Association of Acculturation, Nativity and Years Living in the United States with Biobanking Among Individuals of Mexican Descent

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Abstract

Background—Biobanking is the collection of human biospecimens (tissues, blood and body fluids) and their associated clinical and outcome data. Hispanics are less likely to provide biological specimens for biobanking. The purpose of this study was to investigate the association of acculturation, nativity status and years living in the United States with participation in biobanking among individuals of Mexican descent.

Methods—Participants were 19,212 adults of Mexican descent enrolled in an ongoing population-based cohort in Houston, Texas. Participants were offered the opportunity to provide a blood, urine or saliva sample for biobanking. Acculturation was assessed with the Bidimensional Acculturation Scale for Hispanics and scores were categorized into "low acculturation," "bicultural," and "high-acculturation."

Results—After multivariable adjustment, we found an increased likelihood of participation in biobanking among individuals classified as "bicultural" as compared with "highly acculturated" individuals (OR=1.58; 95% CI, 1.10–2.26). The associations of nativity status and years living in the United States with biobanking were not statistical significant. After stratifying by gender, the associations of acculturation, nativity status and years living in the U.S. with biobanking were not statistically significant.

Conclusion—Although individuals of Mexican descent who were "bicultural" were more likely to participate in biobanking than individuals who were "highly acculturated," the difference in rates of participation among acculturation categories was small. The high participation rate in biospecimen collection is likely due to extensive community-engaged research efforts. Future studies are warranted to understand individuals' participation in biobanking.

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Impact—Community-engaged research efforts may increase Hispanics' participation in biobanking.

Keywords

acculturation; biobanking; Mexican-Americans

Introduction

Biobanking is the collection of human biospecimens (tissues, blood, and body fluids) and their associated clinical and outcome data (1–3). Biorepositories play a significant role in cancer research as biospecimens are stored and later used to investigate cancer etiology, progression, prognosis and the development of biomarkers for early detection (4–6). Although the benefits of collecting biospecimens and establishing biorepositories in cancer research are quite clear for investigators, little effort has been made by researchers to inform the wider public of the importance of donating biospecimens for cancer research (4, 7, 8). The efforts suggested to researchers to implement are to engage the community in the design, development, implementation and interpretation of the research project since previous studies have shown success using these efforts (9). Interestingly, ethnic minority populations in the United States are less informed about patients' rights and the benefits of participating in biobanking (7, 8). Several studies have shown that Hispanics are underrepresented in clinical trials and biobanking (10, 11), yet little is known about the reasons for their low participation rates in biobanking, especially among individuals of Mexican descent (10, 12, 13). Understanding Mexican-Americans' participation in biobanking seems especially timely, as they constitute more than 60% of the Hispanic population in the U.S., and the population has increased 54% from 2000 to 2010, growing from 20.6 million to 31.8 million people (14).

Acculturation, defined as, "the process by which groups or individuals integrate the social and cultural values, ideas, beliefs, and behavioral patterns of their culture of origin with those of a different culture" (15, 16), plays a significant role in explaining variations in health outcomes among ethnic minorities in the U.S., in particular for cancer and cardiovascular diseases (17–20). Acculturation may also influence willingness to participate in research studies or biobanking (10, 21). Thus, in this study we sought to examine the association of acculturation level, nativity status, and years living in the United States with participation in biobanking among individuals of Mexican descent living in Harris County, Texas.

Materials and Methods

Study population

The "*Mano a Mano" Mexican-American Cohort Study* is a population-based study of Mexican-American households in Houston, TX. This is an on-going research study that started recruiting participants in July 2001. The recruitment method and data collection procedures have been described previously (22). Briefly, whenever possible, two adults per household were enrolled and were asked to complete a baseline questionnaire at enrollment. Families were recruited using the following strategies: random-digit dialing, "block walking" (i.e., recruiting door-to-door in selected neighborhoods), "intercept" (i.e., recruiting individuals from locations such as community centers and local health clinics), and networking (participants recommending neighbors). The *"Mano-a-Mano"* Community Advisory Board recommended a number of strategies to engage the community including a) conduct interviews at the participants' home, b) hire Hispanic and bilingual research interviewers, c) conduct research interviews in Spanish if that was the participants' desire,

and d) inform community leaders about the progress of the study in a yearly basis. Potential participants are informed of the study objectives at the time of recruitment. They are assured that answering specific questions and donating specimen is completely optional. These assurances are also repeated at scheduling and at the interview before the consent form is signed. Currently, there are 13,021 households enrolled with a total of 19,212 adults (20 years old). We used participants and not households as the unit of analysis for this study. The questionnaire was divided into the following components: demographics and socioeconomic status (education and income); a full household enumeration (age, gender, educational attainment, and relationship of each household member); personal and family medical history; acculturation (linguistic and behavioral); lifestyle or social habits (tobacco and alcohol use, physical activity); health insurance, birthplace and length of United States residency; and future contact information. Questions on acculturation were adapted from the Bi-dimensional Acculturation Scale (BAS), and the Cultural Lifestyle Inventory, both validated acculturation instruments designed for use with Mexican-Americans (16). Participants were followed at 6-month intervals to ensure continued participation in the cohort and to obtain self-reports of co-morbidities, changes in behavioral practices, and up-to-date contact information. As part of the informed consent process each participant had to mark each type of specimen (blood, mouthwash or cheek cell and/or urine) that he/she would like to provide. Participants were informed that the data and specimen collected would be banked for future studies. This study was approved by the institutional review board at M.D. Anderson Cancer Center.

Sociodemographic characteristics and lifestyle behaviors

Biobanking participation was classified into two categories: "Yes" and "No." Participants who provided blood (57%), cheek cell (63%) or urine (42%) were classified as "Yes." Self-reported nativity status was dichotomized as follows: born in Mexico or born in the United States. Years living in the United States were categorized into three groups: < 5 years, between 6 and 10 years, and 11 years. Education level was categorized as less than or equal to 8 years, 9 to 11 years, or high school or more. Marital status was dichotomized into "married" and "not married." Smoking status was grouped into three categories: current, former and never. Current and former ("ever") smokers reported having smoked at least 100 cigarettes in their lifetime. Former smokers were defined as those who had quit at least 1 year before the interview. Participants also provided data on number of cigarettes smoked per day. A participant was considered a "current" alcohol user if he or she had consumed any alcoholic beverage at least once a month for the past year or more. A "former" alcohol user was a participant who had consumed any alcoholic beverage at least once a month and for 1 year, but had quit at the time of the interview. "Never alcohol users" were those who had never consumed any alcohol less than once a month. Physical activity was dichotomized ("active" and "not active") as follows: "Active" participants were defined as those who participated in moderate-intensity activities for 30 minutes/day on 5 days/week or in vigorous-intensity activities for 20 minutes/day on 3 days/week. Body mass index (BMI) was calculated based on each participant's self-reported height and weight. The following BMI categories were used: normal weight, BMI 24.9 kg/m^2; overweight, BMI 25.0 to 29.9 kg/m^2; and obese, BMI 30.0 kg/m^2.

Acculturation was measured by adapting the Bidimensional Acculturation Scale (BAS). Four items (speak, read, watch television and listen radio) with a 4-point response scale from the adapted BAS were used to measure language use, language proficiency, and electronic media preference in English. Responses were first averaged (mean scores ranged from 1 to 4) and then dichotomized. Scores 2.5 were categorized as "high U.S. acculturation" and scores < 2.5 were categorized as "low U.S. acculturation." The same procedure was used to calculate "high" and "low" categories of Hispanic acculturation.

Lastly, both U.S. and Hispanic categories of acculturation were used to create a single "acculturation" variable with three categories: "low acculturation" ("high" Hispanic score and "low" U.S. score); "bicultural" ("high" Hispanic score and "high" U.S. score); and "high acculturation" ("low" Hispanic score and "high" U.S. score).

Statistical analyses

We used the statistical analysis package SAS version 9.2 (SAS Institute, Inc., Cary, NC) to perform data description, summary and effect measure estimations. Baseline demographic and other characteristics were compared between biobanking participation "Yes" and "No" and differences were tested using the chi-square test for categorical variables and the *t* test for continuous variables (Table 1). Logistic regression was used to estimate odds ratios (ORs) of biobanking participation and 95% confidence intervals (CIs) associated with nativity status, years living in the United States, and acculturation. To evaluate the association between biobanking and nativity status, years living in the United States, and acculturation, we conducted multivariate unconditional logistic regression analyses adjusted for age, sex, education, marital status, number of cigarettes and physical activity.

Tests for interaction were also performed by entering into the model an ordinal variable for nativity status, years living in the United States and acculturation, a binary variable for the potentially modifying factor, and a term for their product; the coefficient for this latter term was evaluated by the Wald test. We considered a two-tailed P value <0.05 to be statistically significant.

Results

Participation rates in biobanking in the current study were very high (94%) (Table 1). Mean age varied slightly between participants who provided biospecimens for biobanking and those who did not; the latter group was slightly older (*P*<0.01). Additionally, Mexican-Americans who participated in biobanking were more likely to be female, obese, married, "bicultural," born in Mexico, with less than a high school education, and on average smoked less cigarettes per day.

Table 2 shows multivariable analyses to test the association of nativity status, years living in the United States and acculturation with biobanking. After adjusting for age, sex, education, marital status, number of cigarettes and physical activity, we found no association between nativity status and biobanking (OR=1.08; 95% CI=0.83–1.40; *P*=0.58). Similar findings were observed for years living in the United States. However, we found a statistically significant increased likelihood of participation in biobanking among Mexican-Americans who were classified as "bicultural" compared with those classified as "highly acculturated" (OR=1.58; 95% CI=1.10–2.26; *P*=0.03) (Table 2).

Table 3 shows interaction tests between gender and nativity status, years living in the U.S. and acculturation. In multivariable analyses, the interaction terms of nativity status (*P*=0.36), years living in the U.S. (*P*=0.82) and acculturation (*P*=0.20) with gender were not significantly associated with biobanking.

Discussion

In the current study, Mexican-Americans classified as "bicultural" were more likely to participate in biobanking than those classified as "high acculturation." This association remained significant after adjusting for age, sex, education, marital status, number of cigarettes and physical activity. To the best of our knowledge, this is the first study that

investigated the influence of acculturation, nativity status and years living in the United States on biobanking participation among Mexican-Americans.

The high rate of biobanking found in this study is in contrast to the findings of previous studies (10–12). Recently, Scott *et al.*(11), in the Retrovirus Epidemiology Donor Studies (REDS-I/-II), demonstrated repository participation rates were lower among African-Americans and Hispanics than among non-Hispanic Whites. These studies suggested that Hispanics are less likely to participate in clinical trials and biobanking because they have concerns related to sharing of genetic data and lack of credibility and trust in research institutions (12, 23). Among focus groups, similar concerns have been reported among racial and ethnic minorities (24, 25). The "*Mano a Mano" Mexican-American Cohort Study* did not collect data on participants' concerns or lack of trust in research institutions, but it is possible that several of our community-engaged recruitment efforts ("block walking", "intercept", and networking) played a significant role in the high biobanking participation rates. In addition, conducting interviews at the participants' home and the use of bilingual Mexican-American research interviewers may have contributed to these high rates.

Although participants who were classified as "bicultural" were more likely to participate in biobanking than those participants who were classified as "high acculturation;" these differences are small and of little practical significance. Our results do not suggest a change in research or intervention approaches for biobanking based on the acculturation status of individuals of Mexican descent. To date, there is still no consensus for the construction of a single measure of acculturation due to its complexity. Some investigators have reviewed evidence for re-conceptualizing acculturation status and proposed a more eco-developmental construct (26). Other researchers have created multidimensional measures of acculturation that include nativity or time since arrival to the U.S. (27). We independently investigated the association of nativity status and years living the United States with biobanking, but no significant associations were identified. However, because these two items are unidimensional, it is possible they are not capturing the concept of "bicultural."

In previous studies, gender has interacted with acculturation in predicting health related outcomes (27). However, in the current study, the interaction term of gender with acculturation was not significantly associated with participation in biobanking. We are unaware of previous studies that have investigated this association. As such, replication is needed.

Study limitations should be considered. The measure of acculturation used in the study only accounted for a behavioral domain (language use) of this construct and consequently the potential effect of other acculturation domains (e.g., cognitive or affective) could not be examined. Key variables used in our analyses, such as nativity status and years living in the U.S. were calculated on the basis of self-reported data. It is possible there could have been categorization errors based on the calculated variables, yet such errors probably were randomly distributed. In addition, no data were collected among participants on factors that might have motivated them to participate in the cohort study. For instance, culturally related concepts, such as *respeto* (respect) and *simpatia* (niceness/sympathy), should be considered given that they possibly played a role in the high participation rates. Our study provided a $25 gift card for time compensation only if participants completed all components of the interview including biological samples; therefore, more research is warranted on the role of compensation in encouraging participation in biobanking. Finally, because no data was collected among potential participants who declined to participate in the study, who could have been less likely to donate biospecimens, our findings need to be interpreted with caution.

In summary, our findings do suggest that a general approach to recruiting participants of Mexican descent to biobanking can be very effective when done through engagement with the community. Future studies are needed to better understand why participants of Mexican descent are more likely to participate in biobanking compared to previous studies with Hispanics. A greater understanding of the motivations, believes and attitudes toward participation can shed light on what issues may need to be addressed to continue increasing participation in biobanking.

Acknowledgments

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Table 1

Descriptive participant characteristics by biobanking

	Biobanking (Yes)	Biobanking (No)	P value
No. of participants	**n= 18,107 (94.25%)**	**n= 1105 (5.75%)**	
Mean age (sd)			
	18,107	1105	
	40.00 (14.20)	43.03 (16.73)	<0.01[*]
Gender			
Male	3820 (93.10)	283 (6.90)	
Female	14,287 (94.56)	822 (5.44)	<0.01[†]
Nativity status			
United States	4847 (93.30)	348 (6.70)	
Mexico	13,232 (94.6)	755 (5.40)	<0.01[†]
Years living in United States			
<5	2597 (94.26)	158 (5.74)	
6–10	2339 (94.39)	139 (5.61)	
11	13,171 (94.22)	808 (3.12)	0.94[†]
Educational attainment			
8 years	6065 (93.29)	436 (6.71)	
9–11 years	6108 (94.86)	331 (5.14)	
High school or more	5916 (94.60)	338 (5.40)	<0.01[†]
Marital status			
Married	13,832 (94.49)	807 (5.51)	
Not married	4242 (93.46)	297 (6.54)	<0.01[†]
Health insurance			
No	9040 (94.40)	536 (5.60)	
Yes	6651 (94.85)	361 (5.15)	0.21[†]
Mean no. of cigarettes/day (sd)			
	8.98 (10.00)	10.02 (12.32)	<0.01[*]
Smoking status			
Never	13,069 (94.14)	813 (5.86)	
Current smoker	2259 (94.64)	128 (5.86)	

	Biobanking (Yes)	Biobanking (No)	*P* value
No. of participants	**n= 18,107 (94.25%)**	**n= 1105 (5.75%)**	
Former smoker	2556 (94.53)	148 (5.47)	0.51[†]
Alcohol use			
Never	11909 (94.40)	706 (5.60)	
Current	3982 (93.87)	260 (6.13)	
Former	1771 (94.30)	107 (5.70)	0.43[†]
BMI (self-reported)			
Normal weight (24.9)	3958 (93.28)	285 (6.72)	
Overweight (25.0–29.9)	6125 (94.32)	369 (5.68)	
Obese (30)	8023 (94.68)	451 (5.32)	<0.01[†]
Physical activity			
Active	5377 (94.33)	323 (5.67)	
Not active	12437 (94.24)	760 (5.76)	0.80[†]
Acculturation			
Low acculturation	10,387 (94.33)	624 (5.67)	
Bicultural	5571 (94.70)	312 (5.30)	
High acculturation	1956 (92.79)	152 (7.21)	<0.01[†]

sd, standard deviation.

[*] Student's *t* test.

[†] Chi-square test.

Table 2

Association of nativity, years living in the United States and acculturation with biobanking in Mexican-Americans

	Biobanking (Yes)	Biobanking (No)	Multivariable*	P value
No. of participants	n= 18,107 (94.25%)	n=1105 (5.75%)		
Nativity status				
United States	4847 (93.30)	348 (6.70)	1.0	
Mexico	13,232 (93.30)	755 (5.40)	1.08 (0.83, 1.40)	0.58
Years living in the United States				
<5	2597 (94.26)	158 (5.74)	1.0	
6–10	2339 (94.39)	139 (5.61)	1.15 (0.64, 2.06)	0.73
11	3395 (95.58)	157 (4.42)	1.12 (0.74, 1.70)	0.81
Acculturation				
Low acculturation	10,387 (94.33)	624 (5.67)	1.33 (0.94, 1.87)	0.68
Bicultural	5571 (94.70)	312 (5.30)	1.58 (1.10, 2.26)	0.03
High acculturation	1956 (92.79)	152 (7.21)	1.0	

*
Adjusted for age, sex, education status, marital status, number of cigarettes and physical activity.

Table 3

Interaction effect between gender and nativity status, years living in the United States and acculturation with biobanking

	Male			Female			$P_{\text{interaction}}$†
	Biobanking (Yes)/Biobanking (No)	OR (95% CI)*	P value	Biobanking (Yes)/Biobanking(No)	OR (95% CI)*	P value	
Nativity status							
United States	1212/110	1.0		3635/238	1.0		
Mexico	2602/173	1.16 (0.74, 1.82)	0.53	10630/582	0.84 (0.55, 1.28)	0.41	0.36
Years Living in United States							
<5	411/27	1.0		2186/131	1.0		
6–10	393/28	1.65 (0.58, 4.67)	0.35	1946/111	1.15 (0.47, 2.79)	0.93	
11	3016/228	1.15 (0.57, 2.34)	0.72	10155/580	1.24 (0.65, 2.35)	0.59	0.82
Acculturation							
Low acculturation	1750/117	1.45 (0.79, 2.68)	0.34	8637/507	0.90 (0.51, 1.58)	0.18	
Bicultural	1516/117	1.35 (0.74, 2.48)	0.61	4055/195	1.44 (0.77, 2.67)	0.09	
High acculturation	515/47	1.0		1441/105	1.0		0.20

*
Adjusted for age, education, marital status, self-insurance, number of cigarettes and physical activity

†
P-value for interaction of conditional logistic regression model between gender and acculturation.