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HIV Knowledge Among a Sample of Puerto Rican and Mexican Men and Women

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This study assessed levels of HIV knowledge and identified factors associated with HIV knowledge among a sample of heterosexual Puerto Rican and Mexican men and women, ages 18 to 45. The sample consisted of 144 men and women living in San Diego County, California, who self-identified as being of Mexican ethnicity and 209 men and women living in Cuyahoga County, Ohio, who self-identified as Puerto Rican. Interviews were conducted by trained, bilingual interviewers. Data were collected on demographic variables, attitudes towards decision-making in relationships, and HIV knowledge and risk behaviors. Puerto Rican individuals were significantly more likely than Mexican individuals to respond correctly to almost one-half of the 12 HIV knowledge items. Multiple logistic regression analysis indicated that higher levels of education, greater U.S. acculturation, legal status and birth in the United States, a self-focused locus of control in relationships, and being male were predictors of higher knowledge.

KEY WORDS: Hispanics; HIV knowledge.

Although a number of studies have suggested that Hispanics in general are less knowledgeable about the causes of HIV and its transmission than are non-Hispanic Whites and African Americans (1–6), relatively few studies have examined levels of HIV knowledge between various Hispanic groups (7–9). However, similarities and differences in these levels of knowledge may be critical to the development of HIV prevention interventions that are culture- and gender-specific and sensitive, potentially maximizing their effectiveness.

We report on the results of a study among a sample Puerto Rican and Mexican men and women designed to assess levels of HIV knowledge, to determine which factors are associated with HIV knowledge independently for each of these two Hispanic subgroups, and to model the associated factors to establish their relative contribution among Puerto Ricans and Mexican.

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METHODS

Study Population

The sample comprised 72 men and 72 women between the ages of 18 and 45 years who self-identified as heterosexual and of Mexican ethnicity, resident in San Diego County, California, and 110 men and 79 women between the ages of 18 and 45 who self-identified as heterosexual and of Puerto Rican ethnicity, resident in Cuyahoga County, Ohio. Prospective participants were initially screened for eligibility based on self-identified sexual orientation, age, and self-identified ethnicity. Those who were found to be eligible were enrolled after obtaining informed consent. Participants were recruited through apartment complexes, tenant associations, churches, social service organizations, civic organizations, social

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clubs, parent–teacher associations, legal associations, and snowball sampling. Twenty-five of the men and 25 of the women of Mexican ethnicity were recruited from individuals in detention at the facilities of the Immigration and Naturalization Service (INS) in order to ensure that individuals who were temporarily detained, but who had been members of the community, were also represented in the sample.

Data Collection

Face-to-face interviews were conducted in San Diego County, California and Cuyahoga County, Ohio, between January 1998 and June 2000. All interviews were conducted by either the Principal Investigator or one of the trained interviewers; the Principal Investigator and all interviewers are bilingual in English and Spanish. By agreement with the INS, all interviews within its detention facilities were conducted by the Principal Investigator. To reduce self-disclosure bias and participant discomfort, all interviewers were female (10). Interviews were conducted in English and/or Spanish in accordance with the preference voiced by each participant.

Interviews required from 2 to 4 h, depending upon the length of each participant's responses relating to sexual and drug-using experience. Interviews were conducted, in accordance with the preference expressed by each participant, in participants' homes, at the facilities of community-based organizations, at the detention facilities of the INS, and at church facilities. All interviews were conducted out of hearing distance of others. Interviews conducted at the INS detention facility were conducted out of the hearing distance of all others, but within visual distance of security officers because of security concerns. Participants were offered $10.00 for their participation, an amount that was established in consultation with the members of the community advisory board developed for this study.

Variables

Demographic Characteristics

Data were gathered on age, educational level, ethnicity, household income, employment status and type, country of birth, and time spent in the United States.

Acculturation

Acculturation was assessed using the 24-item Bidimensional Acculturation Scale (BAS) for Hispanics (11). The BAS includes 12 items per cultural domain, Hispanic and non-Hispanic, across the three subscales of language use, language proficiency, and electronic media. Responses for the three subscales are measured on 4-point Likert scales. Two scores indicate the level of acculturation in each cultural domain, resulting in classification of each individual as Hispanic, Non-Hispanic, or bicultural. The scales demonstrated good internal consistency (Cronbach's $\alpha = .63$). Scores were summed within the subscales for use in multivariate models.

Immigration Status

A modified form of an immigration instrument developed by Loue and Foerstel was used to determine immigration status (12, 13). The assessment tool classifies individuals into 1 of 12 categories, ranging from U.S. citizen to undocumented. This tool has demonstrated excellent validity and reliability (13).

Locus of Control

A seven-item scale was used to assess locus of control in sexual relationships and decision-making. Responses were scored on a 4-point Likert scale (from 1 = *strongly agree* to 4 = *strongly disagree*). Higher scores indicate a stronger male locus of control. Internal reliability was excellent (Cronbach's $\alpha = .71$).

HIV Knowledge

Practical knowledge of HIV transmission and prevention were tested with a 12-item true–false scale similar to those used in previous studies examining HIV risk behaviors among inner-city women, among White, African American, and Hispanic heterosexuals in San Francisco, and among sexually active women in Romania (14–16).

Actual Risk

Criteria for the classification of individuals at high risk of HIV were modeled from previous studies

for the purposes of consistency and comparability (16). Individuals were defined as being at high risk if they had 1) multiple sexual partners in the previous month and reported any unprotected intercourse; 2) unprotected intercourse with a partner who they believed had injected drugs or to have had sex with other people during the previous year; 3) unprotected intercourse with an HIV-positive partner; 4) unprotected intercourse with a regular partner with whom he or she had been sexually involved for less than 1 year, and was uncertain whether that individual had injected drugs or had had sexual intercourse with others; or 5) used injection drugs in the previous 12 months and had shared injection equipment. Use of injection drugs in the previous 12 months encompassed not only the use of illegal drugs, such as heroin, but also the use of vitamins, steroids, and antibiotics, an injection practice that has been documented among some Hispanics (17, 18).

Statistical Analysis

Participants were categorized into those with high knowledge and those with low HIV knowledge. Participants who answered 9 or more of the 12 questions correctly (75%) were classified as having high knowledge of HIV. To determine which predictor variables were significantly associated with high HIV knowledge, a series of univariate logistic regression analyses were conducted. Each factor was analyzed separately to determine its association with high HIV knowledge among Puerto Ricans, among Mexicans, and in the entire sample. Multivariate analysis was conducted utilizing backward stepwise regression. The initial multivariate model included all of the variables utilized in univariate logistic regression analyses. The three final models—Puerto Ricans, Mexicans, and Puerto Ricans and Mexicans combined—were compared to establish the determinants of high HIV knowledge in each group and to assess the potential need for subpopulation-specific interventions. All analyses were performed using SAS.

RESULTS

Demographics

Despite recruitment efforts through similar sources, there were several significant demographic differences between the Mexican and Puerto Rican participants. See Table I. Puerto Rican participants were more likely to have completed college ($p < .02$), more likely to have been born outside of the mainland United States ($p < .001$), more likely to be bicultural, and less likely to be classified as non-Hispanic ($p < .001$). Not surprisingly, since individuals born in the United States and Puerto Rico are by law citizens of the United States, Puerto Rican participants were more likely to be citizens ($p < .001$).

HIV Knowledge

Table II sets forth the percentages of correct responses to the 12 items used to assess HIV knowledge. Puerto Ricans were significantly more likely to respond correctly to almost one-half of the assessment items.

Univariate regression analysis indicates that, among Puerto Ricans, younger age, greater education, and higher levels of acculturation to U.S. culture were found to be predictive of higher HIV knowledge. Additionally, those who reported that the locus of control in sexual relationships rests with their partner, rather than with themselves, were less likely to have high HIV knowledge. Multiple logistic regression analysis for high HIV knowledge among the Puerto Rican respondents found that higher levels of education and a self-focused locus of control were predictive of higher knowledge.

Among Mexican respondents, univariate regression analysis indicated that individuals are more likely to have higher levels of HIV knowledge if they were born in the United States, have more than a high school education, spent a longer period of time in the United States, are bicultural or more closely aligned with non-Hispanic culture, and are legally resident in the United States as either a citizen or permanent resident ("green card" holder) (see Table III). Multivariate logistic regression analysis indicates that among Mexican respondents, being male and having legal status in the United States were predictive of greater knowledge.

The multiple logistic regression analysis that included both the Mexican and Puerto Rican respondents and controlled for ethnicity indicated that higher education, greater levels of acculturation to U.S. culture, legal status in the United States, a self-focused locus of control, birth in the United States, and being male were predictors of higher knowledge (see Table IV).

Table I. Demographic Characteristics ($n = 332$)

	Mean			p value[b]
Age in years	30.0	31.6	30.9	0.896
Average years of education	9.9	11.3	10.7	0.021
Years in mainland United States	17.6	14.0	15.5	0.138

	Mexican ($n = 143$)		Puerto Rican ($n = 189$)		Total		
Demographic variables	n	%	n	%	n	%	p value[a]
Sex							0.16
Male	72	50	110	58	182	55	
Female	71	50	79	42	150	45	
Age							0.27
<20	16	11	12	6	28	8	
20–29	57	40	73	39	130	39	
30–39	44	31	57	30	101	30	
40–49	26	18	47	25	73	22	
Education							0.02
0–6	22	15	14	7	36	11	
7–12	101	71	132	70	233	70	
13–17	16	11	40	21	56	17	
>17	4	3	3	2	7	2	
Employment							0.82
Employed	97	68	126	67	223	67	
Unemployed	46	32	63	33	109	33	
Annual income							0.23
<$10,000	53	37	54	29	107	32	
$10,001–20,000	41	29	73	39	114	34	
$20,001–30,000	24	17	35	19	59	18	
>$30,000	22	15	27	14	49	15	
Place of birth							<0.001
Mainland United States	54	38	39	21	93	28	
Mexico	89	62	3	2	92	28	
Puerto Rico	0	0	147	78	147	44	
Immigration status							<0.001
U.S. citizen	59	41	189	100	248	75	
Permanent resident	19	13	0	0	19	6	
Undocumented	65	45	0	0	65	20	
Acculturation level							<0.001
Non-Hispanic	42	29	29	15	71	21	
Bicultural	32	22	80	42	112	34	
Hispanic	62	43	76	40	138	42	

[a] t-test.
[b] Chi-square test.

DISCUSSION

The differences in the level of HIV knowledge between the two subgroups are striking, with statistically significant differences in the correct responses between the two groups on one-half of the test items. Our finding of a higher level of knowledge among the Puerto Rican participants, as compared to the Mexican participants, is consistent with those of previous studies (7, 9). The underlying reasons for this apparent difference are not discernible from these data but may include differences in the level of effort between the two study communities (San Diego and Cuyahoga counties) in their attempts to provide HIV information to the Hispanic communities, the relative inability of HIV prevention programs to reach undocumented individuals specifically, and reliance in one or both communities on HIV prevention program content that is inadequately tailored to the cultures and needs of Hispanic subgroups.

Even more informative, though, are the findings from the regression analyses conducted for each subgroup and for the sample as a whole. Among the Mexican respondents, being male (multivariate

Table II. Percentages of Correct Responses to 12 Items Assessing HIV Knowledge ($n = 332$)

Knowledge items	Correct responses (%)			
	Mexicans	Puerto Ricans	Total	p value
Birth control pills protect against the HIV virus. (F)	95	98	97	.16
If a man pulls out before orgasm, condoms don't need to be used to protect against the AIDS virus. (F)	85	90	88	.10
Most people who have the AIDS virus look sick. (F)	56	67	63	.04
Vaseline and other oils should not be used to lubricate condoms. (T)	69	82	77	.007
Latex is the best material a condom can be made from to protect against the AIDS virus. (T)	77	85	82	.05
Cleaning injection needles with water is enough to kill the AIDS virus. (F)	87	96	92	.003
Most people who carry the AIDS virus feel and look healthy. (T)	63	55	58	12
Hand lotion is not a good lubricant to use with a condom. (T)	51	81	68	.001
A woman is not likely to get the AIDS virus from a man unless he is bisexual. (F)	70	97	85	.001
Condoms cause men physical pain. (F)	83	67	74	.001
If you're seeing a man (woman) and he (she) agrees not to have sex with other people, it is not important to use a condom. (F)	68	61	64	.19
Always leave room at the tip of the condom when putting it on. (T)	84	84	84	.98

regression), having higher levels of education, being more acculturated to the United States, having spent more time in the United States (univariate regression) and having legal immigration status (univariate and multivariate regression) were predictive of higher levels of HIV knowledge. This finding is consistent with at least one other study, which detected a statistically significant association between HIV knowledge and educational level among Hispanic study participants (19). These findings suggest that the key to increasing HIV knowledge among Mexican subgroups may be to increase exposure to information that is already available to the Mexican community but that has not yet reached the more marginalized members, such as those with lesser education, fewer English language abilities, and without legal status in this country.

Among the Puerto Rican respondents, younger age, greater acculturation to U.S. culture (univariate regression) and higher education (univariate and multivariate regression) predicted greater knowledge. These findings similarly indicate that access to HIV information may be relatively limited among the more marginalized segments of the Puerto Rican community, such as those with lesser education and fewer English language skills. Unlike the Mexican participants, however, the attribution of locus of control to one's sexual partner within a relationship was significantly associated with lower HIV knowledge in both the univariate and multivariate analyses. This may indicate that HIV education efforts among Puerto Rican communities will require significantly greater attention to gender roles in order to be effective.

The generalizability of these findings is limited by the relatively small sample size, by the lack of a random sample, and by reliance on only two study sites. Our reliance on snowball sampling, however, rather than a random sampling strategy, increased our ability to recruit into the study undocumented individuals who had been residing in the United States for varying periods of time and individuals legally resident in the United States who may not have otherwise volunteered for the study because of concerns about the safety of their undocumented family members.

This is one of the few studies to identify intergroup differences in Hispanics' HIV knowledge and predictors of HIV knowledge. Both the univariate and multivariate findings from this study can be

Table III. Univariate Regression Analysis for High HIV Knowledge by Ethnicity

	Mexicans				Puerto Ricans			
Independent variable	β	SE	OR	p value	β	SE	OR	p value
Age	−0.08	0.19	0.92	0.67	−0.50	0.20	0.60	**0.013**
<20								
20–29								
30–39								
40–49								
Place of birth	−1.34	0.40	0.26	**<0.001**	−0.10	0.22	0.91	0.67
U.S.								
Mexico								
Puerto Rico								
Education	0.87	0.33	2.38	**0.009**	1.27	0.39	3.56	**0.001**
High school or less								
More than high school								
Time in the U.S. (in years)	0.04	0.01	1.04	**0.006**	0.01	0.02	1.02	0.36
Acculturation	0.70	0.24	2.02	**0.004**	0.64	0.21	1.90	**0.003**
High Hispanic								
High non-Hispanic								
Bicultural								
Immigration status	−1.18	0.36	0.31	**0.001**	—	—	—	—
U.S. citizen and LPR								
Undocumented								
Actual risk	0.62	0.41	1.87	0.13	0.13	0.44	1.14	.77
Low								
High								
Locus of control	0.04	0.75	1.04	0.95	−2.91	0.44	0.06	**<0.001**
Control								
Less control								

Note. β = beta coefficient, SE = Standard error, OR = odds ratio.

Table IV. Logistic Regression Analysis for High HIV Knowledge

	Mexican respondents				Puerto Rican Respondents				All respondents			
Independent variable	β	SE	OR	p value	β	SE	OR	p value	β	SE	OR	p value
Education					1.25	0.48	3.49	<0.01	0.81	0.28	2.25	<0.01
High school or less												
More than high school												
Acculturation									0.42	0.18	1.53	0.02
High Hispanic												
High non-Hispanic												
Bicultural												
Immigration status	−1.08	0.38	0.34	<0.01					−0.88	0.41	0.41	0.03
U.S. citizen and LPR												
Undocumented												
Locus of control					−2.92	0.46	0.05	<0.001	−2.23	0.40	0.11	<0.001
Control												
Less control												
Place of birth									0.82	0.36	2.27	0.02
U.S.												
Mexico												
Puerto Rico												
Sex	−0.92	0.38	0.40	0.02					−0.58	0.29	0.56	0.05
Male												
Female												

Note. β = beta coefficient, SE = Standard error, OR = odds ratio.

interpreted to support the use of subpopulation-specific strategies for HIV education.

REFERENCES

1. Aruffo J, Coverdale J, Vallbona C: AIDS knowledge in low income and minority populations. Public Health Reports 1991; 106:115–119
2. Hardy AM: National Health Interview Survey data on adult knowledge of AIDS in the United States. Public Health Reports 1990; 105:629–634
3. Humfleet GL, Rhodes F, Baker J, Martin D: Age and ethnic differences in HIV-risk behaviors and knowledge of IV-drug users: In: Abstracts of the Sixth International Conference on AIDS, June 20–23, 1990, 6:406 [abstract no. 3017]
4. Flaskerud JH, Nyamathi A: An AIDS education program for black and Latino women: In: Abstracts of the Fifth International Conference on AIDS, June 4–9, 1989:701 [abstract no. T.D.O. 17]
5. Hingson R, Strunin L, Craven DE, Mofensen L, Mangione T, Berlin B, Amaco H, Lamb GA: Survey of AIDS knowledge and behavior changes among Massachusetts adults. Preventive Medicine 1989; 18:806–816
6. Kroliczak A: AIDS among Hispanics in the United States: In: Abstracts of the Fifth International Conference on AIDS, June 4–9, 1989:748 [abstract no. WDP 33]
7. Hardy A, Thornberry OT, Dawson D: AIDS knowledge among Hispanic American subgroups: In: Abstracts of the Sixth International Conference on AIDS, June 20–23, 1990; 3:249 [abstract no. SC640]
8. Marin BV, Tschann JM, Gomez CA, Kegeles SM: Acculturation and gender differences in sexual attitudes and behaviors: Hispanic vs. non-Hispanic white unmarried adults. American Journal of Public Health 1993; 83:1759–1761
9. Porter J, Bonilla L: The health belief model as a predictor of HIV-testing behavior among Latinos in the USA: In: Abstracts of the Seventh International Conference on AIDS, June 16–21, 1991; 1:391 [abstract no. MD4006]
10. Pollner, M. The effects of interviewer gender in mental health interviews. Journal of Nervous and Mental Disease 1998; 186:369–373
11. Marin G, Gamba RJ: A new measurement of acculturation for Hispanics: The Bidimensional Acculturation Scale for Hispanics (BAS). Hispanic Journal of Behavioral Sciences 1996; 18:297–316
12. Loue S: Defining the immigrant: In: S Loue, ed. Handbook of Immigrant Health. New York: Plenum; 1998
13. Loue S, Foerstel J: Assessing immigration status and eligibility for publicly funded medical care: A questionnaire for public health professionals. American Journal of Public Health 1996; 86:1623–1625
14. Catania JA, Coates TJ, Golden E, Dolcini M, Peterson J, Kegeles S, Siegel D, Thomson Fullilove M: Correlates of condom use among black, Hispanic, and white heterosexuals in San Francisco: The AMEN longitudinal survey. AIDS Education and Prevention 1994; 6:12–26
15. Loue S, Groza V, ARAS: Working Group. HIV knowledge and attitudes in Iasi, Romania: A pilot study. Journal of Health Management and Public Health 1998; 3(2)
16. Sikkema KJ, Heckman TG, Kelly JA, Anderson ES, Winett RA, Solomon LJ, Wagstaff DA, Roffman RA, Perry MJ, Cargill V, Crumble DA, Fuqua RW, Norman AD, Mercer MB: HIV risk behaviors among women living in low-income, inner-city housing developments. American Journal of Public Health 1996; 86:1123–1128
17. Lafferty J: Self-injection and needle sharing among migrant farmworkers (letter). American Journal of Public Health 1991; 81:221
18. Loue S, Oppenheim S: Immigration and HIV (letter). American Journal of Public Health 1993; 83:286
19. Irlanda I, Furumoto-Dawson A, Barker D, Hogan N, Trevino J, Stevenson J, Weinstein R: Assessing health education efforts for English vs. Spanish-speaking patients at a public HIV clinic. Abstract Book of the Association for Health Services Research 1999; 16:353