ORIGINAL RESEARCH ARTICLE

Hypertension and Health-Related Quality of Life (HRQoL): Evidence from the US Hispanic Population

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Abstract

Background and Objective Little evidence exists regarding the marginal decrease in health-related quality of life (HRQoL) in relation to the presence of hypertension among a Hispanic population based on US population-based research.

Method This cross-sectional study used data from the 2014 to 2015 Medical Expenditure Panel Survey (MEPS). The target population was comprised of Hispanic community-dwelling residents with hypertension in the USA. The independent variable was the presence of hypertension. The dependent variable was HRQoL, which was measured using the Short Form-12 (SF-12) physical health composite scale (PCS) and mental health composite scale (MCS).

Results A total of 13,933 members of the Hispanic population met the study inclusion criteria, and the estimated population size was 36,440,400 Hispanics. Among them, 82.9% did not have any hypertensive condition ($n = 11,466$), while 17.7% had some hypertensive condition ($n = 2467$). SF-12 PCS scores (95% CI) were 46.62 (45.68–47.57) in the Hispanic population with hypertension and 51.62 (51.1–52.14) in the Hispanic population without hypertension. SF-12 MCS scores (95% CI) were 52.67 (52.07–53.27) in patients without hypertension and 50.35 (49.45–51.26) in the Hispanic population with hypertensive conditions.

Conclusion The presence of hypertension was associated with lower HRQoL in the Hispanic population. Based on our findings, we suggest that healthcare providers should monitor a hypertensive minority population for anxiety and mood disorders and recommend psychiatric assessment and treatment if appropriate.

1 Introduction

Hypertension (HTN) is known to be a risk factor for many other chronic diseases, such as heart disease, embolism, and renal disease [1]. According to the 2013 the European Society of Hypertension (ESH) and the European Society of Cardiology (ESH) Guidelines for the management of

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arterial hypertension, the prevalence of hypertension in the general population is about 30–45% [2]. The number of elderly patients affected by this disease is much higher in most countries with more than 50% of the elderly population being affected by this disease. Hypertension is a critical risk factor for cardiovascular disease, which accounts for more than 30% of mortality worldwide [3]. The National Health and Nutrition Examination Survey (NHANES) showed that although 54% of hypertensive patients were taking medication, only 34% of hypertensive patients had their hypertension under control. In the USA, 65 million people have hypertension and the number of people affected by this disease is expected to rise with the aging population [1]. The 2017 American College of Cardiology/American Heart Association (ACC/AHA) Task Force on Clinical Practice Guidelines state that hypertension is related to increased risk of Coronary Heart Disease (CHD), End-Stage Renal Disease (ESRD), stroke, myocardial infraction (MI) and Peripheral Artery Disease (PAD) [4]. The American Heart Association (AHA) recommends eating healthy food choices and exercising,

along with antihypertensive medications for better clinical management [1]. The Center for Disease Control and Prevention (CDC) reports that between 2011 and 2012, the prevalence of high blood pressure in US adults was 29.1%. In 2013, over 360,000 deaths were reported to be due to hypertension [5].

Although local and national programs that increase patients' awareness, treatment, and control of hypertension have been well studied in the general population, Hispanics have been excluded from and neglected in many of these programs [6]. It has been observed that there is an increased prevalence rate of hypertension among Latinos [6]. Hypertension rates in Latino adults (18 years and older) increased from 5.2 to 13.5% from 1988 to 2008. Increased rates of hypertension in Hispanic populations can be attributed to low levels of awareness, treatment, and control. Gender, age, migration/acculturation status, and socioeconomic position are factors associated with increased hypertension risk for Hispanics in the USA [6]. Developing data suggest that Hispanics might have rates of uncontrolled hypertension at much higher rates than non-Hispanic Whites [7].

It is noted that even "controlled" chronic diseases have a negative impact on health-related quality of life (HRQoL) [8]. HRQoL is described as "an assessment of health state based on modern concept of healthcare, which reflects the physical, psychological, social and emotional well beings of patients" [9]. HRQoL has been reported to be lower in patients with hypertension, but whether this is attributed to drug treatment, awareness of disease, or if it is secondary to high blood pressure is not well established

[9]. Many studies have concluded that hypertension can have a negative effect on HRQoL [1, 8, 10]. Other studies have concluded that being aware of having hypertension can also affect quality of life (QoL) and might also have an impact on mental health [10, 11]. A recent study from Cyprus concluded that hypertension is related to depression and anxiety, which could further impact HRQoL [11]. A HRQoL and hypertension study showed that hypertensive males, compared to normotensive males, had a significantly higher depression score, less satisfaction with their sexual lives, and more memory problems compared to that of the general population [12]. Hypertension has been known to be a risk factor for developing depression and vice versa [13].

Hypertension is usually diagnosed along with other cardiovascular diseases, with the most prevalent being diabetes. The American Heart Association and the American Diabetes Association released a scientific statement that 70–80% of patients with type 2 diabetes mellitus (T2DM) and hypertension had an increased risk and mortality of cardiovascular diseases, such as stroke and myocardial infraction [14]. Another study showed that 56% of hypertensive adults aged 35 years and older also had diabetes and/or hyperlipidemia and/or were obese with a body mass index (BMI) ≥ 30 mg/m^2 [15]. Mengden et al. found that only 22.9% of patients with both hypertension and T2DM had their blood pressure controlled under the 140/80 mmHg target goal of that time [16]. McLean et al. demonstrated that although 83% of hypertensive patients were being treated with hypertension medications, only 12% had their BP controlled to < 130/80 mmHg [17]. Co-morbidities, such as diabetes and hyperlipidemia, can impact HRQoL as they contribute to increased cardiovascular disease (CVD) morbidity and mortality. The Framingham Heart Study demonstrated that more than 30% of hypertensive patients had three or more additional CVD risk factors, while less than 20% had hypertension as their only CVD risk factor [18]. A different analysis of Framingham data revealed that the population with hypertension and diabetes had an increased risk of all-cause mortality compared to patients with normal blood pressure levels [19]. Identifying risk factors for hypertension and co-morbidities is important for better understanding of the overall management of these patients.

Not much clinical effort and research have been conducted on the awareness, treatment, and control of hypertension in Hispanic adults in the USA. Therefore, it is important for studies to be conducted on this ethnic sub-group to improve HRQoL and health outcomes in American Hispanics. Little evidence exists regarding the impact of hypertension on HRQoL in Hispanic adults in the USA, even though this is the largest growing minority in America [6]. It is important to collect and analyze information that includes different Hispanic ethnicities because health disparities

vary slightly among Hispanic groups and therefore not correctly identifying the extent of these health disparities could inhibit the improvement in quality of care of these Hispanic patients. For example, the percentage of uninsured persons differs between Hispanic subgroups—21% of Puerto Ricans were uninsured compared to 40% of Mexicans and Mexican-Americans who were uninsured [20].

2 Methods

2.1 Data Source

This cross-sectional study used data from the 2014 to 2015 Medical Expenditure Panel Survey (MEPS). MEPS is a set of large-scale surveys of families and individuals, their medical providers, including doctors, hospitals, and pharmacies, and employers across the USA. MEPS is the most complete source of data on the cost and use of healthcare and health insurance coverage [21]. The analytic focus of MEPS has been directed to the topics of health care access, coverage, cost, and use. Over the past several years, the MEPS data have supported a

discernable set of descriptive and behavioral analyses of the US healthcare system [22]. Institutional Review Board (IRB) approval was waived since MEPS data are publicly available de-identified data.

2.2 Study Population

The target population was comprised of Hispanic community-dwelling residents in the USA with hypertension. Patients were included if they: (1) were of the Hispanic population, (2) had any diagnosis codes for hypertension (The International Classification of Diseases, Ninth Revision (ICD-9) codes: 401–405); (3) answered the 12-Item Short Form Health Survey (SF-12); and (4) were aged 18 years or older. The MEPS medical condition files were used to define hypertension and co-morbidities, and the MEPS full-year consolidated files were employed to define HRQoL and patient characteristics.

2.3 Variable Measurement

The primary independent variable was the presence of hypertension among the Hispanic population. The dependent variable was HRQoL, which was measured using: (1) the SF-12 physical health composite scale (PCS) and (2) the SF-12 mental health composite scale (MCS). The measures used in this study, PCS and MCS, are known for indicators between groups with different physical and work limitations (PCS) and with and without cognitive limitations (MCS) [22]. As covariates, the following patients' characteristic were included in the analyses: age group (18–44 years, 45–64 years, ≥ 65 years), gender (male, female), Hispanic ethnicity (Mexican/Mexican–American/Chicano, Puerto Rican, Cuban/Cuban American, Dominican, Central or South American, Other), region (northeast, midwest, south, west), insurance type (any private, public only, uninsured), marital status (married, unmarried), education level (less than high school, high school, college or higher), poverty level (negative/poor/low, middle, or high), BMI level (underweight/normal, overweight, or obese) and Charlson comorbidity index (CCI). *Hispanic population* includes ethnicity, race, region of origin, family ancestry, and Spanish language, while *Hispanic ethnicity* is limited to shared cultural traits or a common nationality.

2.4 Statistical Analysis

Since the MEPS data employ a complex, probabilistic survey design, the sample design effects were used for overall analyses. Chi square tests were used to test differences in the patients' characteristics in relation to the presence of hypertensive conditions among Hispanic population. Two multivariate regression models were conducted to predict HRQoL in presence of hypertension among the Hispanic population, while controlling for described covariates—one for the SF-12 MCS and SF-12 PCS. The α level for statistical significance was set at 0.05. All analyses were performed using SAS 9.3 (SAS Institute, Cary, NC, USA) and Stata/SE 14.1 (STATA Corp., College Station, TX USA).

3 Results

3.1 Patient Characteristics

Table 1 shows the characteristics of the study sample according to the presence of hypertension among Hispanic population. A total of 13,933 members of the Hispanic population met the study inclusion criteria, and the estimated population size was 36,440,400 in the study period. Among them, 82.9% did not have any hypertensive condition ($n = 11,466$), while 17.7% had some hypertensive condition ($n = 2467$). The Chi square tests show that having a hypertensive condition was significantly associated with Hispanic ethnicity ($p < 0.001$), age group ($p < 0.001$), sex ($p = 0.002$), and insurance type ($p < 0.001$).

3.2 SF-12 Scores

Table 2 shows the SF-12 PCS scores in relation to the presence of hypertension in the Hispanic population. Overall, the SF-12 PCS scores [95% confidence interval (CI)] were 46.62 (45.68–47.57) in the Hispanic population with hypertension

Table 1 Sample characteristics of US Hispanic adults in relation to hypertension status ($n = 13,933$, weighted $n = 36,440,400$)

Variable	Without hypertension ($n = 11,466$) (weighted $n = 29,888,416$)		With hypertension ($n = 2467$) (weighted $n = 6551,984$)		p value
	N	Weighted (%)	N	Weighted (%)	
Hispanic ethnicity					< 0.001
Mexican/Mexican–American/Chicano	7336	61.9	1360	54.7	
Puerto Rican	875	8.7	318	12.7	
Cuban/Cuban American	491	4.2	204	8.1	
Dominican	433	3.1	156	4.9	
Central or South American	1856	16.5	326	14.0	
Other/Multiple	475	5.6	103	5.5	
Age (years)					< 0.001
18–44	7971	69.8	370	15.0	
45–64	2974	25.6	1263	48.5	
≥ 65	521	4.6	834	36.5	
Sex					0.002
Male	5714	52.8	1126	48.1	
Female	5752	47.2	1341	51.9	
Region					0.007
Northeast	1562	13.5	448	16.0	
Midwest	984	9.1	195	8.5	
South	3902	36.7	926	40.0	
West	5018	40.8	898	35.5	
Insurance					< 0.001
Any private	4757	50.3	903	42.6	
Public only	2748	19.7	1213	45.3	
Uninsured	3961	29.9	351	12.1	
Marital status					< 0.001
Married	4966	44.3	1354	57.0	
Unmarried	6492	55.7	1113	43.0	
Education					< 0.001
Less than high school	4385	32.7	1197	42.0	
High school	3214	28.3	598	25.8	
College or higher	3675	39.0	646	32.2	
Poverty level					0.012
Negative/poor/low ($\leq 200\%$)	6017	43.1	1370	48.3	
Middle ($200\% \sim < 400\%$)	3686	33.5	714	29.7	
High ($\geq 400\%$)	1763	23.4	383	21.9	
BMI (kg/m^2)					<0.001
Underweight/normal (≤ 24.9)	3324	32.2	352	15.6	
Overweight ($25.0 \sim \leq 29.9$)	4080	37.0	857	36.1	
Obese (≥ 30.0)	3497	30.8	1187	48.4	
CCI score					< 0.001
0	5787	53.2	1190	49.5	
1–2	954	8.9	915	35.2	
≥ 3	4725	37.9	362	15.3	

BMI body mass index, *CCI* Charlson co-morbidity index

Table 2 Estimated SF-12 physical health composite scale (PCS) scores according to hypertension status in US Hispanic adults ($n=13,933$, weighted $n=36,440,400$)

Variable	Without hypertension ($n=11,466$) (weighted $n=29,888,416$)			With hypertension ($n=2467$) (weighted $n=6551,984$)		
	Mean	95% CI		Mean	95% CI	
Total	51.62	51.1	52.14	46.62	45.68	47.57
Hispanic ethnicity						
Mexican/Mexican–American/Chicano	51.77	51.42	52.13	46.78	45.90	47.65
Puerto Rican	50.94	50.10	51.77	45.94	44.85	47.04
Cuban/Cuban American	53.11	52.11	54.10	48.11	46.95	49.27
Dominican	52.72	51.77	53.67	47.72	46.61	48.84
Central or South American	52.36	51.80	52.92	47.37	46.45	48.28
Other/Multiple	50.73	49.68	51.78	45.73	44.33	47.13
Age (years)						
18–44	53.56	53.29	53.82	48.56	47.69	49.43
45–64	50.06	49.60	50.52	45.06	44.22	45.90
≥ 65	47.06	45.98	48.13	42.06	40.81	43.31
Sex						
Male	52.29	51.99	52.60	47.30	46.45	48.15
Female	51.32	51.01	51.63	46.32	45.50	47.14
Region						
Northeast	51.76	51.12	52.40	46.77	45.78	47.76
Midwest	51.44	50.36	52.53	46.45	44.96	47.94
South	51.87	51.40	52.33	46.87	46.03	47.72
West	51.87	51.50	52.23	46.87	46.01	47.74
Insurance						
Any private	52.56	52.25	52.88	47.57	46.72	48.41
Public only	49.44	48.86	50.02	44.45	43.52	45.37
Uninsured	52.59	52.22	52.97	47.60	46.71	48.49
Marital status						
Married	51.86	51.50	52.22	46.86	46.05	47.68
Unmarried	51.78	51.48	52.07	46.78	45.92	47.64
Education						
Less than high school	51.52	51.14	51.89	46.52	45.61	47.44
High school	51.59	51.19	51.98	46.59	45.75	47.44
College or higher	52.23	51.86	52.59	47.23	46.41	48.06
Poverty level						
Negative/poor/low (≤200%)	51.24	50.87	51.61	46.25	45.41	47.08
Middle (200% ~ <400%)	51.92	51.54	52.30	46.92	46.03	47.81
High (≥400%)	52.74	52.25	53.23	47.75	46.82	48.67
BMI (kg/m^2)						
Underweight/normal (≤24.9)	52.66	52.26	53.07	47.67	46.74	48.59
Overweight (25.0 ~ ≤29.9)	52.30	51.99	52.62	47.31	46.52	48.10
Obese (≥ 30.0)	50.59	50.19	50.99	45.60	44.72	46.47
CCI score						
0	49.59	48.84	50.35	44.60	43.57	45.62
1–2	52.52	52.09	52.94	47.52	46.57	48.47

BMI body mass index, *CCI* Charlson comorbidity index

and 51.62 (51.1–52.14) in the Hispanic population without hypertension. Table 3 shows the SF-12 MCS scores in relation to the presence of hypertension in the Hispanic population. Overall, the SF-12 MCS scores (95% CI) were 52.67 (52.07–53.27) in patients without hypertension and 50.35 (49.45–51.26) in the Hispanic population with hypertensive conditions.

3.3 Factors Associated with Health-Related Quality of Life (HRQoL)

The findings pertaining to the factors associated with HRQoL in the Hispanic population with hypertension from the multiple regression analysis are summarized in Table 4. Two multivariate regression models were conducted to predict HRQoL; one for SF-12 MCS and one for SF-12 PCS. The presence of hypertension was associated with both SF-12 PCS and SF-12 MCS scores. First, in the multiple regression analysis on the SF-12 PCS scores, presence of hypertension, sex, insurance type, poverty level, BMI, and CCI score were associated with SF-12 PCS scores. In particular, the regression coefficient (b) for the presence of hypertension was − 5.00 (SE = 0.44, $p < 0.001$), meaning that the SF-12 PCS scores in the Hispanic population with hypertension were lower by 5.00 points than those without hypertension, controlling for covariates. Second, in the multiple regression analysis on the SF-12 MCS scores, presence of hypertension, sex, insurance type, marital status, education, poverty level, and CCI score were associated with SF-12 MCS scores. In particular, the regression coefficient (b) for the presence of hypertension was − 2.32 (SE: 0.38, $p < 0.001$), meaning that the SF-12 MCS scores in the Hispanic population with hypertension was lower by 2.32 points than those without hypertension, controlling for covariates.

Compared with the male population, the SF-12 PCS and SF-12 MCS scores for females were lower ($b = − 0.97$, SE = 0.2, $p < 0.001$; $b = − 1.29$, SE = 0.25, $p < 0.001$, respectively). Among insurance types, the population who had public insurance were lower in both SF-12 PCS scores ($b = − 3.12$, SE = 0.34, $p < 0.001$) and MCS scores ($b = − 2.41$, SE = 0.39, $p < 0.001$) compared with those with private insurance. Marital status lowered both SF-12 PCS scores ($b = − 0.08$, SE = 0.23, $p < 0.718$) and MCS scores ($b = − 1.19$, SE = 0.26, $p < 0.001$), but this was a significant predictor only for the SF-12 MCS scores. The CCI scores were also significantly related to the SF-12 PCS and MCS scores. Overall, as CCI scores got worse, SF-12 PCS and MCS scores dropped. The presence of co-morbidity lowered both SF-12 PCS scores ($b = − 2.39$, SE = 0.42, $p < 0.001$) and MCS scores ($b = − 0.93$, SE = 0.43, $p = 0.032$). Hispanic ethnicity, age, and BMI were not associated with either SF-12 PCS scores or MCS scores.

4 Discussion

HRQoL has been used as a measure that includes physical, psychological, and social well-being and perceived health when evaluating disease impact. Comparison between HRQoL and a hypertensive Hispanic population included age, race, insurance, marital status, region, income, health status, and co-morbidity in this study. The primary objective of this study was to determine whether the presence of hypertension is associated with decreased HRQoL among the hypertensive Hispanic population; in addition, we investigated which factors were linked to HRQoL among a Hispanic population with hypertension. The results showed a negative association between having hypertension and not having hypertension in relation to HRQoL in this study.

This is one of the few studies that focuses on the impact of HRQoL in relation to the presence of hypertension in Hispanic adults in the USA. Although the SF-12 is a subjective measure of HRQoL that can be influenced by the patient's insights, understandings, and anticipations of their disease state, the SF-12 continues to be one of the most widely used HRQoL measures [23, 24]. This study provides an insight into the influence of the factors that are related to HRQoL and hypertension among American Hispanic adults. The results of this study demonstrate that both mental and physical HRQoL were negatively affected by the presence of hypertension. This is consistent with previous research studies and systematic reviews. A systematic review with meta-analysis conducted by Trevisol et al. compiled results of 20 studies and showed that hypertensive patients had lower mental and physical HRQoL scores compared to normotensive patients [25]. In this study, physical HRQoL was impacted more than mental HRQoL. The same systematic review revealed that this was also observed after analyzing the results of the 20 studies selected [25]. Compared to our study, the physical and mental scores of the systematic review with meta-analysis were (− 2.43; 95% CI − 4.77 to − 0.08) and (− 1.68; 95% CI − 2.14 to − 1.23), respectively.

It was noted in our results that the presence of co-morbidities decreased both MCS and PCS scores. As previous studies suggest, hypertension is associated with concurrent diabetes, hyperlipidemia, increased BMI > 30 mg/m², and many other CVD diseases, leading to an increased clinical and economic burden [15, 26]. A previous study conducted by Gonzalez-Chica et al. showed that co-morbidities negatively affected PCS scores but not MCS scores [27]. Another systematic review of 27 studies found an opposite relationship between the number of co-morbidities and PCS scores but the relationship between MCS was uncertain [28].

Compared to males, our results showed that females had lower overall HRQoL scores. Previous literature

Table 3 Estimated SF-12 mental health composite scale (MCS) scores according to hypertension status in US Hispanic adults ($n=13{,}933$, weighted $n=36{,}440{,}400$)

Variable	Without hypertension ($n=11{,}466$) (weighted $n=29{,}888{,}416$)			With hypertension ($n=2467$) (weighted $n=6{,}551{,}984$)		
	Mean	95% CI		Mean	95% CI	
Total	52.67	52.07	53.27	50.35	49.45	51.26
Hispanic ethnicity						
Mexican/Mexican–American/Chicano	52.84	52.46	53.21	50.52	49.74	51.30
Puerto Rican	51.85	50.94	52.77	49.54	48.34	50.73
Cuban/Cuban American	52.57	51.35	53.78	50.25	48.93	51.57
Dominican	54.20	53.10	55.29	51.88	50.59	53.17
Central or South American	52.55	51.82	53.28	50.24	49.24	51.23
Other/Multiple	52.16	51.14	53.19	49.85	48.79	50.91
Age (years)						
18–44	52.60	52.20	53.00	50.29	49.44	51.14
45–64	52.60	52.15	53.05	50.29	49.61	50.97
≥ 65	53.42	52.40	54.43	51.10	49.94	52.26
Sex						
Male	53.33	52.91	53.75	51.01	50.25	51.76
Female	52.03	51.67	52.39	49.72	48.93	50.50
Region						
Northeast	52.28	51.48	53.08	49.96	48.92	51.01
Midwest	52.16	51.13	53.20	49.85	48.67	51.03
South	53.03	52.60	53.45	50.71	49.95	51.48
West	52.64	52.08	53.19	50.32	49.42	51.22
Insurance						
Any private	53.41	53.06	53.76	51.09	50.37	51.81
Public only	50.99	50.31	51.68	48.68	47.70	49.65
Uninsured	52.89	52.36	53.42	50.57	49.69	51.45
Marital status						
Married	53.32	52.97	53.68	51.01	50.23	51.78
Unmarried	52.14	51.71	52.56	49.82	49.05	50.59
Education						
Less than high school	52.22	51.70	52.73	49.90	49.13	50.67
High school	53.40	52.96	53.85	51.09	50.28	51.89
College or higher	52.58	52.12	53.04	50.26	49.40	51.13
Poverty level						
Negative/poor/low (≤200%)	51.78	51.39	52.17	49.46	48.71	50.22
Middle (200% ~ <400%)	53.24	52.68	53.80	50.92	50.05	51.80
High (≥400%)	53.62	53.06	54.19	51.31	50.41	52.20
BMI (kg/m^2)						
Underweight/normal (≤24.9)	52.82	52.24	53.40	50.51	49.58	51.44
Overweight (25.0 ~ ≤29.9)	53.27	52.89	53.65	50.96	50.16	51.75
Obese (≥30.0)	51.96	51.50	52.42	49.64	48.91	50.37
CCI score						
0	51.08	50.24	51.92	48.76	47.72	49.80
1–2	52.01	51.62	52.41	49.70	48.94	50.45
≥ 3	54.55	54.17	54.93	52.23	51.42	53.05

BMI body mass index, *CCI* Charlson comorbidity index

Table 4 Multivariate regression analysis for Hispanic ethnicity and other factors associated with health-related quality of life among US Hispanic adults ($n = 13{,}933$, weighted $n = 36{,}440{,}400$)

Variable	PCS			MCS		
	Coefficient	SE	p value	Coefficient	SE	p value
Hypertension						
No	Reference					
Yes	−5.00	0.44	<0.001	−2.32	0.38	<0.001
Hispanic ethnicity						
Mexican/Mexican–American/Chicano	Reference					
Puerto Rican	−0.83	0.49	0.092	−0.98	0.51	0.057
Cuban/Cuban American	1.34	0.54	0.014	−0.27	0.63	0.671
Dominican	0.95	0.52	0.069	1.36	0.60	0.025
Central or South American	0.59	0.33	0.08	−0.28	0.40	0.482
Other/Multiple	−1.04	0.57	0.071	−0.67	0.52	0.199
Age (years)						
18–44	Reference					
45–64	−0.83	0.49	0.092	0.00	0.28	0.992
≥ 65	1.34	0.54	0.014	0.81	0.59	0.171
Sex						
Male	Reference					
Female	−0.97	0.20	<0.001	−1.29	0.25	<0.001
Region						
Northeast	Reference					
Midwest	−0.32	0.65	0.619	−0.12	0.64	0.858
South	0.10	0.38	0.786	0.75	0.47	0.112
West	0.10	0.40	0.795	0.36	0.51	0.48
Insurance						
Any private	Reference					
Public only	−3.12	0.34	<0.001	−2.41	0.39	<0.001
Uninsured	0.03	0.23	0.886	−0.52	0.31	0.098
Marital status						
Married	Reference					
Unmarried	−0.08	0.23	0.718	−1.19	0.26	<0.001
Education						
Less than high school	Reference					
High school	0.07	0.27	0.807	1.19	0.31	<0.001
College or higher	0.71	0.26	0.006	0.36	0.35	0.307
Poverty level						
Negative/poor/low (≤200%)	Reference					
Middle (200% ~ <400%)	0.68	0.26	0.009	1.46	0.31	<0.001
High (≥400%)	1.50	0.34	<0.001	1.84	0.38	<0.001
BMI (kg/m^2)						
Underweight/normal (≤24.9)	Reference					
Overweight (25.0 ~ ≤29.9)	−0.36	0.24	0.143	0.45	0.34	0.184
Obese (≥30.0)	−2.07	0.28	<0.001	−0.86	0.35	0.014
CCI score						
0	Reference					
1–2	−2.39	0.42	<0.001	−0.93	0.43	0.032
≥ 3	−0.53	0.27	0.051	−2.54	0.27	<0.001
Constant	54.88	0.49	<0.001	52.40	0.62	<0.001

BMI body mass index, *CCI* Charlson comorbidity index

confirms these results. A study that researched gender differences in HRQoL with hypertension as a variable revealed that women had significantly lower HRQoL compared to men, even after adjusting for confounding factors [29]. Another study focusing on critically ill patients in Australia also determined that females had significantly lower HRQoL scores compared to their male counterparts [24]. Our findings indicate that insurance type is related to HRQoL. Patients with public insurance had lower HRQoL compared to those with private insurance. Literature displays somewhat of a similar correlation between insurance type and HRQoL in patients with chronic disease. For both psychological and physical aspects, patients with public insurance had significantly lower HRQoL versus those with private insurance in patients with sickle cell anemia [30]. Compared with other races, there was a significant positive association between higher estimated glomerular filtration rate (eGFR) with the Physical Health Composite (PHC) score but not the Mental Health Composite (MHC) score among an African American population [31]. More studies need to be conducted on whether the insurance type affects HRQoL/QoL in hypertensive patients.

The choice of measure for the HRQoL in our study and similar work can affect the study based on whether it is are valid, reliable, and sensitive [23]. The measure used in this study, SF-12, is known to be valid, reproducible, and useful for measuring physical and mental health functions as well as the social determinants of health [23, 32]. Our study was conducted using an excellent and reliable measurement.

However, this study did have limitations. For example, causation cannot be explained using a cross-sectional design. The resulting interpretation is confined to the relationship between co-morbid anxiety and mood disorders on the HRQoL of a hypertensive Hispanic population. Recall bias can also limit the study due to self-or-proxy reported medical conditions on MEPS. Also, this study used a generic HRQoL tool since it was conducted on a general population and was used as a controlled comparison. Using a generic HRQoL instrument can broadly measure but cannot focus on a specific disease. The CCI could have influenced the results due to the possibility of not capturing some co-morbidities. The study was able to show data on the HRQoL of a hypertensive Hispanic population for the first time despite some limitations.

5 Conclusions

In conclusion, we present valuable data that focuses on the impact of the presence of hypertension on the mental and physical HRQoL of the Hispanic population in the USA.

This study builds upon previous research regarding the relationship between HRQoL and the presence of hypertension, using SF-12 PCS and SF-12 MCS surveys to measure HRQoL. This research is necessary due to the increasing prevalence rates of hypertension, along with other co-morbidities, among the fast-growing Hispanic population in the USA. Additional research is needed to further understand the negative impact that hypertension and other co-morbidities can have on the HRQoL among Hispanics in the USA. Understanding this impact can help to provide better health outcomes and could help improve HQRoL in such patients. We hope this research can be used to recognize other vulnerable populations with hypertension, and put into effect clinical interventions, guide the implementation of plans for chronic diseases to improve HRQoL, and determine the progress needed to enhance life after being diagnosed with a chronic disease.

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