Acculturation of Adult Mexican-American Hispanics and Oral Health Outcomes

2nd International Collaborative Study of Oral Health Outcomes (ICS II), San Antonio TX 1989-93

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Acculturation is the concept of contact between cultures. It is a dynamic, multi dimensional process.

Structural assimilation (large scale entry into organizations of the host society) may or may not follow acculturation.

AIMS

- **To indicate any need for specific, acculturation-related oral health promotion, disease prevention or treatment methods, by defining any relationships of valid measures of acculturation and structural assimilation of Mexican-Americans to oral health outcomes**

- **To better understand disparities in Mexican-American dental access and in oral health outcomes**

Prior Acculturation Scale of Cuellar 1980

Very Mexican
Mexican-oriented bicultural
"True" bicultural
Anglo-oriented bicultural
Very Anglicized

Differentiation based on:
Education*
Age*
Sex*
Places of birth and residence-self & & family*
Preference and fluency in Spanish & English
Food preferences
Ethnic identification of self, family, friends
Media preferences

This scale is generationally congruent, but includes SES* items which are immutable; this is not compatible with the dynamic nature of acculturation. There is increasing linguistic and cultural heterogeneity of Mexican-Americans, but this and other similar scales are single global measures of a truly multi-dimensional process.

The Hispanic Health and Nutritional Examination Study (H HANES) conducted in the southwestern U.S. in 1978-80, using the Cuellar Scale (1980), found differences by direction of acculturation and

(i) decayed tooth surfaces (DS) and,

(ii) in the Periodontal Index (PI) (Gingivitis and Pocketing), after controlling for age, income, education, and gender (Ismail and Szpunar 1990).

However the PI is a composite index,
not based on current etiology,
does not include pocket depths or loss of attachment,
and has distributional problems.

METHODS

Part of WHO Second International Collaborative Study of Oral Health Outcomes (ICS-II) San Antonio site

- **Sample: complex probability sample of San Antonio 35-44 and 65-74 year old adults in their residences. Hispanics were selected for this analysis of acculturation (n=280)**
- **Data: Detailed questionnaire administered at home in English or Spanish and a standardized dental examination on dental van, both using direct data entry**
- **Acculturation Measures: 33 item validated scales of acculturation and structural assimilation (Hazuda 1988) which assesses**

  5 Dimensions of Acculturation and Structural Assimilation

  A1 Childhood experiences with English vs. Spanish
  S1 Interaction with mainstream society as a child
  F1 Functional integration with mainstream society
  A4 Value placed on Mexican cultural origin
  A5 Attitude to traditional family structure and gender-role organization

Hazuda Acculturation Scale

Hazuda (1988) drew on Gordon's (1964) seven-stage model of the assimilation process to validate the above five dimensions of acculturation and structural assimilation. Her scale has shown relationships to outcomes of NIDDM and Heart Disease.

Seven stage model of assimilation (Gordon 1964)

1. **Cultural assimilation (acculturation)**
2. **Structural assimilation**
3. **Marital assimilation**
4. **Identification assimilation**
5. **Attitude receptional assimilation**
6. **Behavioral receptional assimilation**
7. **Civic assimilation**

METHODS - continued

- **Oral Health Outcome Measures:**
  DFT, FT, % caries treatment completed
  LOA ≥ 4mm, pocketing ≥ 4 mm (max. score for the CPITN index teeth)
  Regular dental attendance (≤ 2 years ago and having a usual dentist)

- **Psychosocial Measures: Composite and single variables from the administered questionnaire**
  Oral health behaviors and practices
  Oral health attitudes
  Perception of own oral status and function

- **SES Variables Controlled: Age, education, income, gender**

- **Null Hypothesis: After controlling for SES, dimensions of acculturation are not factors determining oral health outcomes for Mexican-Americans**

- **Analysis:**
  Probability of association and correlation
  Logistic regression
  Linear regression

RESULTS

First Univariate: Measures of acculturation vs. oral status measures

Then Multivariate: Oral status and outcome measures were modeled to determine if acculturation measures were important factors in addition to psychosocial measures.

Age, education, income and/or gender were controlled, but not at the expense of the fit of the model

Each numbered Result Table is followed by a Interpretation.

UNIVARIATE RESULTS

1. % who were more Mexican Acculturated, on Five Dimensions, by Age and Gender

Dimensions		Age			Gender		
		35-44		65-74	Male		Female
In Childhood	A1 Experience with English vs. Spanish language	73.28	*	84.57	78.63		80.57
	S1 Childhood interaction with mainstream society	83.90		76.97	79.84		79.88
As an Adult	F1 Functional integration with mainstream society	38.24	***	58.99	47.06		52.25
	A4 Value placed on preserving Mexican cultural origin	74.25		74.43	70.90		77.02
	A5 Attitude toward traditional family structure and gender-role organization	54.08	***	78.53	74.26	*	63.06

Interpretation of Univariate Results 1.

For those more Mexican acculturated Hispanics (prior slide, univariate)

By Age

- **More of the older than the younger group used Spanish vs. English as a child**
- **Fewer were functionally integrated into mainstream society**
- **More had a traditional family structure and gender roles**

By Gender

- **Differences were not generally apparent**

2. Pearson Correlations Between Acculturation Dimension and the Socioeconomic Indicators Age, Education, Income

Dimensions			Age	Education	Income
In Childhood	A1	Experience with English vs. Spanish Language	35-44 65-74	0.32*** 0.42***	0.25** 0.20*
	S1	Childhood interaction with mainstream society	35-44 65-74	0.32*** 0.46***	0.25** 0.22**
As an Adult	F1	Functional integration with mainstream society	35-44 65-74	0.62*** 0.69***	0.36*** 0.29*
	A4	Value placed on preserving Mexican cultural origin	35-44 65-74	0.09 0.20*	0.06 0.21**
	A5	Attitude toward traditional family structure and gender-role organization	35-44 65-74	0.33*** 0.34***	0.29*** 0.07

Interpretation of Univariate Results 2.

Acculturation Dimensions and Socioeconomic Indicators (prior slide, correlations)

- **All dimensions of acculturation correlated with level of education and income, such that mainstream society acculturation was associated with higher educational attainment and income.**

- **The only exception was in younger adults, for whom education and income did not correlate with value of preserving Mexican cultural origin (A4).**

3. Mean DFT on Five Dimensions of Acculturation by Age

Dimensions			35-44		65-74	
			To Mexican Culture	To American Culture	To Mexican Culture	To American Culture
In Childhood	A1	Experience with English vs. Spanish language	6.77	8.34	4.16 ***	8.12
	S1	Childhood interaction with mainstream society	7.24	8.32	3.85 ***	7.63
As an Adult	F1	Functional integration with mainstream society	5.84 **	8.10	3.51 ***	6.72
	A4	Value placed on preserving Mexican cultural origin	7.16	7.26	4.43 *	6.05
	A5	Attitude toward traditional family structure and gender-role organization	7.03	7.39	4.11 ***	7.62

Interpretation of Univariate Results 3.

Acculturation dimensions and decayed and filled teeth (DFT)

- **Mean caries experience (DFT) was significantly less (about half) in more Mexican acculturated older Hispanic adults on all five dimensions**

- **Similar trends in younger Hispanic adults were usually not significant.**

4. Mean FT/DFT on Five Dimensions of Acculturation by Age

Dimensions			35-44			65-74		
			To Mexican Culture		To American Culture	To Mexican Culture		To American Culture
In Childhood	A1	Experience with English vs. Spanish language	0.58	*	0.76	0.58	*	0.78
	S1	Childhood interaction with mainstream society	0.58	*	0.82	0.57		0.71
As an Adult	F1	Functional integration with mainstream society	0.53	*	0.69	0.55	*	0.71
	A4	Value placed on preserving Mexican cultural origin	0.63		0.62	0.57	*	0.74
	A5	Attitude toward traditional family structure and gender-role organization	0.56	*	0.71	0.58		0.74

Interpretation of Univariate Results 4.

Acculturation dimensions and Caries treatment rate (FT/DFT)

- **The rate of completion of caries treatment (proportion of carious teeth which were filled) was generally significantly lower for those Hispanic adults who were more Mexican acculturated, in both age groups.**

5. % Regular Dental Attenders by Age and Acculturation Status on Five Dimensions

Dimensions			35-44		65-74	
			To Mexican Culture	To American Culture	To Mexican Culture	To American Culture
In Childhood	A1	Experience with English vs. Spanish language	45.26	45.71	41.41	52.00
	S1	Childhood interaction with mainstream society	42.86	47.37	40.74	54.29
As an Adult	F1	Functional integration with mainstream society	41.18	47.62	36.26	53.85
	A4	Value placed on preserving Mexican cultural origin	43.30	47.06	35.96	65.00
	A5	Attitude toward traditional family structure and gender-role organization	38.89	51.61	38.84	61.76

6. % Adults with Periodontal Pocketing (≥ 4mm) by Age and Acculturation Status on Five Dimensions

Dimensions			35-44		65-74	
			To Mexican Culture	To American Culture	To Mexican Culture	To American Culture
In Childhood	A1	Experience with English vs. Spanish language	49.47*	28.57	55.28	58.33
	S1	Childhood interaction with mainstream society	42.86	31.58	54.37	61.76
As an Adult	F1	Functional integration with mainstream society	52.94	39.29	56.32	53.97
	A4	Value placed on preserving Mexican cultural origin	44.30	47.06	53.64	57.89
	A5	Attitude toward traditional family structure and gender-role organization	50.00	38.71	55.17	54.55

7. % Adults with Loss of Periodontal Attachment (LOA ≥ 4mm) by Age and Acculturation Status on Five Dimensions

Dimensions			35-44		65-74	
			To Mexican Culture	To American Culture	To Mexican Culture	To American Culture
In Childhood	A1	Experience with English vs. Spanish language	51.58	34.29	78.86	79.17
	S1	Childhood interaction with mainstream society	47.96	26.32	79.61	79.41
As an Adult	F1	Functional integration with mainstream society	56.86	42.86	81.61	74.60
	A4	Value placed on preserving Mexican cultural origin	48.45	50.00	80.91	71.05
	A5	Attitude toward traditional family structure and gender-role organization	52.76	43.55	81.03	69.70

Interpretation of Univariate Results 5, 6, 7.

No relationship was found between dimensions of acculturation and

- **regular dental attendance**
- **periodontal pocketing ≥ 4mm**
- **loss of periodontal attachment ≥ 4mm**

in either Hispanic adult age group.

FOR MULTIVARIATE RESULTS:

Linear, Logistic and Polytomous Modeling used

Polytomous modeling involved logistic models shown to be parallel and so can be combined.

Parameter estimate indicates the impact on the equation of the independent variable under consideration.

The dependent variables multi colinearity did not distort the models.

MULTIVARIATE RESULTS

8. Linear Regression Modeling for Decayed and Filled Teeth (DFT)

Variable	Parameter Estimate	Standard Error	Variation Inflation Factors
Intercept	1.379	3.162	---
Teeth Present/28	0.136	0.043	1.50
Young (35-44)	1.004	0.636	1.69
Low Income (<$20,000/yr)	-0.741	0.639	1.38
Low Education (<12 yrs)	-0.926	0.658	1.82
Att. Oral Health (composite)	0.095	0.074	1.58
Reg. Attender (≤ 2 yrs & have DDS)	1.905	0.559	1.28
Other Fluorides Used	-2.536	0.600	1.07
Special Small Brush	2.195	0.874	1.11
Perc. Oral Status (composite)	-0.491	0.183	1.28
Language Exp (child)	0.463	0.209	1.34
Child Interact	0.264	0.166	1.41

n=240 Adjusted R-Square = 0.325

Interpretation of Multivariate Results 8.

Linear regression for decayed and filled teeth (DFT).

Associated with lower DFT were:
- **lower income (<$20,000 p.a.)**
- **lower educational attainment**
- **use of fluorides additional to toothpaste**
- **a high level of self-perceived oral health**

Associated with higher DFT were:
- **being a regular dental attender**
- **using a special small brush (surrogate for bridge, perio treatment)**

Two acculturation dimensions entered the model, indicating slightly greater DFT with:
- **greater English language experience as a child**
- **greater mainstream society interaction as a child**

Number of sweet foods consumed (24-hour recall) did not enter this model.

Note: Using the Hazuda acculturation scale (1988) the San Antonio Heart Study showed total carbohydrate intake did not differ significantly by acculturation dimensions (Knapp 1985).

9. Subsequent to this DFT Model, the Univariate Associations of DT and FT on these two Dimensions of Acculturation which entered the Model, were separately assessed.

		Mean DT	Mean FT
Language experience as a child	> Spanish	1.9	3.4
		N.S.	***
	> English	1.8	6.5
Childhood interaction with mainstream society	> Mexican	2.0	3.5
		N.S.	***
	> American	1.8	6.0

The effect of these two acculturation dimensions on DFT is therefore posited to be due to the FT component. Those more acculturated towards the mainstream have almost twice the number of filled teeth, but the number of decayed teeth do not differ significantly. Number of teeth present (at risk) is controlled in the regression model, so effect is not due to missing teeth (MT).

10. Polytomous Logistic Modeling for Filled Teeth

Variable	Parameter Estimate	Standard Error	Odds Ratio
Intercept 1	-4.582	1.679	---
Intercept 2	-6.496	1.706	---
Teeth Present/28	0.066	0.020	1.07
Teeth Decay/28	-0.131	0.056	0.88
Low Income	-0.599	0.315	0.55
Low Education	-0.638	0.300	0.53
Reg. Attender	0.435	0.268	1.55
Positive Att. Oral Health (Composite)	0.111	0.042	1.12
Special Small Brush	0.830	0.446	2.29
Language Exp (child)	0.213	0.106	1.24

n=258 Prop. Odds Assumption Test (p-value = 0.213)

Interpretation of Multivariate Results 10.

For Polytomous Logistic Modeling of filled teeth (FT), this was categorized as 0, 1-5, >5 FT.

One measure of acculturation entered the model, language expression as a child.

It was confirmed that adults who have greater English expression in childhood had greater number of filled teeth, after controlling for SES factors, dental attendance, number of teeth at risk etc. The latter indicates the effect is not due to a difference in number of missing teeth (MT).

English language expression as a child relates to greater number of filled teeth in adulthood, through life-long caries treatment decisions made by dentists.

11. Logistic Modeling for High Degree of Completion of Caries Treatment (FT/DFT ≥ .56)

Variable	Parameter Estimate	Standard Error	Odds Ratio
Intercept	0.220	0.523	--
Low Income	-1.092	0.376	0.34
Low Education	-0.018	0.305	0.98
Floss	0.976	0.300	2.65
Special Small Brush	1.365	0.565	3.92
Regular Attender	0.590	0.294	1.81
Dentist: "Need brush better"	-0.772	0.292	0.46
Positive Perc. Oral Status (Composite)	1.015	0.344	2.75

n=281, Hosmer and Lemeshow G.O.F. Test (p-value=0.493)
Mean FT/DFT for Hispanics was 0.56

Interpretation of Multivariate Results 11.

A high degree of completion of caries treatment was not related to any acculturation measures, while controlling for:

- **Income**
- **Educational attainment**
- **Use of dental floss (possible surrogate for preventive behaviors generally)**
- **Use of special brush (surrogate for bridge, perio treatment?)**
- **Regular dental attendance**
- **Dental advice to brush more effectively (-ve)**
- **More positive perceived oral health**

12. Logistic Modeling for Mexican-American Regular Attendance (≤ 2 yrs, and having a usual dentist)

Variable	Parameter Estimate	Standard Error	Odds Ratio
Intercept	0.921	0.528	---
Low Income	-0.504	0.312	0.61
High perceived Treatment Cost	-1.350	0.435	0.26
"Dentists spend enough time with patients"	1.120	0.410	3.07
"Getting sick a matter of luck" (Fatalism)	-0.592	0.281	0.55
Other Fluorides Used	0.665	0.322	1.95
"Not able to chew"	-0.726	0.383	0.48
Positive Perc. Oral Status (Composite)	0.798	0.286	2.22

n=276, Hosmer and Lemeshow G.O.F. Test (p-value=0.823)

Interpretation of Multivariate Results 12.

The model of regular dental attendance did not include any dimensions of acculturation, while controlling for:

- **Higher income**
- **High perceived cost of treatment**
- **Perception that dentists do spend enough time with patients**
- **Not being fatalistic about oral health**
- **Use of fluorides in addition to toothpaste**
- **Ability to chew food**
- **More positive perceived oral health**

Note:
Dental attendance of Hispanics (42%) was found to be significantly lower than Whites (66%) in the ICS II Study, with less than half of those attending for a preventive reason (c.f. Whites 2/3).

13. Logistic Modeling for Periodontal Pocketing (≥ 4mm)

Variable	Parameter Estimate	Standard Error	Odds Ratio
Intercept	-0.306	0.687	--
Young	-0.318	0.272	0.73
Low Income	0.346	0.311	1.41
Low Education	0.370	0.292	1.45
Male	0.751	0.260	2.12
Value dental health	-0.754	0.522	0.47
Regular Attender	-0.282	0.261	0.76
Dentist: "Need teeth cleaned"	0.641	0.331	1.90

n=280, Hosmer and Lemeshow G.O.F. Test (p-value=0.842)

Interpretation of Multivariate Results 13.

This model for periodontal pocketing in Hispanics did not include any acculturation dimensions, while controlling for:

- **Age group**
- **Income**
- **Education**
- **Gender**
- **Value placed on dental health**
- **Regular dental attendance**
- **Dental advice to have teeth scaled**

14. Logistic Modeling for Loss of Periodontal Attachment (≥ 4mm)

Variable	Parameter Estimate	Standard Error	Odds Ratio
Intercept	0.735	0.433	---
Young	-1.071	0.297	0.34
Low Income	0.581	0.322	1.79
Low Education	0.241	0.315	1.27
Male	0.553	0.284	1.74
Diabetes Dx	0.540	0.420	1.72
Nuts/cheese eaten	-0.291	0.287	0.75
Positive Perception Oral Health	-0.703	0.283	0.50

n=282, Hosmer and Lemeshow G.O.F. Test (p-value=0.421)

Interpretation of Multivariate Results 14.

The model of loss of periodontal attachment in Hispanics did not include any dimensions of acculturation, while controlling for:

- **Age group**
- **Income**
- **Educational attainment**
- **Gender**
- **Treatment of diabetes**
- **Consumption of nuts and cheese**
- **More positive perceived oral health**

CONCLUSIONS

After controlling for socioeconomic factors already found in ICS II to be influential:

1. **Measures of caries (DFT, FT) in adults were directly related to two dimensions of acculturation and structural assimilation (Hazuda 1988) – English language expression as a child, and childhood interaction with mainstream society.**
   But this is accounted for by filled teeth, not decayed or missing teeth, suggesting that it is not so much the disease of caries as exposure to dentists treatment decisions, through which acculturation has this influence.

   This is a troubling finding, but not unique to Mexican Americans, and reflects both the iatrogenic nature of much dental caries treatment, and overtreatment.

2. **Measures of degree of completion of caries treatment, current periodontal status, and regularity of dental attendance were not significantly related to acculturation or structural assimilation. The lower rate of dental attendance of Mexican Americans cannot be explained by acculturation.**

IMPLICATIONS

- **The ICS II Study does not show major relationships in adult Mexican-Americans between oral health outcomes and degree/direction of acculturation and structural assimilation. Simpler explanations for oral health disparities should be accepted and acted upon.**

- **Age, income, education, and gender have important relationships to oral health in Mexican-Americans. So also do knowledge, health behaviors, and personal perceptions of oral function and status.**

- **While oral health promotion is needed in appropriate languages and at suitable literacy levels, oral health promotional, disease preventive or treatment methods tailored specifically to a Mexican versus mainstream cultural orientation do not have a strong justification.**

IMPLICATIONS - continued

- **While interpretation from cross-sectional data should be done with caution, higher rates of dental attendance and caries treatment are apparent in younger adults, and are consistent with a relatively high rate of preventive sealants and of caries treatment found in other studies of Mexican American children in Texas. (See other ICS II Reports and TX DH Survey 1999 on this website <www.oralhealthsa.org>.) This appears to show gradually improving dental access and better oral health outcomes across the generations of Mexican Americans.**

- **Cost of dental care is the most apparent barrier for many Mexican Americans. Gradual generational improvement in socio economic status will be very slow in addressing this disparity. Access programs focused on removing cost barriers can be a more immediate remedy.**

- **Overtreatment, and under prevention of dental caries is apparent. Etiologic and risk-based prevention with minimally invasive treatment should be the norm.**