only significant variable in delayed dental care was dental fear.

Conclusion: In Appalachia-West Virginia , there remains a high level of dental fear, despite advances in dental care, techniques, and procedures.

Keywords: Unmet need; delayed dental care; dental fear; dental anxiety

This study supports the NDHRA priority area, **Health Promotion/Disease Prevention:** Identify, describe and explain mechanisms that promote access to oral health care, e.g., financial, physical, transportation.

Introduction

Delayed dental care is a significant public health concern which could be addressed in public health outreach programs. Delayed dental care is frequently more complex, costly and urgent.[1] Delayed dental care often results in dental visits to the emergency department of hospitals, and such visits stress the health care system.[2] Many hospitals do not have the equipment or staff for dental care;[3,4] and 90% of dentally related emergency department visits do not result in definitive dental treatment.[2] In the U.S., there were 1.1 million dentally related emergency department visits in 2000, and 2.1 million in 2010.[4] Overall, approximately 4.3% of emergency visits in the U.S. are dentally related.[2] The average cost of dentally related emergency department care from 2008 to 2010 was $760 (adjusted to 2010 dollars).[2] More importantly than the financial burden is the progression of dental disease to complex and life-threatening levels. From 2008 to 2010, there were 101 dentally related deaths in the emergency department in the U.S. (56 caries-related, 43 related to a pulp/periapical lesion, 18 related to periodontal diseases and 24 related to cellulitis/abscess).[2]

One determinant for delayed dental care is cost. Reed et al indicated that cost of care was a factor for 9% of participants.[5] Singhal et al studied unmet dental need during pregnancy and found women, whose annual incomes were less than $40,000, were more likely to have unmet dental needs.[6]

Riley et al indicated the sensory and temporal characteristics of pain were factors in delayed dental care.[7] It was later suggested dental attitudes more accurately explained oral health behaviors, including delayed dental care.[8] Riley et al used the categories of:[8]

1. Individuals with favorable attitudes to dental care
2. Frustrated believers in dental care
3. Individuals with negative attitudes and cost concerns
4. Individuals pessimistic about personal and professional oral care

Dental anxiety and dental fear may also have a role in explaining dental health behaviors such as delayed dental care. Dental anxiety is defined as the emotional state of unpleasant cognitions and feelings, and the physiological and behavioral responses relative to a dental experience which precedes

the dental encounter.[1,9,10] Dental fear is defined as the emotional state involving the actual encounter often associated with fear of dental pain, fear of damage/catastrophe, fear of specific stimuli, generalized anxiety, lack of power/control, feeling embarrassed or shame, and/or distrust of dental personnel.[1,9,10] Dental phobias are defined as clinically diagnosed mental disorders with excessive anxieties and fears.[1,9,10] The prevalence of dental fear is difficult to establish as various scales and criteria exist to measure dental fear, and researchers and clinicians often use similar language interchangeably. For example, some researchers report "dental fear" prevalence with a definition of moderate to severe levels of fear, while other researchers do not include moderate levels in their definition of "dental fear." Crego et al,[11] in a review of literature of dental fear prevalence, found prevalences reported at 16%,[12] 24%[13] and 5 to 7%.[14] As a consequence of the reported data from the various studies, there is a lack of precise prevalence estimates for dental fear.[11]

Dental fear, dental anxiety, and dental pain affect oral health care.[15] A vicious cycle dynamic is suggested as a mechanism where fear affects delayed dental care or irregular dental visits, which affects the severity of dental conditions, and reinforces treatment-related fear and anxiety as the treatment needs become more complex.[11] Individuals who delay dental care often forego preventive care which is less intensive, expensive and severe.[11]

Appalachia-West Virginia is a culturally unique region of the U.S. It has a population of 1.85 million, of which 94% is non-Hispanic white.[16] The median income is $40,043 (the national median is $53,046), and 17.9% of the population is below the federal poverty level (the national median is 15.4%).[16] West Virginia is 42% rural. Its location has been described as being in the South, in the Mid-Atlantic region and being in the Appalachia region—features adding to its unique characteristics. The rugged mountains have isolated much of the population which has resulted in strong areas of shared culture and cultural pride. Appalachia-West Virginia's population is described as being centered on religion, family, food, outdoor activities and being independent. In a previous study of 27 adults over age 18 years in Appalachia-West Virginia, the mean score on the Dental Fear Survey (which has values from 20 to 100) was 65.7 (standard deviation=23).[17]

The people in Appalachia-West Virginia have greater dental disparities as compared with the rest of the nation. Appalachia-West Virginia has the highest national prevalence of older adults who are edentulous (36% in Appalachia-West Virginia compared to 17% nationally).[18] Fewer people in Appalachia-West Virginia have visited the dentist within the past year than the people in the nation (61% in Appalachia-West Virginia compared to 70% nationally).[18]

The purpose of this study was to evaluate dental fear as a factor for delayed dental care in the Appalachia-West Virginia culture. The rationale for this study is that it is important to determine the risk factors for delayed dental care in a population with significant oral health disparities. The theoretical framework for the research is the Andersen Model of Health Services Use. In the Andersen Model, service use outcomes (also called realized access to care, or actual utilization) are influenced by predisposing characteristics, enabling resources and need.[19] The enabling resources include finances/insurance for care, the presence of a site for care in the community, support from family/friends to seek care, etc.[19] Need is both a perception from the perspective of the individual and an evaluation of a clinician that a service should be performed. The model was developed to have a scientific means by which to evaluate access to health service utilization.[20] It is an effective model for use in this study in that health services involve more than state indicators, they involve interrelationships of many factors, and the Andersen model helps in explaining the relationships.[21]

METHODS AND MATERIALS

This study was approved by the Appalachia-West Virginia University Institutional Review Board and was in compliance with the Declaration of Helsinki. The study design was cross-sectional. Participants were recruited from community-dwelling patients seeking care at a West Virginia University dental school urgent care clinic during their wait in the reception area. The inclusion criteria for the participants were that they were age 18 years and above, and that they provided verbal consent. The researchers posed the questions to the participants. Exclusion criteria included an age of less than 18 years, refusal to provide consent and an inability to understand the posed questions. Consent was obtained from all participants. Participants did not receive an incentive to participate in the survey. The sample included 140 individuals, ages 18 years and above.

The study outcome was delayed dental care. The participants were asked "How long have you had today's symptoms?" The potential responses were dichotomized to 1 to 3 days vs. more than 3 days. The cut-point for this study was based upon the 2009 consensus definition of oral neglect for institutionalized elderly in which the criteria for neglect for caries, abscesses, moderate pain and periodontal disease (among other listed oral conditions) from detection to diagnosis was 3 days.[22] The cut-point was also determined as the criteria as abscesses, and cellulitis from

odontogenic infections may develop very quickly from the onset of symptoms and become serious risks to health and life.[23,24]

The 20-question, publicly available Dental Fear Survey was used to evaluate the primary variable of interest, dental fear. The scale was validated across 4 demographically and geographically diverse groups.[25] In factor analysis, factor score variables had correlations on comparable factors of 0.93, 0.96 and 0.97.[25] The survey has a high internal consistency and a high test-retest reliability (r=0.74).[25-27] It has been translated in many languages and is a research survey used worldwide.[17,29-32]

The questions in the Dental fear survey have Likert-style response sets of: 1=Not afraid at all, 2=A little afraid, 3=Somewhat afraid, 4=Pretty much afraid and 5=Very afraid.[32,33] The survey was dichotomized at a score of 33 based upon the operationalized value for moderate fear in previous research.[28,34-36] For this study, scores 33 and above indicated dental fear. In the collected data, there were 9 missing values from the potential 1,800 values (0.5%), and these were replaced with the imputed neutral response value of 3.

Other Variables

Bivariate analyses included variables considered in previous studies and important in the Andersen Model of Health Services Use.[19] The predisposing variables in the study were: sex (male vs. female), race/ethnicity (minority vs. white - dichotomized due to the high non-Hispanic White population in Appalachia), age (25 to 44 years; 45 to 59 years, 60 and above vs. 18 to 24 years), and highest education of a member of the family in the household (high school or less than high school vs. more than high school). The enabling resources evaluated in the study were: household income category (less than $15,000, $15,000 to $49,000 vs. $50,000 and greater), difficulty in arranging a ride to a dental appointment (yes vs. no), difficulty in managing a dental bill or dental copay balance of ($51 to $100, more than $100 vs. $50 or less), and difficulty with taking time from work (yes, I do not have employment vs. no).

The last dental visit (1 to less than 3 years, 3 years and above vs. 0 to 1 years) was the "health service usage" in the model. Perceived need was evaluated with pain level (6 to 10 vs. 0 to 5) and self-reported oral health status (very good, neutral, somewhat poor, very poor vs. excellent). Personal health practices were evaluated with smoking status (currently smoking (yes vs. no)).

Statistical Analysis

IBM SPSS Statistics 21 (Armonk, NY) was used to analyze the data. The statistical significance level was determined as 0.05 prior to the study. Descriptive statistics were analyzed. The variables of interest were compared with delayed dental care using Chi square exact analyses. The data were analyzed with logistic regression on dental delay.

Results

The descriptive statistics of the study sample are presented in Table I. There were 140 participants, 57.1% of whom were men, 46.4% of whom were 25 to 44 years and 96.4% of whom were non-Hispanic white. The racial characteristic of the survey sample is representative of Appalachia-West Virginia. A majority of the participants (83.6%) had a high school education or above. There were 42.9% of participants who reported an income of $25,000 to $50,000. More than half of the participants (53.6%) reported current smoking. There were 46.4% of participants who reported a somewhat poor or very poor oral health status, and 17.1% who reported a pain level of 10 on a 0 to 10 scale. In terms of dental fear, there were 47.1% with moderate to high dental fear scores on the Dental Fear Survey. In terms of the outcome variable, delayed dental care, the prevalence of delayed dental care over 3 days was 78.6% (110 participants).

In bivariate analysis with delayed dental care (Table II), there were several significant relationships between delayed dental care and the other variables presented in the study. In the primary analysis of interest, the relationship of delayed dental care and dental fear, the association was significant (p=0.014). Significant relationships emerged between delayed dental care and the pain scale (p=0.021), delayed dental care and last dental visit (p=0.009), delayed dental care and current tobacco use (p=0.033), delayed dental care and self-reported oral health status (p=0.014), and delayed dental care and income (p=0.026). The p-values corresponded to an exact Chi square, one-sided test for these variables.

Table III provides the logistic regression on delayed dental care and dental fear. In the unadjusted analysis, the odds ratio is 2.87 (95% CI: 1.17, 7.04; p=0.021). In the parsimonious adjusted analysis, which included the significant variables from the bivariate analysis (dental fear, current tobacco use, income, perceived health status, pain and last dental visit), the association of delayed dental care and dental fear was 3.83 (1.14, 12.82; p=0.030). None of the other variables were significantly related with delayed dental care in the adjusted logistic regression. In an analysis which additionally included sex, race/ethnicity, age and education, the association of delayed dental care and dental anxiety/fear had an odds ratio of 4.83 (95% CI: 1.30, 17.86; p=0.019). Dental fear was the only significant variable in the models.

Table I: Sample Description

All	n (140)	Percent (100)
Sex		
Male	80	57.1
Female	59	42.1
Age		
18 to 24	23	16.4
25 to 44	65	46.4
45 to 59	38	27.1
60 and above	14	10.0
Race/Ethnicity		
Non-Hispanic Whites	135	96.4
Non-Hispanic Blacks	suppressed	suppressed
Non-Hispanic, Other	suppressed	suppressed
Duration of oral symptoms before seeking care		
1 day	7	5.0
2 to 3 days	22	15.7
More than 3 days, but less than 1 month	70	50.0
Over 1 month	40	28.6
Pain level on a 0 to 10 scale		
0	16	11.4
1	8	5.7
2	5	3.6
3	10	7.1
4	2	1.4
5	17	12.1
6	11	7.9
7	17	12.1
8	24	17.1
9	6	4.3
10	24	17.1
Last dental visit		
0 to 1 year	64	45.7
1 to less than 3 years	43	30.7
3 years and above	32	22.9

Table I: Sample Description (continued)

All	n (140)	Percent (100)
Difficulty in arranging a ride to a dental appointment		
Yes	13	9.3
No	125	89.3
Difficulty in managing bill or copay balance of:		
$50 or less	33	23.6
$51 to $100	36	25.7
More than $100	68	48.6
Difficulty with taking time from work		
Yes	41	29.3
No	63	45.0
I do not have employment	34	24.3
Education		
Less than high school	22	15.7
High school graduation and above	117	83.6
Current tobacco use		
Yes	75	53.6
No	62	44.3
Self-reported oral health status		
Excellent	suppressed	suppressed
Very good	23	16.4
Neutral	48	34.3
Somewhat poor	45	32.1
Very poor	20	14.3
Income		
More than $50,000	14	10.0
$25,000 to $50,000	60	42.9
Less than $25,000	50	35.7
Dental Fear Survey Scores		
Less than 33	74	52.9
33 and above	66	47.1

Mean DFS score: 41.6; SD=23.7
Mean Avoidance/Anticipatory Fear score: 15.2; SD=9.8
Mean Fear of Specific Dental Stimuli score: 14.0; SD=8.4
Mean Physiological Arousal score: 10.1; SD=6.4

DISCUSSION

This study of Appalachia-West Virginia attendees to a university urgent care clinic examined the patterns of delayed dental care associated with dental fear. The participants had a high (47.1%) prevalence of dental fear which was associated with increased odds of delayed dental care. This study describes dental fear associated with delayed dental care in a region of known health disparities compared with the rest of the U.S.

Table II: Sample Description by Dental Delay (n=140)

	Less than 3 days	Over 3 day delay	p-value
Sex			
Male	14 (17.5%)	66 82.5%)	0.294
Female	15 (25.4%)	44 (74.6%)	
Age			
18-24	5 (21.7%)	18 (78.3%)	
25-44	13 (20.0%)	52 (80.0%)	0.475
45-59	6 (15.8%)	32 (84.2%)	
60 and above	5 (35.7%)	9 (64.3%)	
Race/Ethnicity			
Non-Hispanic Whites	28 (20.7%)	107 (79.3%)	
Non-Hispanic Blacks	0	suppressed	-
Non-Hispanic, Other	suppressed	0	
Pain level on a 0-10 scale			
0	6 (37.5%)	10 (62.5%)	
1	2 (25%)	6 (75.0%)	
2	1 (20.0%)	4 (80.0%)	
3	0	10 (100%)	
4	0	2 (100%)	
5	6 (35.3%)	11 (64.7%)	0.021
6	4 (36.4%)	7 (63.6%)	
7	4 (23.5%)	13 (76.5%)	
8	5 (20.8%)	19 (79.2%)	
9	1 (16.7%)	5 (83.3%)	
10	0	24 (100%)	
Last dental visit			
0-1 year	19 (29.7%)	45 (70.3%)	
1 to less than 3 years	7 (16.3%)	36 (83.7%)	0.009
3 years and above	3 (9.4%)	29 (90.6%)	
Difficulty in arranging a ride to a dental appointment			
Yes	3 (23.1%)	10 (76.9%)	0.542
No	26 (20.8%)	99 (79.2%)	

Table II: Sample Description by Dental Delay (n=140) (continued)

	Less than 3 days	Over 3 day delay	p-value
Difficulty in managing bill or copay balance of:			
$50 or less	3 (9.1%)	30 (90.9)	
$51-$100	9 (25.0%)	27 (75.0%)	0.114
More than $100	15 (22.1%)	53 (77.9%)	
Difficulty with taking time from work			
Yes	6 (14.6%)	35 (85.4%)	
No	13 (20.6%)	50 (79.4%)	0.080
I do not have employment	10 (21.0%)	24 (70.6%)	
Education			
Less than high school	4 (18.2%)	18 (81.8%)	
High school graduation and above	25 (21.4%)	92 (78.6%)	0.459
Current tobacco use			
Yes	11 (14.7%)	64 (85.3%)	0.033
No	18 (29.0%)	44 (71.0%)	
Self-reported oral health status			
Excellent	2 (50.0%)	2 (50.0%)	
Very good	8 (34/8%)	15 (65.2%)	
Neutral	9 (18.8%)	39 (81.3%)	0.014
Somewhat poor	8 (17.8%)	37 (82.2%)	
Very poor	2 (10.0%)	18 (90.0%)	
Income			
More than $50,000	6 (42.9%)	8 (57.1%)	
$25,000-$50,000	12 (20.0%)	48 (80.0%)	0.026
Less than $25,000	7 (14.0%)	43 (86.0%)	
Dental Fear Survey Scores			
Less than 33	21 (28.4%)	53 (71.6%)	0.014
33 and above	8 (12.1%)	58 (87.9%)	

Exact 2-sided Pearson Chi square used for the variables: sex, age, and race/ethnicity.
Exact 1-sided Pearson Chi square used for the other variables.

This study indicates that dental fear is an additional consideration in the dental attitudes associated with oral health disparities in adults.[8] Previous studies have addressed dental avoidance; however, few studies have investigated dental care when a person is symptomatic. Riley et al stated no previous publication had examined sociodemographic predictors of delayed dental care in relation to when a person was symptomatic, prior to their study.[7] They indicated that minority status individuals and women were at

Table III: Odds Ratios and 95% Confidence Intervals from Logistic Regression on Delayed Dental Visits (n=131)

	Odds ratio [CI]	p-value	-2 Log Likelihood	model p-value
Unadjusted				
High vs. Low fear	2.87 [1.17, 7.04]	0.021	137.033	0.016
Adjusted model 1				
High vs. Low fear	3.83 [1.14, 12.82]	0.030	99.964	0.016
Adjusted model 2				
High vs. Low fear	4.83 [1.30, 17.86]	0.019	94.070	0.058

Model 1 is parsimonious model adjusted for the significant variables from the bivariate analyses (dental fear, tobacco use, income, perceived oral health status, pain, and last dental visit).
Model 2 additionally includes sex, race, age, and education.

greater risk of delayed dental care longer than 48 hours after onset of pain than non-Hispanic whites and men, respectively.[7] This current study of Appalachia-West Virginia participants did not support the results related to gender; the only variable which was significant in this study's adjusted models was dental anxiety/fear. This result was also reported in a study that examined dental fear and found greater dental fear was related to non-symptomatic delayed dental care or avoidance of dental visits for any reason.[37]

The attitudes and behaviors of Appalachia residents have been described as reflecting a unique culture.[38] One of the common cultural behaviors of Appalachia described in the medical literature is "present time orientation" in which patients seek to address needed health care services on the day that the problem manifests, particularly through the request for antibiotics and the belief in the cure of antibiotics even for non-bacterial diagnoses.[37] This time orientation was not evident in the dental setting of the present study, nor was it present in a study of Appalachia-Virginia in which residents delayed health care due to cultural beliefs described as "self-reliance," and "fatalism" (controlled for health insurance).[39] And although health perceptions were associated with general health behaviors in the Appalachia-Virginia study, that association was not significant for oral health perceptions in the adjusted logistic regression on dental delay in this study.[39] In a focus-group study in Southern Appalachia-West Virginia , findings indicated that not all cultural characteristics historically ascribed to Appalachians are evident in Appalachia-West Virginia, including the belief in fatalism.[40] Limited health-seeking behavior was attributed to lack of knowledge rather than fate/religious faith.[40] Culture has been previously associated with health behavior, and needs to be considered as a factor in delayed dental care as well, but lack of knowledge and dental fear are important as well.[40]

This study has limitations. It was conducted using a cross-sectional design, which is a very useful epidemiologic design, but, by nature, cannot be used to establish a causal relationship or temporal inferences. Participants were asked to recall the length of time from symptom onset. These data may be subject to non-differential misclassifications due to recall bias. Generally, recall bias tends to weaken an association. The participants may have been embarrassed or ashamed to admit a long delay. Therefore, a social desirability bias may exist in the data which would tend to increase the number of responses of short delay reports. Such a bias would tend to weaken an association of delayed dental care and dental fear. The data were collected over several months in one dental school clinic's urgent care area, therefore, the participants may not have represented all dental patients. Also, the culture of Appalachia-West Virginia may have a unique quality making the results not generalizable to other cultural or geographic regions. However, the study design allowed for the present evaluation of dental fear in a dental setting, rather than a retrospective recall of fear. The logistic regressions and the resultant odds ratios answered the research question as to if there were an association of dental delay and fear in the Appalachia-West Virginia population. The study would be strengthened if it were conducted in practice-based research networks across Appalachia-West Virginia under similar circumstances.

Conclusion

Evidence from this cross-sectional study in a population located in Appalachia-West Virginia with higher than normal dental disparities indicates a role of dental fear in delayed dental care. Data from this study add to the available literature evidence further supporting a need to address dental fear with the public in regard to the impact of delayed dental care on dental treatment.

These data may be utilized by dental hygienists, particularly public health dental hygienists who are responsible for outreach programs and routinely ed-

ucate the public about oral health conditions. Discussing delayed dental care is relevant and may help to provide better care if the public can be encouraged to seek preventive, routine and early intervention. The education programs should include a discussion on dental fear, and educators should stress that the technological advances in dental care have made dental procedures more comfortable; and the technological advances in prevention/control help to reduce the need for urgent care.

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