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Race Differences in the Physical and Psychological Impact of Hypertension Labeling

Tanya M. Spruill, Ph.D.¹, Linda M. Gerber, Ph.D.², Joseph E. Schwartz, Ph.D.³, Thomas G. Pickering, M.D., D.Phil.³, and Gbenga Ogedegbe, M.D.¹

¹New York University School of Medicine, New York, NY

²Weill Cornell Medical College, New York, NY

³Columbia University Medical Center, New York, NY

Abstract

Background—Blood pressure screening is an important component of cardiovascular disease prevention, but a hypertension diagnosis (i.e., label) can have unintended negative effects on patients' well-being. Despite persistent disparities in hypertension prevalence and outcomes, whether the impact of labeling differs by race is unknown. The purpose of this study was to evaluate possible race differences in the relationships between hypertension labeling and health-related quality of life and depression.

Methods—The sample included 308 normotensive and unmedicated hypertensive subjects from the Neighborhood Study of Blood Pressure and Sleep, a cross-sectional study conducted between 1999 and 2003. Labeled hypertension was defined (by self-report) as having been diagnosed with high blood pressure or prescribed antihypertensive medications. Effects of labeling and race on self-reported physical and mental health and depressive symptoms were tested using multivariate analysis of covariance, controlling for age, sex, body mass index, previous medication use and “true” hypertension status, defined by average daytime ambulatory blood pressure.

Results—Both Black and White subjects who had been labeled as hypertensive reported **similarly** poorer physical health than unlabeled subjects ($p=.001$). However, labeling was associated with poorer mental health and greater depressive symptoms only among Blacks ($ps<.05$ for the interactions). These findings were not explained by differences in socioeconomic status.

Conclusions—These results are consistent with previous studies showing negative effects of hypertension labeling, and demonstrate important race differences in these effects. Clinical approaches to communicating diagnostic information that avoid negative effects on well-being are needed, and may require tailoring to patient characteristics such as race.

Keywords

hypertension; screening; disparities; quality of life

INTRODUCTION

One-third of adults in the United States have hypertension, although an estimated 20% of them are unaware of it.¹ High blood pressure increases the risk of heart disease and stroke,²

Corresponding author: Tanya M. Spruill, PhD, New York University School of Medicine, 550 First Avenue VZ30 6th Floor, 640, New York, NY 10016, USA. Tel: (646) 501-2619; Fax: (212) 263-4201; tanya.spruill@nyumc.org.

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two of the leading causes of death and disability in the U.S.³ Screening for hypertension is therefore recommended for all adults to support primary prevention of these chronic diseases.⁴ Often overlooked, however, are the unintended negative consequences that may result from diagnosing hypertension, referred to as “labeling effects”.⁵

Individuals who have been diagnosed (i.e., “labeled”) with hypertension report problems in a broad range of functional domains. Compared with those who have never been labeled, they demonstrate higher rates of work absenteeism,^{6–8} higher levels of bodily pain⁹ and psychological distress,^{10–12} greater sympathetic responses to stress,^{13,14} and poorer self-rated health and quality of life.^{15–17} These differences are not explained by blood pressure elevation itself or by medication side effects, but instead appear to reflect the psychological impact of being labeled and becoming aware of one’s elevated disease risk. Given that hypertension is typically asymptomatic and many patients are otherwise healthy and functioning well, the possibility that its detection, in and of itself, may lead to declines in well-being is quite concerning. These findings highlight the need for approaches to screening for this important risk factor that avoid or reduce negative labeling effects while maximizing the benefits of diagnosis. Identifying groups who are particularly vulnerable to labeling effects will help to inform the development of such approaches. The persistent disparities in hypertension prevalence and outcomes in the U.S.^{18–20} suggest that race may be one important factor to consider.

Data from the National Health and Nutrition Examination Survey (NHANES) indicate increases in the awareness and treatment of hypertension between 1988 and 2008, with the highest rates of both among Blacks compared with both Whites and Hispanics.¹ This likely reflects more aggressive screening and management of hypertension among Blacks due to their increased cardiovascular risk, which probably helps to reduce disparities but may also exacerbate the negative effects of labeling. However, little is known about whether and how the impact of being diagnosed differs by race. The goal of the present study was to evaluate the relationship of hypertension labeling to health-related quality of life and depressive symptoms in a biracial sample of Black and White adults who participated in the Neighborhood Study of Blood Pressure and Sleep, a cross-sectional study of race, socioeconomic status, neighborhood characteristics, sleep, and diurnal blood pressure.

METHODS

Participants and Procedures

Subjects were recruited from four hospitals in New York City (Weill Cornell Medical College, Mount Sinai School of Medicine, Harlem Hospital, and North General Hospital) to participate in the Neighborhood Study of Blood Pressure and Sleep. The study fieldwork was conducted from September 1999 through July 2003 and was approved by the institutional review committee at each participating institution. A sample of 340 black and white normotensive and hypertensive (screening blood pressure less than 160/105 mm Hg) subjects was enrolled. Subjects were eligible if they were 18 to 65 years old and reported no previous cardiovascular morbid event (e.g., stroke, myocardial infarction) or major medical problem (e.g., diabetes) other than hypertension. Individuals taking antihypertensive medication were eligible if they were willing and able to discontinue treatment for two weeks prior to participation. The analysis sample was comprised of the 308 subjects (91%) who had the blood pressure and questionnaire data required for the present analyses. Subjects who were excluded from this report due to missing data were more likely to be Black than included subjects ($p=.02$), but were not significantly different with regard to age, sex, body mass index, labeled hypertension, or “true” hypertension status (by ambulatory blood pressure, ABP).

After providing informed consent, subjects completed demographic, medical and psychosocial questionnaires. Height and weight were measured twice, and the average was used to calculate body mass index. Subjects were fitted with ABP monitors (Spacelabs 90207 or Meditech CardioTens), which were calibrated against simultaneous auscultatory readings to within 5 mm Hg. The monitors were programmed to take readings every 20 minutes throughout the 24-hour study period.

Measures

Labeled hypertension was defined as participants' self-reports of ever having been diagnosed with hypertension or high blood pressure, or prescribed antihypertensive medications. To rule out possible effects of blood pressure elevation itself, it is necessary to control for an objective measure of hypertension when testing effects of the diagnostic label. However, this is complicated by the fact that the clinic blood pressure measurements most often used to establish hypertension status can be affected by previous labeling experiences. In an earlier study,²¹ we found that individuals who reported having been labeled in the past exhibited greater elevations in clinic blood pressure relative to ABP (i.e., larger white coat effects), in part due to increased anxiety in the clinical setting. ABP is considered the gold standard of blood pressure measurement;²² therefore, hypertension status based on ABP, rather than clinic blood pressure, was controlled to evaluate the independent effects of labeling. "True" hypertension was defined as having an average awake ABP $\geq 135/85$ mm Hg, off medication.²³ Average awake ABP was calculated using subjects' self-reported sleep and wake times. A minimum of 5 valid awake readings was required; the average number was 40.9 (SD = 10.7) readings per subject.

Depressive symptoms were assessed with the Beck Depression Inventory (BDI),²⁴ a 21-item measure of cognitive, affective and somatic symptoms. Scores range from 0 to 63; a score of 10 or greater suggests clinically significant depressive symptoms. Health-related quality of life was assessed with the Short Form (SF)-36,²⁵ a 36-item self-report measure of eight domains of well-being: physical functioning, role limitation due to physical problems, bodily pain, general health, mental health, role limitation due to emotional problems, social function and vitality. These subscales are weighted and combined to yield Physical Component Summary (PCS) and Mental Component Summary (MCS) scores. These scores have a range of 0 to 100, where higher scores reflect better health, and are normalized to a mean of 50 and standard deviation of 10 to allow comparisons with the general U.S. population.

Analysis

T-tests and χ^2 tests were used to compare labeled and unlabeled subjects on continuous and categorical variables, respectively. The primary hypothesis was tested using analysis of covariance (ANCOVA). In the first model, the effects of labeled hypertension status and race on PCS, MCS and BDI scores were tested, controlling for age, sex, body mass index and true hypertension status (by ABP). Repeating the analyses with continuous ABP measures did not meaningfully alter the findings (results not reported). Although all subjects who were being treated with antihypertensive medications were withdrawn from their medications for at least 2 weeks prior to their ABP recording, previous or ongoing side effects could potentially impact mood as well as perceived physical and mental health. Therefore, antihypertensive medication use prior to study enrollment was included as an additional covariate. Following the main effects models, interaction terms were added to determine whether the effects of labeling differed by race (the primary hypothesis) or by age, sex, or true hypertension status. Plots of the adjusted means are shown for significant interaction effects.

Socioeconomic status (SES) is hypothesized to contribute to many health disparities,^{26,27} therefore its role in the hypothesized race differences in labeling effects was explored. Because race and SES are so strongly related, it is often difficult to disentangle their effects. The Neighborhood Study provides a unique opportunity to examine this question since by design, the sample included a wide range of SES within each racial group. Years of education and total family income (adjusted for family size) were used as indicators of SES. Given that the four NYC hospitals from which subjects were recruited served very different patient populations, possible effects of study site were also examined. The sites were combined into two groups based on their socioeconomic characteristics: (1) Harlem and North General, and (2) Cornell and Mount Sinai. Main effects and interactions of SES and site with race and labeled hypertension were tested using ANCOVA, as described for the primary analyses.

Analyses were conducted using SPSS v.19.

RESULTS

Sample Characteristics

Demographic characteristics of the final study sample are presented in Table 1. The mean age was 45 years, and 61% of the sample was female. By design, approximately half the subjects were Black (54%), since the primary aim of the study was to compare aspects of blood pressure between Blacks and Whites. On average, labeled subjects were older ($p < .001$) and had a higher BMI ($p = .001$) than those who had never been labeled, but there were no significant sex or race differences between the two groups. While labeled subjects were much more likely to be truly hypertensive (by ABP; $p < .001$), as expected, it is noteworthy that 20% of the unlabeled subjects were hypertensive while 23% of the labeled subjects were not hypertensive by ABP.

Effects of Labeling on Health-Related Quality of Life

The first set of analyses concerned the effects of labeled hypertension on self-reported physical and mental health. Subjects who had previously been labeled reported poorer physical functioning compared with unlabeled subjects ($B = -3.88$, $p = .001$); the mean PCS scores were 50.8 and 54.7, respectively, after adjusting for covariates. Given that the PCS is scaled to have a standard deviation (SD) of 10 in the general population, this represents a quite substantial difference of almost 0.4 SD. Other significant predictors of poorer physical health were Black race ($B = -2.91$, $p = .002$), older age ($B = -0.13$, $p = .004$), female sex ($B = -2.65$, $p = .004$) and higher BMI ($B = -0.23$, $p = .007$). Interestingly, true hypertension status was not significantly associated with self-reported physical health ($p = .14$). Adding interaction terms to the model revealed that the negative effect of labeling on physical functioning was similar for Blacks and Whites. The impact of labeling also did not differ by age, sex, or true hypertension status (ps for all interactions $> .17$).

Labeled subjects also reported poorer mental health compared with unlabeled subjects ($B = -3.76$, $p = .02$). Of the covariates, only previous medication use ($B = 3.78$, $p = .03$) and younger age ($B = 0.11$, $p = .07$) were at least marginally associated with poorer mental health; again, true hypertension was unrelated ($p = .61$). The interaction model indicated that the effect of labeling on mental health did not differ by age, sex, or true hypertension status ($ps > .11$); however there was a large, statistically significant difference between races ($B = 7.65$, $p = .002$ for the interaction). Examination of the within-race effects revealed that being labeled as hypertensive was associated with poorer mental health among Blacks ($B = -7.89$, $p < .001$), but was unrelated to mental health among Whites ($B = 1.95$, $p = .44$). A plot of this interaction is shown in Figure 1.

Effects of Labeling on Depressive Symptoms

Not surprisingly, results for depressive symptoms paralleled those for mental health. Subjects who had been labeled as hypertensive reported significantly more depressive symptoms compared with unlabeled subjects ($B=3.04$, $p=.01$). BDI score was not associated with true hypertension ($p=.28$) or any of the other covariates ($ps>.10$). Again, there were no differences in the effect of labeled hypertension by age, sex, or true hypertension status ($ps>.41$), but there was a significant interaction with race ($B=-4.38$, $p=.01$). Labeled hypertension was associated with more depressive symptoms among Blacks ($B=5.19$, $p=.002$), but was not related to depression among Whites ($B=0.19$, $p=.90$). As shown in Figure 2, the mean BDI score among labeled blacks (adjusted for covariates) was 9.9, which approaches the cutoff for clinically significant depressive symptoms.

The Role of Socioeconomic Status

Secondary analyses were performed to evaluate whether SES or study site helped to explain these findings. Differences in race, SES and hypertension status by site are shown in Table 2. Socioeconomic differences were also observed within the group of Black subjects: compared with those recruited from Cornell and Mount Sinai, Black subjects from Harlem and North General had significantly lower income (\$22,255 vs. \$38,424; $p=.006$) and education levels (13.5 vs. 14.3 years; $p=.01$). Harlem/North General and Cornell/Mount Sinai subjects did not differ with regard to the proportion who were hypertensive by ABP ($p=.21$) or who reported having been labeled as hypertensive ($p=.40$). However, the proportion of “misclassified” normotensives (i.e., those with normal ABP but who reported having been diagnosed with hypertension) was more than doubled in the Harlem/North General group compared with the Cornell/Mount Sinai group (20% versus 9%, $p=.04$). Labeling status did not differ by race overall ($p=.38$), but Blacks from Harlem/North General were three times as likely to be misclassified normotensives as Blacks from Cornell/Mount Sinai (21% vs. 7%, $p=.07$).

The next set of analyses tested the contribution of SES (education, income) and study site to the observed race differences in the psychological effects of labeling. Adjusting for the earlier set of covariates, lower income was associated with both poorer mental health ($p=.002$) and greater depressive symptoms ($p=.03$), but neither education ($ps>.64$) nor site ($ps>.43$) was related to either outcome ($ps>.58$). Controlling for SES and site in the primary analyses did not affect those results. Further, none of the three-way interactions among labeling, race and SES or site were significant for mental health ($ps>.57$) or depressive symptoms ($ps>.20$), indicating that the greater psychological impact of hypertension labeling among Blacks versus Whites is not explained by SES or study site.

DISCUSSION

The present findings are consistent with previous research demonstrating a negative impact of hypertension labeling on physical and psychological well-being,⁶⁻¹⁷ but to our knowledge, ours is the first study to demonstrate race differences in these effects. Having been labeled as hypertensive was associated with greater depressive symptoms and poorer mental health among Blacks, but was not related to these measures among Whites. On the other hand, both Blacks and Whites who had been labeled as hypertensive reported poorer physical functioning than those who had never been labeled.

An important feature of this study was the use of ABP monitoring, which provided the measure of “true” hypertension status. All but one¹⁷ of the previous studies we are aware of in this area have classified participants by clinic blood pressure, a less accurate measure that itself can be affected by labeling.²¹ The fact that the present findings were independent of

true hypertension status as determined by ABP increases our confidence that the observed effects can be attributed to the hypertension label rather than BP elevation and associated sequelae per se.

The majority of subjects in this study who were labeled as hypertensive did, in fact, have hypertension. However, almost one-quarter of labeled subjects (23%) were found to be normotensive by ABP (i.e., incorrectly believe they are hypertensive). Given that the interaction between labeled and true hypertension status was not a significant predictor of physical or psychological health, it appears that the negative impact of labeling does not differ by “true” hypertension status. Consistent with previous research, both correctly labeled hypertensives and “mis-labeled” normotensives (which includes some white coat hypertension) report poorer functioning. These findings support the interpretation that the *belief* that one’s blood pressure is elevated contributes to poorer self-reported health and greater depressive symptoms, whether or not this belief is accurate.

The mechanisms underlying labeling effects are not well understood. With regard to self-reported physical health, studies of hypertension labeling and work absenteeism suggest the adoption of a “sick role” among the newly diagnosed.⁵ In one study,⁸ an increase in self-reported symptoms mediated the association between hypertension awareness and absenteeism, despite the fact that hypertension is largely asymptomatic. This is consistent with theories of illness cognition that would predict that being labeled contributes to the perception of physical symptoms and limitations that are believed, correctly or not, to be consistent with hypertension.²⁸ Illness beliefs may also help to explain race differences in psychological effects of labeling. Previous studies have shown that Blacks believe that high blood pressure is a more serious health concern than Whites,²⁹ and are less likely than Whites to believe that lifestyle change can lower blood pressure.³⁰ Greater perceived seriousness and lower feelings of personal control may leave Blacks more vulnerable to the negative psychological reactions to the diagnosis.³¹

Although neither SES nor study site explained the race differences in labeling effects, Blacks from Harlem/North General were more likely to be “mis-labeled” than those from Cornell/Mount Sinai and therefore more likely to be unnecessarily exposed to the consequences of labeling. This is consistent with a previous study in which rates of hypertension awareness were higher in Chicago neighborhoods that were more disadvantaged or had higher proportions of Blacks.³² Such findings likely reflect efforts to increase screening in high-risk populations, which may be accompanied by other differences in physicians’ interactions with patients as well. For example, in a study of treated hypertensives, Black patients reported that their physicians discussed health risks associated with hypertension and the importance of medications for blood pressure control more often than did White patients.²⁹ Future research should investigate the extent to which aspects of patient-physician communication (e.g., amount, content, message framing) influence the impact of hypertension labeling and contribute to race differences in these effects.

Several limitations of this study should be noted. First, the cross-sectional design precludes causal inferences regarding the effects of hypertension labeling. The possibility that individuals who experience problems with physical or psychological functioning are more likely to seek health care, and therefore have their hypertension detected, cannot be ruled out. Prospective studies are needed to demonstrate changes in these measures before and after blood pressure screening and diagnosis. Also, the exclusion of more severe and treated hypertensives from the study limits the generalizability of these findings. It is possible that including these groups would have revealed effects of true hypertension status or antihypertensive medication use. This is unlikely, however, in light of evidence that antihypertensive treatment tends to improve, rather than impair, quality of life in this

population.^{33,34} Finally, average ABP was based on only one 24-hour period; although ABP is more reliable than clinic BP,³⁵ multiple days of monitoring might have further improved the measure of true hypertension.

Conclusions

Given the high prevalence of hypertension, labeling effects are a significant public health concern. Depressive symptoms and declines in quality of life are important outcomes, and are associated with increased cardiovascular disease and mortality risk.^{36–38} Labeling effects may also help to explain why disparities in blood pressure control persist despite higher hypertension detection and treatment rates among Blacks.¹ Depression is associated with poor medication adherence;³⁹ thus, if Blacks are more vulnerable to negative psychological effects, hypertension labeling could reduce the likelihood of achieving blood pressure control among this high-risk group. Developing strategies for communicating diagnostic information that minimize the negative effects of labeling and increase the likelihood of positive outcomes such as health behavior change and medication adherence is thus an important area for future research. Whether being diagnosed with prehypertension, which affects an additional 31% of U.S. adults,⁴⁰ also has negative effects is another important research question.⁴¹

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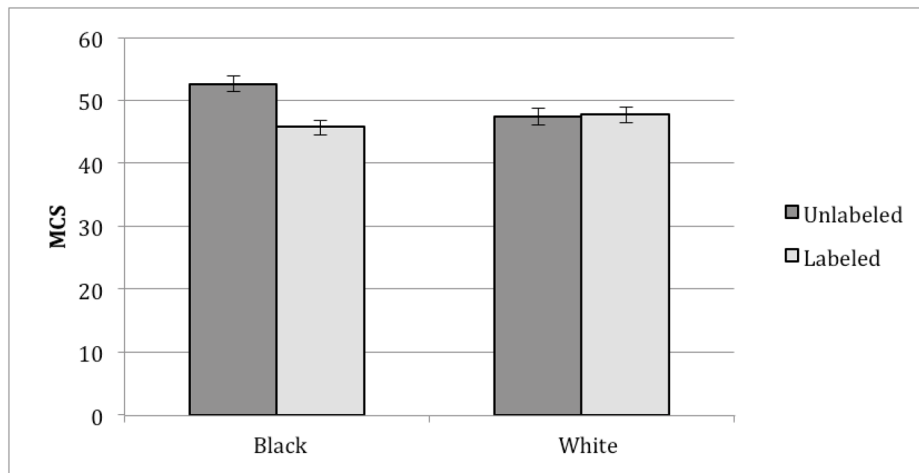


Figure 1. Mean Mental Component Scores (MCS) by labeled hypertension status and race, adjusted for age, sex, body mass index, previous medication use and “true” hypertension status. Standard error bars are shown for each mean.

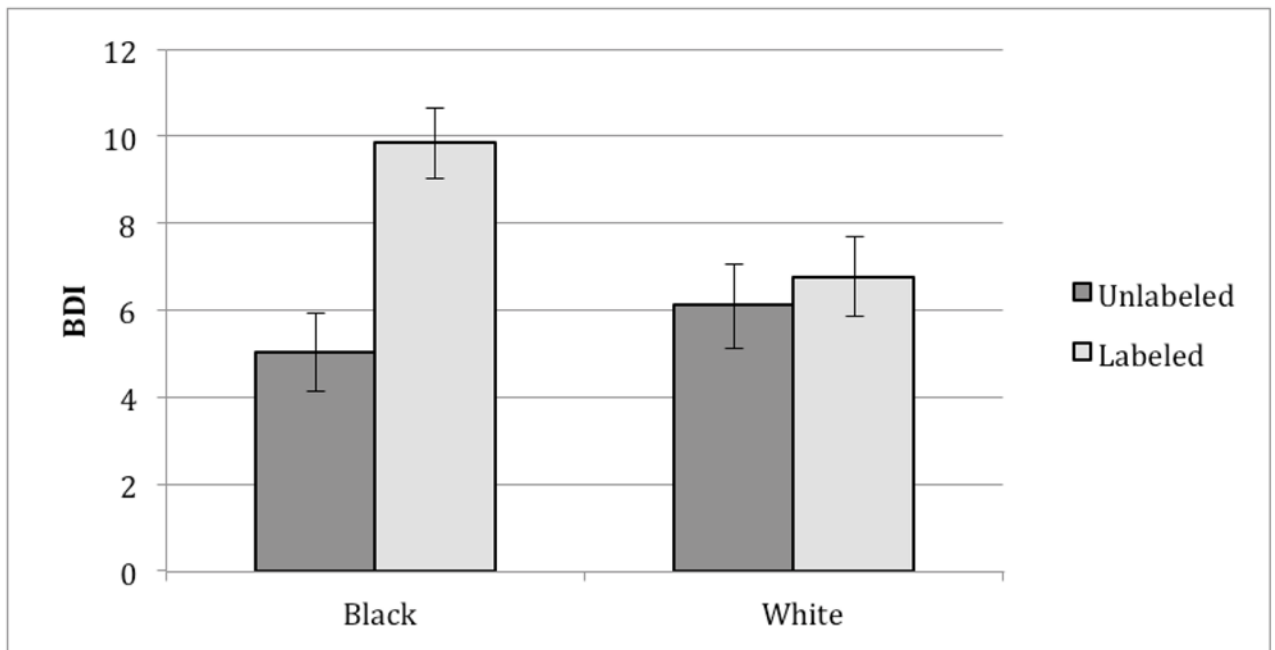


Figure 2. Mean Beck Depression Inventory (BDI) scores by labeled hypertension status and race, adjusted for age, sex, body mass index, previous medication use and “true” hypertension status. Standard error bars are shown for each mean.

Table 1

Participant Characteristics by Labeled Hypertension Status.

	Unlabeled (N=144)	Labeled (N=164)	Total (N=308)	<i>p</i>
Age	42.2 ± 10.5	47.9 ± 10.3	45.2 ± 10.7	<0.001
Sex (% Female)	63.2%	59.8%	61.4%	0.54
Body Mass Index	28.0 ± 5.5	30.1 ± 5.3	29.1 ± 5.5	0.001
Race (% Black)	53.5%	54.9%	54.2%	0.81
BP Status, by ABP (% HTN)	20.1%	77.4%	50.6%	<0.001
Daytime ABP, systolic	124.3 ± 11.8	144.6 ± 16.2	135.1 ± 17.5	<0.001
Daytime ABP, diastolic	77.6 ± 8.5	88.8 ± 10.2	83.6 ± 11.0	<0.001

Table 2

Socioeconomic Characteristics and Blood Pressure Classification by Study Site.

	Harlem/North General (N=95)	Cornell/Mount Sinai (N=213)	<i>p</i>
Race (% Black)	90.5%	38.0%	<0.001
Education (years)	13.6 ± 2.2	15.5 ± 2.1	<0.001
Income (\$)	26,062 ± 32,574	53,002 ± 43,008	<0.001
HTN by ABP (%)	53.1%	45.3%	0.21
Labeled HTN (%)	56.8%	51.6%	0.40