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Examining the impact of Latino nativity, migration, and acculturation factors on colonoscopy screening

Rosario Costas-Muñiz, PhD¹ [Assistant Attending Psychologist],

Memorial Sloan Kettering Cancer Center, Department of Psychiatry & Behavioral Sciences, Immigrant Health and Cancer Disparities Service, Professor of Psychology in Psychiatry, Weill Cornell Medical College

Lina Jandorf, MA³ [Research Professor],

Department of Oncological Sciences at the Icahn School of Medicine at Mount Sinai

Errol Philip⁴ [Research Collaborator],

Notre Dame Laboratory for Psycho-oncology Research, University of Notre Dame, Notre Dame, IN, USA

Noah Cohen, BA³ [Project Coordinator],

Department of Oncological Sciences at the Icahn School of Medicine at Mount Sinai

Cristina Villagra, MPH³ [Clinical Research Manager],

Department of Oncological Sciences at the Icahn School of Medicine at Mount Sinai

Pathu Sriphanlop, MPH³ [Research Coordinator],

Department of Oncological Sciences at the Icahn School of Medicine at Mount Sinai

Elizabeth Schofield, MPH² [Research Biostatistician], and

Behavioral Sciences Service, Department of Psychiatry & Behavioral Sciences, Memorial Sloan-Kettering Cancer Center

Katherine DuHamel, PhD^{2,3} [Attending Psychologist]

Memorial Sloan Kettering Cancer Center, Department of Psychiatry & Behavioral Sciences, Psychiatry Service, Professor of Psychology in Psychiatry, Weill Cornell Medical College, Department of Psychiatry

Abstract

Objective—Latinos are a diverse population comprised of multiple countries of origin with varying cultural profiles. This study examines differences in colonoscopy completion across place

¹Memorial Sloan Kettering Cancer Center, Immigrant Health & Cancer Disparities Service, Department of Psychiatry & Behavioral Sciences, 485 Lexington Avenue, 2nd Floor, New York, NY 10017, Phone: (646) 888 – 8062, Fax: (929) 321-1520, costasmr@mskcc.org

²Memorial Sloan Kettering Cancer Center, Department of Psychiatry & Behavioral Sciences, 641 Lexington Avenue, 7th Floor, New York, NY 10022

³Icahn School of Medicine at Mount Sinai, Department of Oncological Services, 1425 Madison Ave, Suite 3-70, New York, NY 10029

⁴University of Notre Dame, Notre Dame Laboratory for Psycho-oncology Research, Notre Dame, IN, USA.

Conflict of Interest

The authors declare that they have no conflict of interest.

of birth and migration-related factors in a sample of predominantly Dominican and Puerto Rican Latinos living in New York City after receiving a recommendation for colonoscopy screening and navigation services.

Design—The sample included 702 Latinos recruited for two cancer screening projects targeting Latinos eligible for colonoscopy who seek healthcare in New York City. Participants completed a survey that included sociodemographic, health-related questions, psychosocial assessments and cancer screening practices, in Spanish or English.

Results—Migration, acculturation, and language factors were found to predict colonoscopy completion. The results indicated that Latinos born in the Dominican Republic and Central America were more likely to complete a screening colonoscopy than their counterparts born in the US. Further, those who emigrated at an older age, who have resided in the US for less than 20 years, preferred Spanish and those with lower US acculturation levels were also more likely to complete a screening colonoscopy.

Conclusion—The findings suggest that Latinos who are less acculturated to the US are more likely to complete a screening colonoscopy after receiving a physician recommendation for colonoscopy screening. The results provide important information that can inform clinical practice and public health interventions. Continued attention to cultural and migration influences are important areas for cancer screening intervention development.

Keywords

Colonoscopy; Adherence; Latinos; Cancer Screening; Immigrant Health

Introduction

The US Latino population is a heterogeneous ethnic group that includes individuals born in the US, as well as people born in Latin and Central America. According to the US Census of 2012, 308.8 million people resided in the US, and 52.4 million (17%) were Latino [1]. In 2013, more than eighteen million Latinos, or 36% of the total US Latino population, were foreign-born. The majority of Latino immigrants were born in Mexico (63%), the Caribbean (10%), South America (11%), and Central American countries (15%). An additional 3.7 million individuals, or 7% of the total Latino population, were born in Puerto Rico (not considered foreign-born) [2]. New York City (NYC) has the fourth largest Latino population in the US (3.5 million), with the majority being Dominicans (41%) and Puerto Ricans (41%) [1].

Latinos are slightly less likely than non-Latino whites to be diagnosed with localized colorectal cancer (CRC; 38% versus 40%), but more likely to be diagnosed with distant-stage disease (21% versus 19%); these disparities are likely associated with lower screening rates amongst the Latino population [3]. Colorectal cancer screening (CRCS), promoted through the development of national screening guidelines and screening programs, has been proven to greatly reduce mortality in the US [4]. However, evidence suggests that screening rates among Latinos may be as low as 47% compared to 62% among non-Latino whites, thus contributing to disparities in disease burden [3].

US-based studies of Latinos have suggested that screening behavior is complex and have found differences in the uptake of CRCs preventive services by country of origin [6–10], language preference [11–13], acculturation level [12–18] as well as length of stay in the US [13]. In the context of CRCs, the potential influence of acculturation levels and language preferences in this population has received particular attention [12, 13]. These disparities in disease burden, and the proven ability for screening to reduce mortality risk, emphasize the critical need for an enhanced understanding of screening behavior and its determinants among this group.

Studies utilizing nationally representative samples have suggested that foreign-born Latinos are less likely to be screened for CRC compared to Latinos born in US [7, 8, 19]. Moreover, studies conducted with Latino immigrant samples have shown country of birth differences for other cancer prevention services, such as cervical and breast cancer screening. Shelton and colleagues [9] found the highest level of cervical cancer screening adherence amongst women born in the Dominican Republic and the lowest adherence amongst Puerto Ricans; Lawsin and colleagues [6] found Dominican women to be most adherent to mammography screening guidelines; and Shelton and colleagues [10] found that Mexican women were least likely to be adherent to cancer screening tests, including clinical breast exam, mammogram and Pap test. However, limited research has been conducted examining specific place of birth differences in screening colonoscopy uptake.

Differences in cancer screening rates based on country of origin have been attributed to a variety of factors, including documentation status, which is linked to insurance coverage; lack of Spanish-speaking health care providers; and lack of access to systematic screening practices in their respective countries of origin. The availability of cancer screening services is limited in the lower and middle income countries of Latin America [20]. Most Latin American countries lack CRC screening guidelines and only half of these countries have colonoscopy screening available in the public sector [21]. Therefore, Latino immigrants might experience more access to preventative services in the US than in their countries of origin.

The majority of studies exploring the association between acculturation and cancer screening (colorectal, cervical, and breast) among Latinos have documented a positive relationship between higher acculturation to the US and higher cancer screening rates [15–18]. For example, Jandorf and colleagues found that among 400 Latinos, those who preferred English were more likely to have undergone CRCs [13]. However, with subsamples of the original sample of 400 Latino individuals, Jibara and colleagues [12] found that, for those who received a physician recommendation for colonoscopy screening ($n = 280$), a preference for speaking Spanish was associated with higher rates of CRCs. Ellison and colleagues [11] also found that a preference for speaking Spanish was associated with higher CRCs among a subsample of Latina immigrants ($n = 255$). Finally, in a separate study with a different sample, Braschi and colleagues [14] reported that among a group of Latino individuals receiving patient navigation, higher acculturation to the US, specifically higher language and media acculturation, was associated with lower colonoscopy screening completion rates.

Length of stay in the US is also a key predictor of CRCS. Shih and colleagues [8], with a nationally representative sample, reported that among those who were foreign-born, recent immigrants (defined as people who migrated to the US within the last 10 years) were significantly less likely to receive CRCS (including sigmoidoscopy, colonoscopy, or blood stool tests) than those who had a longer periods of residency (15 years or more) in the US. Other studies have also suggested that longer duration of residency in the US is associated with higher colonoscopy screening [11, 13].

Whereas Latinos have lower rates of colonoscopy screening compared to non-Hispanic whites in the US [3], the influence of nativity and other migration and acculturation factors on screening colonoscopy completion remains unclear in the context of receiving a recommendation for colonoscopy and patient navigation services. The current study seeks to extend the understanding of this important issue and examine place of birth differences in colonoscopy screening completion of Latinos who received a screening recommendation. Further, it aims to examine the relationship between other acculturation and migration factors and colonoscopy completion, such as language preference, years of residence in the US, age at migration, and acculturation level.

Procedures

A prospective analysis of colonoscopy completion amongst Latino patients undergoing colonoscopy screening was performed as part of two studies. Both randomized-controlled prospective cohort studies were approved by the Institutional Review Board of a tertiary-care academic hospital in East Harlem, New York City, which serves a diverse primary care population.

The first prospective cohort study was a patient navigation program, which was shown to increase colonoscopy screening adherence rates among urban Latinos. Participants were randomized to receive one of two forms of patient navigation [22]. In both forms, the role of the patient navigator was to facilitate adherence to colonoscopy among study participants via patient education and support (e.g., assistance with bowel preparation instructions). This included three telephone calls: an initial scheduling call, a reminder call two weeks before the procedure, and a final call three days before the procedure. The second prospective cohort study was an randomized controlled trial in which all participants received patient navigation as per usual care and two arms also received print materials [14]. The schedule of phones calls was the same as the first study.

Recruitment for both studies occurred at a primary care clinic after a primary care physician referred a patient for colonoscopy screening. Patients were recruited in their preferred language (English or Spanish). The recruitment period for the first study was between May 2008 and December 2011. The recruitment period for the second study was between May 2012 and December 2014. In order to be eligible for either study, patients must have: 1) self-identified as Latino, 2) an age of ≥ 50 years, 3) an average risk for CRC with no GI symptoms, 4) no previous colonoscopy screening within the previous five years, and 5) no significant medical comorbidities. Exclusion criteria included personal history of polyps, CRC, inflammatory bowel disease, familial adenomatous polyposis, or hereditary

nonpolyposis colorectal cancer syndrome and family history of CRC (first degree relative diagnosed before age 60).

Measures

Patient information, including socio-demographic and socio-cultural measures, was collected via interviews at time of enrollment. These measures included age, gender, nationality, marital status, employment status, education, income level, country of origin and years lived in the US. The 9-item Marin Acculturation scale was used to evaluate language preference in social interactions, media use and healthcare provider communication (e.g., “What language(s) do you usually speak with your friends?”; rated 1 – “only Spanish” to 5 – “only English”) with internal consistency of $\alpha=0.94$ for this study sample [23]. The main endpoint for both parent studies was colonoscopy completion rates. Adherence to colonoscopy of each participant was documented from the individual’s electronic medical record.

Analysis

Statistical analyses were executed using the SPSS19 software package. Descriptive analyses were performed to examine socio-demographic characteristics. To test for potential differences, participants were compared by place of birth across the demographic (age, gender, marital status) and socioeconomic (education, income, and employment status) realms. Differences between the groups were analyzed using chi-squared tests. For 57 cases with missing income information, we imputed income via regression mean imputation based on education, age, and indicators of insurance type and employment.

Binary logistic regression analyses were then run to determine the relationship between the migration, linguistic and acculturation variables with colonoscopy screening. A p value less than .05 was considered statistically significant. Given the overlap between the predictors (i.e. years in the US, age at migration) and to avoid multi-collinearity, five independent adjusted logistic regression models were conducted, controlling for age, gender, marital status, income, and education; this allowed for the examination of the contribution of place of birth, age at migration, years of residence in the US, language preference, and acculturation level on colonoscopy screening adherence.

Results

Socio-demographic characteristics are shown in Table 1. The mean age of participants was 59.6 (SD=7.7) years of age. Two-thirds of the sample were female (67%) and one-third was married or partnered (33%). Fifty-six percent of the sample had less than high school education and slightly more than half of the sample (55%) had a yearly income of less than \$10,000. Only 26% of the sample reported being employed and 42% were retired. Twenty-seven percent of participants were born in the US and 41% were born in Puerto Rico. Nineteen percent of the sample ($n=133$) did not complete colonoscopy screening (Table 1).

Chi-squared analyses were conducted comparing socio-demographics and place of birth (United States, Puerto Rico, Dominican Republic, Central America, South America).

Latinos born in US were more likely to be younger than age 65, and those born in Puerto Rico were more likely to be age 65 or older ($\chi^2=93.97$, $p<.001$). A greater proportion of females reported being born in the Dominican Republic and Central America ($\chi^2=19.01$, $p<.001$). Latinos born in Puerto Rico or US were more likely to be non-married than their foreign-born counterparts ($\chi^2=23.85$, $p<.001$). Participants born in Puerto Rico and the Dominican Republic had lower educational attainment (less than high school) than their counterparts ($\chi^2=83.01$, $p<.001$). The Latino subgroups had similar income levels, but those born in US were more likely to be unemployed, and those born in Puerto Rico were more likely to be retired ($\chi^2=85.41$, $p<.001$).

As shown in Table 2, unadjusted logistic regression analyses revealed differences based on place of birth, length of time living in the US, age at migration, preferred language, and acculturation level. After adjusting for socio-demographic characteristics (age, gender, marital status, income, education, and employment status), most predictors remained significant including place of birth, length of time living in the US, age at migration, preferred language and acculturation level. Latinos born in the Dominican Republic (OR = 2.13; CI = 1.11–4.09) or Central America (OR = 2.79; CI = 1.11–7.04) were more than two times more likely to complete screening than those born in the US. Foreign-born Latinos living in the US for less than 20 years were more likely to complete colonoscopy screening than those born in the US (OR = 2.84; CI = 1.34–6.01). Participants who migrated at age 50 or older were 4.5 times more likely to be screened (ages 19–30: OR = 1.85; CI = 1.06–3.21; ages 31–49: OR = 2.35; CI = 1.23–4.51; age 50 or older: OR = 4.50; CI = 1.26–16.00) compared to US-born participants. Participants who preferred Spanish (OR = 1.64; CI = 1.08–2.50) were more likely to complete colonoscopy screening and those more acculturated to the US were less likely to complete screening (OR = 0.73; CI = 0.59–0.90).

Discussion

This study demonstrates that place of birth, length of stay in the US, age at migration, language preference, and acculturation to the US are significant correlates of colonoscopy screening completion among a sample of Latino adults who received a recommendation for CRC screening. A major strength of this study is that the common problem of inadequate sample size in investigating subgroup differences was addressed by combining data from two samples examining medical chart verified CRC adherence with Latino individuals. Latinos born in the Dominican Republic and Central America were two times more likely to complete colonoscopy than Latinos born in the US. Latinos born in Puerto Rico and South America had similar rates of colonoscopy completion as those born in the US. Studies conducted with national samples have shown that Latinos born in the US were more likely to be screened for CRC [7, 8, 19]. The data from this study, however, contradict those findings. In this study, instead, Latinos born in US were less likely to complete colonoscopy screening than Dominicans and Central Americans. Moreover, these findings should be interpreted within the context of a program with participants who had no colonoscopy screening in the previous five years and received a colonoscopy recommendation and navigation services. The research of Shelton and colleagues [9] and Laws and colleagues [6], also found the highest level of adherence to Pap tests and mammography screening were among Dominican women.

Lower acculturation to the US, Spanish language preference, and shorter time living in the US were significant predictors of colonoscopy completion. These results are in contrast to previous observational research that has shown that acculturation to the US is positively related with the use of preventive and cancer screening services [7, 15–19, 24–26]. However, studies conducted in the context of a patient navigation programs have shown that acculturation to the US is negatively correlated with CRCS [14, 27]. In other words, it is likely that less acculturated individuals, who prefer Spanish and more recently immigrated, are more likely to adhere to colonoscopy guidelines than more acculturated individuals if they receive a recommendation for screening and patient navigation services. Less acculturated Latinos can face more barriers to health care access [28] and patient navigators help to address these barriers. Therefore, it is possible that less acculturated individuals benefit more from patient navigation services than those who are more acculturated, and those who are more acculturated might need additional support services to complete colonoscopy. For US-born Latinos, additional services might include screening for and addressing possible medical mistrust and motivation or lack of interest in screening, as well as other preventive services.

Limitations

Although this study has many strengths, there are some limitations. First, this study is limited by its design and causality between the migration/cultural dimensions and CRCS could not be determined. Future studies with longitudinal designs, focusing on changes on acculturation and screening completion could address this issue. Additionally, this study was conducted in East Harlem with a sample predominantly born in Puerto Rico (41%). Thus, the results may not generalize to Latinos in different geographical locations. Future studies can include a recruitment plan that accounts for different levels of acculturation and places of origin, to replicate these analyses and test their generalizability. Patient navigation trials stratified by nativity and other acculturation-related factors might help to disentangle the relationship between acculturation, barriers of access to health care preventive services and cancer screening. Further, global health or cross-national studies can help clarify the relationship between acculturation, migration and use of cancer screening services.

Conclusion

The results suggest that, in a sample of urban Latinos eligible for CRCS, a recommendation for screening and navigation services was associated with higher colonoscopy completion by Latinos born in the Dominican Republic and Central America, those living in the US for less time, those who prefer speaking Spanish, and those less acculturated to the US. It is very likely that some immigrants and less acculturated Latinos have had less exposure and access to preventive services in their respective countries of origin than Latinos born in the US; this new-found availability of cancer screening services for foreign-born Latinos may positively influence their willingness to complete colonoscopy screening. Another possible reason for these findings is differences in compliance with medical advice and recommendations, between US-born Latinos and foreign-born, less acculturated Latinos. Furthermore, for US-born Latinos, other factors might influence their willingness to be screened and to access preventive services, such as mistrust of providers and lack of interest in screening and other

preventive services. More research is needed to document the specific risk factors of colonoscopy non-adherence of different Latino groups. Navigation approaches may need to be tailored for the specific risk factors of different Latino groups with different levels of acculturation.

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References

1. US Census. The Hispanic Population in the United States: 2012. 2012. Retrieved from: <http://www.census.gov/population/hispanic/data/2012.html>
2. US Census Bureau. Place of birth for the foreign-born population in the United States, 2006–2010.
3. American Cancer Society. Cancer Facts & Figures for Hispanics/Latinos 2012–2014: American Cancer Society. 2012
4. Walsh JM, Terdiman JP. Colorectal cancer screening: Scientific review. JAMA. 2003; 289(10): 1288–1296. [PubMed: 12633191]
5. Center MM, Jemal A, Smith RA, Ward E. Worldwide variations in colorectal cancer. CA Cancer Journal for Clinicians. 2009; 59:366–378.
6. Lawsin C, Erwin D, Bursac Z, Jandorf L. Heterogeneity in breast and cervical cancer screening practices among female Hispanic immigrants in the United States. Journal of Immigrant & Minority Health. 2011; 13(5):834–841. [PubMed: 20734140]
7. Goel MS, Wee CC, McCarthy EP, Davis RB, Ngo-Metzger Q, Phillips RS. Racial and ethnic disparities in cancer screening: The importance of foreign birth as a barrier to care. Journal of General Internal Medicine. 2003; 18(12):1028–1035. [PubMed: 14687262]
8. Shih YC, Elting LS, Levin B. Disparities in colorectal screening between US-born and foreign-born populations: Evidence from the 2000 National Health Interview Survey. Journal of Cancer Education. 2008; 23(1):18–25. [PubMed: 18444042]
9. Shelton RC, Jandorf L, King S, Thelemaque L, Erwin DO. Cervical cancer screening among immigrant Hispanics: An analysis by country of origin. Journal of Immigrant and Minority Health. 2012; 14(4):715–720. [PubMed: 22038070]
10. Shelton RC, Jandorf L, Thelemaque L, King S, Erwin DO. Sociocultural determinants of breast and cervical cancer screening adherence: An examination of variation among immigrant Latinas by country of origin. Journal of Health Care for the Poor and Underserved. 2012; 23(4):1768–1792. [PubMed: 23698689]
11. Ellison J, Jandorf L, Villagra C, Winkel G, DuHamel K. Screening adherence for colorectal cancer among immigrant Hispanic women. Journal of the National Medical Association. 2011; 103(8): 681–688. [PubMed: 22046845]
12. Jibara G, Jandorf L, Fodera MB, DuHamel KN. Adherence to physician recommendation to colorectal cancer screening colonoscopy among Hispanics. Journal of General Internal Medicine. 2011; 26(10):1124–1130. [PubMed: 21541795]
13. Jandorf L, Ellison J, Villagra C, Winkel G, Varela A, Quintero-Canetti Z, Duhamel K. Understanding the barriers and facilitators of colorectal cancer screening among low income immigrant Hispanics. Journal of Immigrant & Minority Health. 2010; 12(4):462–469. [PubMed: 19621259]
14. Braschi CD, Sly JR, Singh S, Villagra C, Jandorf L. Increasing colonoscopy screening for Latino Americans through a patient navigation model: A randomized clinical trial. Journal of Immigrant and Minority Health. 2013

15. O'Malley AS, Kerner J, Johnson AE, Mandelblatt J. Acculturation and breast cancer screening among Hispanic women in New York City. *American Journal of Public Health*. 1999; 89(2):219–227. [PubMed: 9949753]
16. Peragallo NP, Fox PG, Alba ML. Acculturation and breast self-examination among immigrant Latina women in the USA. *International Nursing Review*. 2000; 47(1):38–45. [PubMed: 10765497]
17. Savas LS, Vernon SW, Atkinson JS, Fernandez ME. Effect of acculturation and access to care on colorectal cancer screening in low-income Latinos. *Journal of Immigrant and Minority Health*. 2014
18. Harmon MP, Castro FG, Coe K. Acculturation and cervical cancer: Knowledge, beliefs, and behaviors of Hispanic women. *Women Health*. 1996a; 24(3):37–57. [PubMed: 9046552]
19. Afable-Munsuz A, Liang SY, Ponce NA, Walsh JM. Acculturation and colorectal cancer screening among older Latino adults: Differential associations by national origin. *Journal of General Internal Medicine*. 2009; 24(8):963–970. [PubMed: 19472016]
20. Parkin DM, Bray F. The burden of HPV-related cancers. *Vaccine*. 2006; 24:S11–S25.
21. PAHO/WHO. Cancer in the Americas. Country profiles. 2013 Retrieved from: <http://bit.ly/1b5chfx>.
22. Jandorf L, Gutierrez Y, Lopez J, Christie J, Itzkowitz SH. Use of a patient navigator to increase colorectal cancer screening in an urban neighborhood health clinic. *Journal of Urban Health-Bulletin of the New York Academy of Medicine*. 2005; 82(2):216–224. [PubMed: 15888638]
23. Marin G, Sabogal F, Marin BV, Otero-Sabogal R, et al. Development of a Short Acculturation Scale for Hispanics. *Hispanic Journal of Behavioral Sciences*. 1987; 9(2):183–205.
24. Borrayo EA, Guarnaccia CA. Differences in Mexican-born and U.S.-born women of Mexican descent regarding factors related to breast cancer screening behaviors. *Health Care Women International*. 2000; 21(7):599–613.
25. Elder JP, Castro FG, de Moor C, Mayer J, Candelaria JI, Campbell N, Ware LM. Differences in cancer-risk-related behaviors in Latino and Anglo adults. *Preventive Medicine*. 1991; 20(6):751–763. [PubMed: 1766946]
26. Johnson-Kozlow M. Colorectal cancer screening of Californian adults of Mexican origin as a function of acculturation. *Journal of Immigrant and Minority Health*. 2010; 12(4):454–461. [PubMed: 19252984]
27. Hillyer GC, Basch CE, Schmitt KM, Neugut AI. Feasibility and efficacy of pairing fecal immunochemical testing with mammography for increasing colorectal cancer screening among uninsured Latinas in northern Manhattan. *Preventive Medicine*. 2011; 53(3):194–198. [PubMed: 21726577]
28. Lara M, Gamboa C, Kahramanian MI, Morales LS, Bautista DE. Acculturation and Latino health in the United States: A review of the literature and its sociopolitical context. *Annual Review of Public Health*. 2005; 26:367–397.

Table 1

Demographic Characteristics by Place of Birth

	US (n=176)		Puerto Rico (n=280)		Dominican Republic (n=119)		Central America (n=58)		South America (n=54)		Total (n=687)	
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
Age (M/SD)	54.5	(4.5)	62.9	(7.7)	59.1	(7.8)	58.2	(6.7)	62.0	(7.9)	59.6	(7.7)
< 65	172	(97.7)	162	(57.9)	89	(74.8)	48	(82.8)	34	(63.0)	505	(73.5)
65	4	(2.3)	118	(42.1)	30	(25.2)	10	(17.2)	20	(37.0)	182	(26.5)
Gender												
Male	73	(41.5)	88	(31.4)	27	(22.7)	12	(20.7)	24	(44.4)	224	(32.6)
Female	103	(58.5)	192	(68.6)	92	(77.3)	46	(79.3)	30	(55.6)	463	(67.4)
Marital Status												
Non-married	121	(68.8)	210	(75.3)	70	(58.8)	33	(56.9)	26	(48.1)	460	(67.1)
Married or living with partner	55	(31.3)	69	(24.7)	49	(41.2)	25	(43.1)	28	(51.9)	226	(32.9)
Education												
Less than 7 th grade	3	(1.7)	61	(21.9)	39	(32.8)	22	(37.9)	14	(25.9)	139	(20.3)
7–11 th grade	72	(41.1)	111	(39.8)	38	(31.9)	10	(17.2)	10	(18.5)	241	(35.2)
HS graduate	51	(29.1)	71	(25.4)	25	(21.0)	15	(25.9)	13	(24.1)	175	(25.5)
More than HS	49	(28.0)	36	(12.9)	17	(14.3)	11	(19.0)	17	(31.5)	130	(19.0)
Yearly Income												
Less than \$10k	91	(51.7)	168	(60.0)	64	(53.8)	27	(46.6)	28	(51.9)	378	(55.0)
More than \$10k	85	(48.3)	112	(40.0)	55	(46.2)	31	(53.4)	26	(48.1)	309	(45.0)
Employment												
Employed	45	(25.6)	37	(13.2)	44	(37.0)	19	(32.8)	12	(22.2)	157	(22.9)
Unemployed	91	(51.7)	77	(27.5)	31	(26.1)	23	(39.7)	19	(35.2)	241	(35.1)
Retired	40	(22.7)	166	(59.3)	44	(37.0)	16	(27.6)	23	(42.6)	289	(42.1)
Age at Migration												

	US (n=176)		Puerto Rico (n=280)		Dominican Republic (n=119)		Central America (n=58)		South America (n=54)		Total (n=687)	
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
Born in US	176	(100)	20	(7.2)	0	(0.0)	0	(0.0)	0	(0.0)	187	(27.3)
Age 1–18	0	(0.0)	130	(46.8)	14	(11.8)	6	(10.3)	4	(7.4)	158	(23.1)
Age 19–30	0	(0.0)	88	(31.7)	43	(36.1)	28	(48.3)	16	(29.6)	180	(26.3)
Age 31–49	0	(0.0)	31	(11.2)	46	(38.7)	19	(32.8)	25	(46.3)	121	(17.7)
Age 50 or more	0	(0.0)	9	(3.2)	16	(13.4)	5	(8.6)	9	(16.7)	39	(5.7)
Years in US												
0–9 years	0	(0.0)	4	(1.4)	17	(14.3)	5	(8.6)	9	(16.7)	35	(5.1)
10–20 years	0	(0.0)	17	(6.1)	26	(21.8)	8	(13.8)	11	(20.4)	62	(9.1)
21–40 years	7	(4.0)	72	(25.9)	59	(49.6)	38	(65.5)	26	(48.1)	202	(29.5)
More than 40 years	2	(1.1)	165	(59.4)	17	(14.3)	7	(12.1)	8	(14.8)	199	(29.1)
Born in US	167	(94.9)	20	(7.2)	0	(0.0)	0	(0.0)	0	(0.0)	187	(27.3)
Preferred language												
Spanish	2	(1.2)	169	(60.4)	112	(94.9)	45	(77.6)	46	(86.8)	374	(54.8)
English	123	(71.1)	49	(17.5)	2	(1.7)	5	(8.6)	2	(3.8)	181	(26.5)
Both	48	(27.7)	62	(22.1)	4	(3.4)	8	(13.8)	5	(9.4)	127	(18.6)
Acculturation level (M/SD)	3.7	(0.5)	2.4	(0.9)	1.8	(0.6)	2.1	(0.9)	1.9	(0.7)	2.5	(1.0)
Colonoscopy Status												
Non- completer	45	(25.6)	58	(20.7)	16	(13.4)	6	(10.3)	8	(14.8)	136	(19.8)
Completer	131	(74.4)	222	(79.3)	103	(86.6)	52	(89.7)	46	(83.3)	551	(80.2)

Note: M= Mean, SD= Standard Deviation, HS= High School

Table 2

Odds ratios (OR) and 95% confidence intervals (CI) of migration factors predicting colonoscopy completion

	Colonoscopy Completion			
	Unadjusted		Adjusted	
	OR	CI	OR	CI
Birth Country or Region				
US	1.00		1.00	
Puerto Rico	1.32	(0.84–2.05)	1.41	(0.84–2.35)
Dominican Republic	2.21	(1.18–4.14) **	2.13	(1.11–4.09) *
Central America	2.98	(1.20–7.40) *	2.79	(1.11–7.04) *
South America	1.98	(0.87–4.50)	1.88	(.80–4.43)
Years in US				
Born in US	1.00		1.00	
More than 40 years	1.32	(0.82–2.12)	1.35	(0.77–2.38)
21–40 years	1.70	(1.04–2.78) *	1.71	(1.02–2.87) *
0–20 years	3.03	(1.46–6.29) **	2.84	(1.34–6.01) **
Age at Migration				
Born in US	1.00		1.00	
Age 1–18	1.17	(0.72–1.92)	1.27	(0.74–2.16)
Age 19–30	1.76	(1.06–2.93) *	1.85	(1.06–3.21) *
Age 31–49	2.14	(1.17–3.93) **	2.35	(1.23–4.51) **
Age 50 or more	4.20	(1.24–14.24) *	4.50	(1.26–16.00) *
Preferred language				
English	1.00		1.00	
Spanish	1.64	(1.12–2.39) **	1.64	(1.08–2.50) *
Both	2.53	(0.57–11.28)	2.34	(0.52–10.55)
Acculturation level				
	0.75	(0.62–0.91) **	0.73	(0.59–0.90) **

Note: Models were adjusted for age, gender, marital status, income, education, and employment status

*
p < .05,**
p < .01,***
p < .001