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Baseline characteristics and Latino versus non-Latino contrasts among Bronx A1C study participants

Elizabeth A. Walker¹, Lynn D. Silver², Shadi Chamany², Clyde B. Schechter¹, Jeffrey S. Gonzalez¹, Jeidy Carrasco², Danielle Powell², Diana Berger², and Charles E. Basch³

¹Albert Einstein College of Medicine, Bronx, NY, USA

²New York City Department of Health & Mental Hygiene, New York, NY, USA

³Columbia University Teachers College, New York, NY, USA

Abstract

We describe the New York City A1c Registry and associations among baseline characteristics of low-income, diverse adults with diabetes enrolled in a telephonic intervention trial. Baseline data were analyzed from 941 participants randomized to a telephonic/print or a print-only intervention to improve glycemic control in the context of an A1c Registry program. Summary statistics for key variables were calculated and we highlight contrasts between Latino and non-Latino participants. There were high proportions of Latino (67.7%) and Black (28.0%) participants from the South Bronx. Mean age was 56.3 years, almost 70.0% were foreign born, and 55.8% preferred Spanish language. Mean A1c was 9.2% and mean BMI 32.1kg/m². There were significant contrasts between the Latino and non-Latino participants for behavioral and psychosocial variables. A telephonic intervention study was able to randomize a large number of low-income, ethnically diverse, urban participants with poor diabetes control. Latino vs. non-Latino differences at baseline were striking.

Keywords

telephonic interventions; Latino; diabetes; self-management support

Type 2 diabetes disproportionately affects the most disadvantaged Americans, particularly certain ethnic minorities and those of low socio-economic status. Using national data from 2007–2009, the U.S. Centers for Disease Control and Prevention estimated that age-adjusted diabetes prevalence rates for Latinos (11.8%) and non-Latino blacks (12.6%) were more than 66% and 77% higher, respectively, than that for non-Latino whites (7.1%), aged 20 years and older (CDC, 2011). Lifetime risk of a diabetes diagnosis is significantly higher among blacks and Latinos compared to non-Latino whites; both minority groups, but particularly Latinos, experience a significantly greater reduction in quality-adjusted life-years (Narayan, Boyle, Thompson, Sorensen, & Williamson, 2003). Meta-analyses show that blacks have hemoglobin A1c levels 0.65% units higher, on average (Kirk et al., 2006),

and that Latinos have A1c levels 0.5% higher (Kirk et al., 2008), on average, than non-Latino whites. Finally, socio-economic status is consistently related to health outcomes in individuals with diabetes. Differences in health behaviors, access to care, and quality of care processes are hypothesized as potential explanatory variables for these differences. Understanding factors related to these disparities and evaluating scalable interventions are important research priorities to reduce the health burden from diabetes in minority populations. This was the purpose of our intervention study.

Development and implementation of the New York City A1c Registry

In 2005, the New York City (NYC) Department of Health and Mental Hygiene (DOHMH) was faced with a rapidly increasing prevalence of diabetes and a scarcity of disease registries among health care facilities. In response, the DOHMH proposed mandatory reporting of A1c levels to create the New York City A1C Registry. Applying the model of registries that had been shown to support diabetes quality improvement programs (Tsai, Morton, Mangione, & Keeler, 2005), the A1C Registry was designed to monitor glycemic control across NYC and disseminate provider and patient tools to improve diabetes care, at least until innovations such as electronic medical records with registry functionality became widespread (Chamany et al., 2009). The change to the NYC Health Code to require reporting was approved by the NYC Board of Health in December 2005.

The Registry offered several free services to providers. Facilities could request that their providers receive reports listing their patients' A1c test results from highest to lowest, time since last test, and a summary of A1c control across all providers for comparison purposes. Facilities with multiple providers could also receive a facility-level report. Additionally, a facility's patients could be sent letters informing them of a recently high (>9%) A1c value or that their last A1c was greater than 9% and they are overdue (> 8 months) for testing. These letters were sent from the DOHMH, but with approved use of the health facility's letterhead. Patients could opt to *not* receive any letters by calling a toll-free telephone number or submitting a form by post or online. After a pilot program in the Bronx, the DOHMH made services available across all five boroughs of NYC in 2008.

Telephonic interventions to promote diabetes self-management behaviors have been studied with some success using several formats, including voice-activated telephonic outreach (Piette, Weinberger, Kraemer, & McPhee, 2001), and live discussion with health educators (Walker, Schechter, Caban, & Basch, 2008; Walker et al., 2011) or licensed health care professionals, such as registered nurses (Frosch DL, 2011). The cost of a telephonic intervention by health educators to improve diabetes control was recently reported as "moderate" for a modest, but significant improvement in A1c (Schechter, Cohen, Shmukler, & Walker, 2012). The opportunity arose to implement and evaluate a telephonic intervention in the context of the innovative A1c Registry in NYC, as part of an academic-public health collaboration focusing on the high-risk diabetes population in the South Bronx.

The purpose of this report is to describe: the NYC A1c Registry services which constituted the environment and control group for this study; the telephonic behavioral counseling and print self-management materials forming the interventions in this randomized trial; the

baseline characteristics of the sample; associations at baseline with participant characteristics, such as ethnicity, and the metabolic, self-care and psychosocial measures collected at baseline.

Research Design and Methods

Bronx A1c was a prospective, randomized, behavioral intervention study comparing the incremental effects on diabetes control of telephonic counseling plus print self-management materials (Tele/Pr) with print materials only (PrO). These interventions were within the context of the multi-component A1c Registry intervention implemented by the NYC DOHMH.

The study interventions were designed to keep costs moderate so that, if found to be successful in significantly improving the A1c, it could be scaled up beyond the South Bronx and be generalizable and affordable in other geographic areas. By protocol, participants were not seen in person throughout the one-year duration of the intervention. Telephone counseling was provided by health educators, and print materials were mailed to participants. Only 16.3% of participants supplied email addresses; they were contacted electronically only if they could not be reached by telephone.

Eligible participants were adults ≥ 18 years, with a self-reported diagnosis of diabetes and a recent A1c >7% from the Registry. All potential participants had to reside in one of 10 zip codes of the South Bronx. The South Bronx was chosen as it is one of the lowest-income congressional districts in the U.S., and has known high rates (up to 13.8%, age adjusted) of diagnosed diabetes among its mostly Latino and Black population (DOHMH-NYC, 2012). Potential participants were recruited by telephone by DOHMH staff hired specifically for this study. Study exclusion criteria included: inability to read or speak English or Spanish, mental impairment as assessed by telephone, either recent or planned bariatric surgery, or intention to move from the NYC area within one year. Patients from a total of 68 facilities of all sizes were included on recruitment lists provided to the DOHMH study staff during active participant recruitment between September 2008 and October 2010. A computer-generated sequence of 941 individuals for random assignment into either the telephone and print (Tele/Pr) or the print-only (PrO) group was placed into sealed opaque envelopes. After obtaining informed consent, each participant's envelope was opened to effect randomization. This study was approved by the institutional review boards at the Albert Einstein College of Medicine and the NYC DOHMH. It is registered with Clinicaltrials.gov as NCT00797888.

Interventions

All participants were recruited from the A1c Registry from medical practices of any size. Most practices were aware of the research study, and the majority had received some level of DOHMH support from the A1c Registry. All study participants (Tele/Pr and Pr/O) received the same diabetes self-management support materials in English or Spanish as preferred by the participant. Most materials were available free online from various agencies, or they were created or modified for this study; they address self-care behaviors in interactive ways. Examples include medication logs to identify barriers to adherence, logs to

help monitor healthy eating and exercise behaviors, goal-setting worksheets, a 24-hour food intake assessment, low-literacy A1c test information, and prevention and treatment of hypoglycemia and hyperglycemia. These materials were incorporated into health educators' talking points for the telephonic intervention protocol and were delivered as appropriate for each participant.

Tele/Pr participants were assigned to a health educator for the one-year telephonic intervention. By protocol, participants with a baseline A1c from > 7% to 9% were offered up to 4 self-management support phone calls (after randomization/receipt of print materials, and then generally at 3, 6, and 9 months). Those with an A1c > 9% could receive up to 8 phone calls, generally about every 4–6 weeks over the one-year intervention. The content of the telephone calls was focused first on diabetes medication adherence; healthy eating, physical activity and/or stress management topics were later introduced, depending on the priorities identified by the participant. A written protocol with talking points guided the health educators in activating and integrating the information from the print materials into the lifestyles of Tele/Pr participants.

Five adults from the community were recruited to function as health educators in the study. All possessed a college degree, the majority in the social sciences. Four were bilingual Latino/a and one was non-Latino Black. They were neither health care professionals nor health educators by academic training. Active training was provided over about 2 weeks, with workshop sessions on counseling and motivating behavior change via telephone, as well as the specifics of protocol, recruitment and retention techniques, data collection, documentation, and quality assurance. Training in counseling for behavior change was grounded in assessing readiness for change (Prochaska, Redding, & Evers, 2002), promoting problem-solving (Hill-Briggs, 2003), goal setting, and increasing self-efficacy (Bandura, 1997) for self-management behaviors. The health educators also attended the 10-hour American Diabetes Association-recognized diabetes self-management program for patients offered at Montefiore Medical Center. In total, about 20 hours of structured training was completed before they began to work with study participants.

Multi-disciplinary experts in diabetes self-management, including a nurse certified diabetes educator, a physician, and a clinical health psychologist, provided supervision to the health educators. Supervision was done by telephone or email when needed acutely, but primarily through the weekly in-person case management meetings with at least one supervisor. Fidelity to the protocol was enhanced by the use of telephone log sheets for every call for the Tele/Pr group to both promote and document staff adherence to the behavioral intervention. Every study participant also had a protocol flow sheet with exact dates by which protocol activities had to occur. These flow sheets were carefully monitored by the study coordinator.

Baseline Measures

Data were collected using a comprehensive participant characteristics survey and the following validated behavioral/psychosocial surveys: the Summary of Diabetes Self-Care Activities (SDSCA) (Toobert, Hampson, & Glasgow, 2000), the Patient Health

Questionnaire (PHQ)-8 item scale to screen for depression (Kroenke, Spitzer, & Williams, 2001), the Morisky Medication Adherence 4-item scale (Morisky, Green, & Levine, 1986), and the Well-Being Index, a 5-item scale from the World Health Organization, also known as the WHO-5 (Bonsignore, Barkow, Jessen, & Heun, 2001). Surveys were administered by telephone in English or Spanish by trained staff; a small proportion of surveys were self-administered by mail when the participant was not available by phone. Ultimately, the primary study outcome measure was the change in A1c from baseline to a post-intervention A1c retrieved electronically from the A1C Registry during a time period that started 6 weeks prior to the end of the one-year intervention and ended 4 months after the intervention. Those data are beyond the scope of this manuscript.

Analysis

Each randomized participant was assigned a study identification (ID) number. To reduce the risk of ascribing data to the wrong subject, each study ID contained redundant information, structured so that common typographical errors (e.g., digit reversals) would usually result in an invalid ID number. The data collected directly from participants were recorded on paper forms and transcribed into a Microsoft Access database. The database was programmed to reject impossible values and enforce questionnaire skip patterns. Ten percent of all questionnaires were randomly selected for double entry. The observed error rate was less than 1 per 1,000 data fields. For analysis, Stat Transfer version 11 was used to translate the data to Stata version 12 MP format. After importation to Stata, data were screened for unusual values and internal inconsistencies, discrepancies being resolved by reference to the original paper forms or, when necessary by consultation with the health educator who had filled out the form. Scale and subscale scores for the SDSCA (Toobert et al., 2000), PHQ-8, (Kroenke et al., 2001) Morisky Medication Adherence survey (Morisky et al., 1986), and the Well-Being Index (Bonsignore et al., 2001) were scored in accordance with the algorithms published by their authors.

Summary statistics of the distributions of key variables were calculated separately for each arm of the study and for the sample as a whole. For continuous variables we present means and standard deviations. For ordinal and nominal category variables we present the percentage at each level. Where appropriate, levels containing small numbers of participants were combined. We also show the contrast between values for Latino and non-Latino participants. For continuous variables, p-values are those of the Mann-Whitney U-test. For nominal category variables the Pearson chi square test was used, and for ordinal variables a Wilcoxon test for trend was applied (Cuzick, 1985). To test the bivariate associations of variables with A1c at baseline, we used cross tabulations with Pearson chi square tests for nominal variables, a non-parametric test for trend for ordinal variables, and Spearman correlations for interval variables.

Results

The study protocol flow is depicted in Figure 1. Eligibility screening by telephone, the informed consent process, and the collection of survey data took approximately 20 minutes in either English or Spanish. Of the 9,389 individual names of potential participants from

A1c Registry lists, 5,814 could not be screened by phone and 571 were without a valid phone number. Call attempts were made as feasible from frequently updated lists from the A1c Registry. Individuals not meeting all study criteria were found ineligible (n=1,374). Of the 1,630 individuals who met eligibility criteria, 941 participants from 48 facilities provided oral consent by telephone and were randomized to the Tele/Pr (n=443) or PrO (n=498) groups. Of the total randomized, 378 participants (40%) had a baseline A1c > 9%. Of those in the Tele/Pr intervention, 181 (41%) had an A1c >9% and, thus, could receive up to 8 telephone calls over 1 year; those with an A1c between >7% and 9% (n=262) could receive up to 4 phone calls during the intervention period.

The participant characteristics by randomization group and total are shown in Table 1. Of note were the high proportions of Latino (67.7%) and non-Latino Black (28.0%) individuals, with only 1.0% non-Latino white; these proportions are generally representative of the South Bronx population. The majority were women. The total mean age was 56.3 years. Almost 70% were foreign born (not including those born in Puerto Rico). Spanish was the preferred language for 55.8% of the total sample. The participants were low-income, with 76.6% having an annual family income <\$20,000. And although the majority had not completed high school, 23.3% had some college or beyond. Because study participants were drawn from the A1c registry, they presumably had some contact with medical care as they had an A1c test completed. Only 13.9%, however, reported that they had ever received diabetes education either in a group setting or one-to-one.

As shown in Table 1, watching television for more than 4 hours each day was reported by 42.6%. More than half of all participants (54%) were obese (based on self-reported height and weight), and the mean BMI was 32.1 kg/m². Nearly half (48.3%) reported taking pills only for their diabetes, 16.3% reported taking insulin only, and another 23.9% reported taking both pills and insulin. The mean A1c was 9.2%, with a range of 7.1% (the lower limit for eligibility) to 23.5%. Interestingly, in contrast to the poor levels of diabetes control, the mean self-reported Morisky Medication Adherence score was 3.1 on a scale of 0–4, where 4 indicates complete adherence to medication. Psychosocial variables included the PHQ-8 screen for major depressive disorder and 27.0% of the sample had a positive score (PHQ-8 10); the mean score was 6.4±5.5. The WHO-5 Well-Being Index scores indicated, on average, lower well-being, with a mean score of 15.1, and 35.8% (n=338) of the sample scored less than 13, indicating poor well-being.

In comparing Latino and non-Latino (primarily Black) participants, significant differences emerged (see Table 2). There were large and statistically significant differences in level of education and in annual family income, with Latinos being both less educated and having lower incomes. Other significant differences included greater prevalence of depression and lower well-being among Latinos in the crude analyses. After adjusting for age, insurance status, duration of diabetes, income and education, there were no statistically significant differences between Latino and non-Latino study participants on the mean baseline A1c measure; however, the mean BMI of Latino participants was lower than that of non-Latinos (31.5 vs. 33.2). As measured by the SDSCA scale, Latinos reported lower frequency for three of six self-management behaviors related to physical activity and diet. Non-Latinos, compared with Latinos, reported a significantly greater number of days per week of exercise

(mean = 3.0 vs. 2.4) and of eating a generally healthy diet (mean = 4.0 vs. 3.6 days). In contrast, non-Latinos reported fewer days per week of performing foot care (mean 4.4 vs. 4.9). There were no significant differences between Latino and non-Latino participants for types of diabetes medications taken. Latinos reported a score for depression, as indicated by a PHQ-8 score, that was 21% higher than non-Latinos (mean 6.8 vs. 5.6), and over one-third more Latinos had a PHQ-8 score that was ≥ 10 , indicating a positive screen for depression (28.5% vs. 20.8%). Adjustment for age, insurance status, duration of diabetes, income and education failed to account for most of these differences.

When using the baseline A1c as the dependent variable, we found the following significant associations at the $p < 0.01$ level without correcting for multiple hypothesis testing: higher A1c levels were seen in men, those who preferred English to Spanish, and those who reported smoking in the last week. Younger participants generally had higher A1c levels than older participants, as did those who reported taking insulin as part of their medication regimen. Of interest were the characteristics that were not significantly associated at baseline to A1c, including diabetes education, race, ethnicity, depression, and BMI.

Conclusions

The NYC DOHMH A1c Registry presented a unique population-based opportunity to strengthen the evidence base for electronic methods (i.e., registries or electronic health records) for tracking A1c levels in clinical practices and in populations, as well as for evaluating the incremental effects of interventions to improve diabetes control. The Bronx A1c study became the vehicle to evaluate a tailored, tiered telephonic intervention in the context of a large-scale A1c Registry in a high-risk urban population that is often not represented in research studies. Study intervention components were informed by our prior study (Walker et al., 2011), with value placed on keeping costs as low as possible for wider dissemination (i.e., scalability) if the intervention is deemed effective.

Our baseline characteristics portray a highly diverse urban population with elevated rates of poverty, poor metabolic control, obesity, and with few participants reporting having received diabetes education. While these characteristics often preclude participation in research studies, this telephonic/mail-based intervention study recruited 941 eligible participants in just 24 months. Access to A1c Registry data certainly facilitated recruitment of such a large number of participants.

Latino vs. non-Latino differences were striking at baseline. Latinos were lower-income and had less education on average than non-Latinos; this finding points to the potential for additional challenges in diabetes self-management support with Latinos. Since Latino and non-Latino Black were the majority groups in this study (only 4.4% were non-Latino white or other), having the intervention tailored by health educators from the community to meet individual needs was critical. While there was no significant difference in A1c level between Latinos and non-Latinos at baseline, significant differences were noted among factors known to be related to A1c, including: a higher self-reported BMI among non-Latinos; fewer days per week of healthy eating and physical activity among Latinos; a mean depression score (PHQ-8) 40% higher for Latinos than non-Latinos, as well as a 66%

increase in having a positive screen for depression among Latinos. Significant differences persisted after full adjustment. These critical differences highlight the need to incorporate intervention components that address the needs of this high-risk, multi-ethnic population in order to improve diabetes control through supporting medication adherence, healthy eating, and physical activity. Clearly, mental health or emotional support should be integrated into future interventions, particularly with Latinos.

Recent diabetes literature supports the presence of disparities in health and health care between Latinos and non-Latinos. Puerto Rican adults diagnosed with diabetes (n=606) living in New York City were found to be significantly less likely to receive annual A1c testing, cholesterol testing, medication for hypertension, or to be taking aspirin regularly, as compared to a representative group of New York State adults with diabetes (Hosler & Melnik, 2005). They also had significantly lower income and educational attainment, as also seen in our study. However, Spanish-speaking Latinos had lower BMI and greater emotional well-being than either Whites or English-speaking Latinos in a study by Brown et al. (Brown et al., 2003) of diabetes patients in managed care. Latinos were more likely than Whites to report checking their feet for sores every day (Brown et al., 2003); we also noted better foot self-care reported by our Latino participants.

Cooper et al (Cooper et al., 2003) found that among 829 adult primary care patients with recent symptoms of depression and a prior history of meeting criteria for major depressive episode, African Americans and Latinos had significantly lower odds than Whites of finding antidepressant medications acceptable. African Americans were somewhat *less* likely, and Latinos were more than three times *more* likely than Whites to consider counseling an acceptable treatment for depression (Cooper et al., 2003). Qualitative research with Latinos has suggested that they tend to view depression as being caused by social stressors, prefer counseling to medications, and report distrust of antidepressants (e.g., (Cabassa, Hansen, Palinkas, & Ell, 2008). Blacks and Latinos appear to be less likely to adopt psychiatric models to label their experience of depression as compared to White European Americans (Karasz, Garcia, & Ferri, 2009). Consideration of these factors will be important in developing culturally appropriate treatment approaches to the related problems of emotional distress and problems with diabetes self-management in Latinos.

The influence of socioeconomic and psychosocial factors on health outcomes relevant to patients living with diabetes is pervasive. Low socioeconomic status contributes to risk for depression in patients with diabetes (Everson, Maty, Lynch, & Kaplan, 2002). In turn, depression, even at subclinical levels, contributes to poorer diabetes self-management (Gonzalez et al., 2008), and is associated with increased risk of diabetes complications over time (Lin et al., 2009) and with increased mortality risk (Katon et al., 2005). Thus, the increased prevalence of depression, the lower sense of well-being, and poorer dietary and physical activity behaviors observed among low-income Latinos in the current study may suggest an important opportunity for targeted interventions in this population, as well as for non-Latino Blacks. To date, interventions with Latinos living with diabetes have primarily targeted depression with antidepressants (Echeverry, Duran, Bonds, Lee, & Davidson, 2009), failing to demonstrate that reductions in depression symptom severity result in improved glycemic control or self-management. Reviews have noted the relative dearth of

intervention studies that target emotional well-being in Latinos with type 2 diabetes and highlight the need for culturally sensitive community-based approaches for improving emotional, behavioral and health outcomes. Intervention approaches that are consistent with the illness-models of Latinos and non-Latinos and their preferences for treatment are worthy of further investigation.

Improving diabetes control is a challenging task from the perspective of the patient, family, community, and health care provider. The Bronx A1c study sought to improve control through a low-cost, tailored telephonic intervention directed toward at-risk individuals identified through a registry. Thus, interventions that aim to provide support for an individual's self-management of diabetes and that improve access to and utilization of support from health-care providers may be particularly well positioned to promote improvements in self-management and glycemic control. In a population of individuals who embody critical health disparities, an intervention such as this, if effective, has the potential to be scalable and sustainable. The Bronx A1c project provides opportunity for evaluation of one such approach.

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Figure 1.
Flow Diagram of the Bronx A1c Protocol

Table 1

Baseline Participant Characteristics by Randomization Group and Total

Characteristic	Telephone and Print (Tele/Pr) [†] (n=443)	Print Only (PrO) [†] (n=498)	Total (n=941)
Female (%)	64.8	62.7	63.7
Race/ethnicity (%)			
Latino	66.1	69.1	67.7
Black (non-Latino)	29.8	26.3	28.0
White (non-Latino)	0.9	1.0	1.0
Other	3.2	3.6	3.4
Age (years, mean $\pm$ s.d.)	56.7 $\pm$ 11.3	56.0 $\pm$ 12.0	56.3 $\pm$ 11.7
Marital Status (%)			
Married/Cohabiting	35.2	38.0	36.7
Widowed	11.5	8.4	9.9
Separated/Divorced	24.4	21.7	23.0
Never Married/Single	28.9	31.9	30.1
Foreign born* (%)	69.5	68.9	69.7
Spanish language preferred (%)	55.1	56.4	55.8
Any health care coverage (%)	89.8	91.6	90.8
Taken diabetes education program (%)	11.5	16.1	13.9
Years with diabetes (%)			
5	33.2	32.6	32.9
6–10	21.6	21.9	21.7
>10	45.2	45.6	45.4
Working status (%)			
Works full time	14.1	18.4	16.3
Works part time	10.7	6.1	8.2
Unemployed	22.7	26.8	24.9
Retired	19.1	13.9	16.3
Disabled	26.5	30.0	28.4
Other	7.0	4.8	5.9
Annual Household income (%)			
<\$20,000	78.0	75.4	76.6
\$20–29,000	12.2	11.0	11.6
\$30–39,000	4.6	5.7	5.2
\$40–49,000	3.0	4.5	3.8
\$50,000	2.2	3.3	2.8
Education (%)			
8th Grade or less	31.2	31.4	31.3
9th – 11th Grade	19.0	20.9	20.0
Completed H.S or GED	26.0	25.0	25.4
Some college or beyond	23.9	22.7	23.3
Television watching			

Characteristic	Telephone and Print (Tele/Pr) [†] (n=443)	Print Only (PrO) [†] (n=498)	Total (n=941)
None	1.8	2.0	1.9
<2 hours/day	26.9	27.3	27.1
2–4 hours/day	26.9	29.7	28.4
>4 hours/day	44.3	41.0	42.6
Diabetes medications (%)			
Diabetes pills	47.9	48.6	48.3
Insulin only	16.0	16.5	16.3
Pills and insulin	25.5	22.5	23.9
Neither pills nor insulin	0.5	1.4	1.0
Pills and other injectable	9.9	10.6	10.3
Other	0.2	0.4	0.3
HbA1c (mean ± s.d.)	9.3 ± 2.1	9.1 ± 2.0	9.2 ± 2.0
BMI (kg/m², mean ± s.d.)	32.3 ± 7.8	32.0 ± 7.5	32.1 ± 7.6
Morisky score, mean ± s.d.	3.1 ± 1.1	3.1 ± 1.1	3.1 ± 1.1
PHQ-8 score, mean ± s.d.	6.3 ± 5.4	6.5 ± 5.5	6.4 ± 5.5
WHO-5 score, mean ± s.d.	15.3 ± 6.7	15.0 ± 6.7	15.1 ± 6.7

[†] Tele/Pr = Telephone and Print. PrO = Print Only.

* Foreign born does not include those born in Puerto Rico.

Abbreviations: H.S. (high school); GED (high school equivalency); BMI (body mass index)

Associations among participant characteristics by ethnicity (Latino vs. Non-Latino), adjusted for age, insurance status, years since diabetes diagnosis, income, and education

Table 2

Variable	Crude (non-adjusted)		P-value	Fully Adjusted ^a		P-value
	Latino (n=637)	Non-Latino (n=291) ^b		Latino (n=637)	Non-Latino (n=291) ^b	
Age, mean (95% CI)	56.4 (55.4–57.3)	56.5 (55.1–57.8)	NS	N/A	N/A	N/A
Diabetes diagnosis >10 years ago, % (95% CI)	44.1 (40.3–48.0)	46.4 (40.7–52.1)	NS	N/A	N/A	N/A
Any health care coverage, % (95% CI)	90.5 (88.2–92.8)	90.8 (87.4–94.2)	NS	N/A	N/A	N/A
Less than \$20,000 annual income, % (95% CI)	82.8 (79.6–86.0)	63.4 (57.3–69.4)	***	N/A	N/A	N/A
Less than 12 th grade education, % (95% CI)	61.3 (57.5–65.1)	30.2 (25.0–35.5)	***	N/A	N/A	N/A
A1c, mean (95% CI)	9.1 (9.0–9.3)	9.3 (9.1–9.5)	NS	9.1 (8.9–9.3)	9.3 (9.1–9.6)	NS
BMI (kg/m ²), mean (95% CI)	31.6 (31.0–32.2)	32.9 (32.0–33.8)	*	31.5 (30.8–32.2)	33.2 (32.2–34.2)	**
Foreign born, % (95% CI)	86.5 (83.8–89.1)	34.7 (29.2–40.2)	***	87.0 (83.9–90.1)	33.2 (26.6–39.8)	***
PHQ-8 score, mean (95% CI)	7.0 (6.6–7.4)	5.0 (4.4–5.6)	***	6.8 (6.3–7.3)	5.6 (4.9–6.3)	**
PHQ-8 score 10, % (95% CI)	30.8 (27.2–34.4)	18.6 (14.1–23.0)	***	28.5 (24.4–32.6)	20.8 (15.3–26.2)	*
WHO-5 Well-being Index, mean (95% CI)	14.8 (14.3–15.3)	15.8 (15.1–16.6)	*	15.0 (14.5–15.6)	15.4 (14.5–16.3)	NS
# Days/week of exercise, mean (95% CI)	2.4 (2.2–2.5)	3.0 (2.7–3.3)	***	2.4 (2.2–2.6)	3.0 (2.7–3.3)	***
# Days/week eating general healthy diet, mean (95% CI)	3.5 (3.3–3.7)	4.0 (3.7–4.3)	*	3.6 (3.4–3.8)	4.0 (3.7–4.4)	*
# Days/week of blood glucose testing, mean (95% CI)	4.6 (4.4–4.9)	4.4 (4.0–4.7)	NS	4.7 (4.5–4.9)	4.4 (4.1–4.8)	NS
# Days/week performing foot care, mean (95% CI)	4.9 (4.7–5.1)	4.4 (4.1–4.7)	**	4.9 (4.7–5.1)	4.4 (4.1–4.8)	*
Morisky Medication Adherence Score = 4 ^c , % (95% CI)	50.9 (47.0–54.8)	46.9 (41.2–52.6)	NS	51.9 (47.4–56.3)	45.2 (38.4–52.0)	NS

Variable	Crude (non-adjusted)		Fully Adjusted ^a		P-value
	Latino (n=637)	Non-Latino (n=291) ^b	Latino (n=637)	Non-Latino (n=291) ^b	P-value
Current diabetes Medications, % (95% CI)					
Diabetes pills					
Insulin only	49.8 (45.9–53.6)	46.4 (40.7–52.1)	48.9 (44.2–53.7)	46.5 (39.4–53.7)	NS
Pills and insulin	15.2 (12.4–18.0)	18.9 (14.4–23.4)	14.6 (11.4–17.7)	17.6 (12.5–22.7)	NS
Pills and other injectable	22.9 (19.7–26.2)	24.7 (19.8–29.7)	19.8 (16.2–23.4)	23.6 (17.8–29.4)	NS
Taken a diabetes education class, % (95% CI)	10.5 (8.1–12.9)	9.6 (6.2–13.0)	10.1 (7.4–12.8)	7.6 (4.2–10.9)	NS
	14.3 (11.6–17.0)	13.0 (9.2–16.9)	13.5 (10.5–16.6)	10.3 (6.4–14.3)	NS

^a Data adjusted for age, insurance status, years since diabetes diagnosis, income, and education.

^b Missing participants are those who did not respond regarding being Latino vs. non-Latino

^c Possible range is 0–4, with 4 being most adherent.

* p<0.05

** p<0.01

*** p<0.001

NS = non-significant