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DO DOCTORS CONTRIBUTE TO THE SOCIAL PATTERNING OF DISEASE? THE CASE OF RACE/ETHNIC DISPARITIES IN DIABETES MELLITUS

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Abstract

Data from the Boston Area Community Health (BACH) survey show that both undiagnosed signs and symptoms and diagnosed Type 2 Diabetes Mellitus (T2DM) are patterned by socio-economic status (SES). Such patterning is corroborated by National Health and Nutrition Examination Survey (NHANES) data for diagnosed T2DM. Complementary data from an experiment concerning clinical decision making show T2DM is patterned by race/ethnicity, following diagnosis by a physician. Undiagnosed signs and symptoms of T2DM in the community are patterned by SES (rather than race/ethnicity), but following diagnosis by primary care physicians they are patterned more by race/ethnicity (rather than by SES). Race/ethnicity and SES in the US are almost totally confounded, such that measuring one is essentially also measuring the other. Physician patterning of T2DM by race/ethnicity however motivates the search for genetic and biophysiologic explanations and distracts attention from the more important contribution of SES circumstances to the prevalence of diabetes mellitus.

INTRODUCTION

That the prevalence of Type-2 Diabetes Mellitus (T2DM) varies substantially by race/ethnicity in the US is considered a well-established epidemiologic fact. Both the National Institutes of Health (NIH) (2006) and the American Diabetes Association (ADA) (2009) report race/ethnicity to be a major independent contributor to T2DM. Assuming the race/ethnic disparity in T2DM to be real, researchers seek its explanation in either: (a) social and behavioral risk factors or life styles; or increasingly, (b) genetic contributions and family history. We consider a third possible contributor to race/ethnic disparities in T2DM – the racial/ethnic patterning resulting from diagnostic decisions, principally by primary care providers. Notwithstanding the possibility of a modest race/ethnic contribution, we question whether the reported wide race/ethnic variation in the prevalence of physician diagnosed T2DM accurately reflects its actual distribution in the general population. We hypothesize the actual prevalence of signs and symptoms of T2DM, when undiagnosed in the community, is patterned far more strongly by SES (than by race/ethnicity), but when eventually diagnosed by physicians it is patterned more by race/ethnicity (than by SES).

This paper addresses three questions:

1. How are signs and symptoms suggesting T2DM patterned in the general population before they are diagnosed by a physician (controlling for the effects of race/ethnicity, SES, age and gender)?

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2. Is there evidence of race/ethnic disparities in the prevalence of self-reported physician diagnosed diabetes in the general population (after controlling for SES, age, and gender)? and

3. Are there race/ethnic differences in the diagnosis of diabetes when physicians are experimentally presented with signs and symptoms of diabetes (after controlling for SES, age, and gender)?

Answering these three related questions requires different methodological approaches, described in detail below. The first and second questions require data from population-based probability sample surveys. Ideally, the third question requires data from a study specifically designed to provide un-confounded estimates of social variations in diagnostic decision making at the level of primary care.

NEW CONTRIBUTION

This study capitalizes on the rare opportunity provided by the availability of two different but complementary studies (a population-based epidemiological survey and an experiment concerning physician decision making). Use of two large community-based random sample surveys, with sufficient numbers of black, Hispanic and white subjects, detailed information on major indicators of SES, and the availability of self-reported signs and symptoms allows for a unique examination of the effects of race/ethnicity on the prevalence undiagnosed signs and symptoms of diabetes as well as self-reported physician diagnoses of diabetes. Our experimental study of physician's clinical decisions provides unconfounded estimates of the independent effects of race/ethnicity versus socioeconomic status on the patterning of diabetes by primary care physicians.

CONCEPTUAL FRAMEWORK

Sociologists use the term "reification" to denote the common error of considering an abstraction to be a material thing (real) and attributing causal powers to it – sometimes called the "fallacy of misplaced concreteness" (Whitehead, 1997). Officially reported prevalence rates (e.g., race/ethnic differences in T2DM) are assumed to estimate the real distribution of diseases in society: they are considered "a fact", and precipitate the well-intentioned search for bio-physiologic, genetic and behavioral explanations (misplaced concreteness). An equally plausible explanation for disparate rates could lie in the complex sorting process physicians engage in (consciously or unconsciously) with certain individuals or groups. Departing from Durkheimian positivism, which assumes epidemiologic rates (e.g., suicide) to be "real" (Durkheim, 1951), social scientists have shown how health statistics are "socially constructed" requiring clearance of a number of social hurdles, one of which is physician decision making and central to the creation of observed rates of disease (Hindess, 1973; Bloor, 1976; Irvine, 1979; White, 2009). Social constructionism provides a plausible complementary explanation for health disparities and has deep theoretical roots in the work of Berger and Luckman (1966), following philosophical foundations developed by Heidegger (1978), Husserl (1982) and Schutz (1962). Hacking (1999) observes social constructionism applies not only to worldly items, like things and facts, but also to beliefs about them. Social constructionism denotes an ongoing dynamic process that is reproduced by people acting on their interpretations and their available knowledge. It seeks to uncover the ways social phenomena, like prevalence rates, are initially created, institutionalized and become part of established knowledge (Searle, 1995; Vygotsky, 1978).

From the social constructionist perspective, disease rates are essentially the sum total of individual diagnoses (labels) applied by a health professional, usually a physician, to some constellation of signs and symptoms presented by different types of patients (Becker, 1963).

Research on the contribution of providers to disease disparities has been strongly encouraged both by the Institute of Medicine (2003) and the National Institutes of Health (2006), but the process by which this occurs remains poorly understood (Van Ryn, 2002).

METHODS

The Boston Area Community Health (BACH) Survey (Addresses Questions No. 1 and 2)

Estimation of the magnitude and distribution of undiagnosed signs and symptoms of diabetes in the general population necessarily requires use of an appropriately designed, community-based, random sample survey, rather than administrative data reporting the results of clinical encounters. The BACH study is an NIH supported epidemiologic survey of Boston residents aged 30–79 years, conducted from 2002–2005. Detailed methods have been described elsewhere (McKinlay & Link, 2007). Briefly, a stratified two-stage cluster sample was used to recruit residents of Boston with approximately equal numbers of participants by gender, race/ethnicity (non-Hispanic black, Hispanic, non-Hispanic white), and age group (30–39, 40–49, 50–59, 60–79). In total, 5503 adults participated (1767 black, 1877 Hispanic, 1859 white; 2301 men and 3202 women). The response rate was 63.3% of eligible participants, which is typical of an epidemiologic field survey in recent years with a demanding two-hour in-home protocol, sensitive questioning and including anthropometric measurements and phlebotomy. All protocols and procedures were approved by the New England Research Institutes' Review Board, and signed informal consent was obtained prior to beginning the study.

Race/ethnicity was determined by self-report from each subject (Office of Management and Budget, 1997). Following the method of Green (1970), SES was constructed as a function of standardized education and income variables for the Northeastern United States, (Green, 1970) (with weights of .7 for education and .4 for income), and categorized such that approximately ¼ of the study population was lower, ½ middle, and ¼ upper SES. The BACH sampling scheme oversampled those of lower SES, leaving the smallest number of respondents in the upper SES group (129 black, 71 Hispanic, and 585 white respondents). Following advice from diabetes specialists and primary care physicians, six cardinal signs and symptoms were identified which together would be sufficient to permit a provisional diagnosis of the disease (obviously to be confirmed by subsequent testing). They were as follows: (underlined responses count as affirmative for diabetes):

1. Fatigue: How much during the past four weeks did you have a lot of energy (none of the time, a little of the time, some of the time, a good bit of the time, most of the time, all of the time) OR Much of the time during the last week I could not "get going" (yes, no);
2. Being overweight: was based on interviewer measured height and weight (body mass index (BMI) ≥25 kg/m^2);
3. Frequent urination: During the last month, how often have you had to urinate again less than two hours after you finished urinating (I do not have the symptom, rarely, a few times, fairly often, usually, almost always); OR During the last month, how often have you had frequent urination during the day (I do not have the symptom, rarely, a few times, fairly often, usually, almost always); OR In the last seven days, on average, how many times have you had to go the bathroom to empty your bladder during the day (0–7, 8+); OR During the last month, how often have you had to get up to urinate more than once during the night (I do not have the symptom, rarely, a few times, fairly often, usually, almost always); OR In the last seven days, on average, how many times have you had to go to the bathroom to empty your bladder during the night after falling asleep (0–1, 2+);

4. Thirst: Number of 8 oz. servings of non-alcoholic beverages daily (0–9, 10+);
5. Not feeling well: In general, would you say your health is (excellent, very good, good, fair, or poor); and
6. Hypertension: Have you ever been told by a health care provider that you have or had high blood pressure (yes, no); OR interviewer measured systolic blood pressure ≥ 130 mmHg; OR interviewer measured diastolic blood pressure ≥ 85 mmHg.

For the purposes of this research, a person not previously diagnosed with diabetes who reported at least 5 of these 6 cardinal symptoms was considered highly likely to have undiagnosed T2DM. Our interest here is in the prevalence of undiagnosed signs and symptoms strongly suggesting T2DM (as it is experienced by patients in the community), not the prevalence of physician diagnosed diabetes. To determine physician diagnosed diabetes, subjects were asked: "Have you ever been told by a doctor or health professional that you have diabetes or sugar diabetes (other than during pregnancy)."

National Health Examination And Nutrition Study (NHANES) (Addresses Question No. 2)

Publically available data from NHANES (Centers for Disease Control and Prevention, 2011a), collected between 1999–2006 (overlapping in time with the BACH survey) were used for people aged 30–79 years (to correspond with the ages collected in BACH). T2DM was ascertained by self-report of a physicians' diagnosis of the condition. Consistent with the BACH study described above, recorded race/ethnicity was used (non-Hispanic black, non-Hispanic white, and Hispanic) and SES was determined using education and household income (Green, 1970). The cut-offs for SES differed slightly from those used for the BACH study (due to the higher level of education and income in the Boston area) and aimed to create approximately ¼ lower, ½ middle, and ¼ upper income levels.

An Experiment to Examine T2DM Decision Making (Addresses Question No. 3)

To examine the way primary care physicians would diagnose different patients presenting with signs and symptoms strongly suggesting diabetes, we employed a factorial experimental design and used clinically authentic videobased scenarios with professional actors/actresses (McKinlay, Potter, & Feldman, 1996; Feldman et al., 1997). A factorial experiment is a research design consisting of two or more factors (e.g. race/ethnicity, gender, and socioeconomic status) each with discrete values (or 'levels"). All possible combinations of these levels across the factors are then randomly assigned to subjects.. Such experiments permit estimation of the effect of each factor on the response variable, as well as the effects of interactions between factors and the response variable (Fisher, 1971; Box, Hunter, & Hunter, 2005). This approach permits estimation of the unconfounded effect of a "patient's" race/ethnicity (also age, gender and SES) on diagnostic decision making when primary care physicians encounter different randomly assigned patients presenting with exactly the same signs and symptoms strongly suggesting undiagnosed diabetes. Professional actors and actresses were recruited in New York City and trained (under experienced physician supervision) to realistically portray a "patient" presenting to a primary care provider with the signs and symptoms listed in Table 1. Twenty-four absolutely identical versions of the clinical scenario were filmed, systematically varying only the "patient's" race, age, gender, and SES. The encounter simulated an initial patient interview with a primary care physician and was 5–7 minutes in duration, reflecting the average length of such a consultation (face time) (Konrad et al., 2010). Immediately after viewing the scenario, experimental subjects (physicians) were asked for their most likely diagnoses, along with their level of certainty, and completed an interview which included questions concerning how they would manage the case in their everyday practice. Specific measures to protect external validity are discussed below.

An ordered version of a clinical vignette varying only the "patient's" race/ethnicity (non-Hispanic black, Hispanic, or non-Hispanic white), age (35 or 65 years), gender, and SES (as depicted by their dress and occupation as a janitor or a lawyer) was shown to each of 192 licensed internists, family physicians, or general practitioners practicing in New Jersey, New York, or Pennsylvania. Physicians were also required to be graduates of an accredited medical school in the US and to be providing clinical care at least half time. Since this study was part of a larger international study concerning the management of T2DM in different countries (health care systems) it was not possible to include international medical graduates (IMGs). We stratified physician subjects according to gender and level of clinical experience (graduated from medical school between 1993–1999 (less experience) or between 1969–1983 (more experience)) (there were 2×2=4 strata) and recruited eligible physicians until each of the 4 strata was complete. Each of 24 vignette pairs was viewed twice in each of the 4 strata for a total of (24×2×4=) 192 physicians.

The scripts for the clinical vignettes were developed from tape-recorded role-playing sessions with experienced, clinically active physicians, and independently checked for authenticity by local area clinicians who regularly encounter patients with diabetes. Studies by our team (Arber et al., 2006; McKinlay et al., 2007) and others (Peabody, Luck, Glassman, Desselhaus, & Lee, 2000) reveal that video-based clinical scenarios have advantages over both standardized patients and written scenarios, and produce valid results.

As summarized in Table 1 the "patient" was overweight and presented during the video encounter with symptoms thought to be strongly suggestive of diabetes, including increased fatigue, non-intentional weight loss over more than three months without diet or increased exercise, increased thirst, frequent urination, and not feeling well. These closely correspond with the (undiagnosed) cardinal symptoms discussed above with respect to the BACH study, with the exception of unexplained weight loss which was not available in the BACH study. This study was conducted from 2005–2007—contemporaneous with the epidemiologic surveys. Details concerning our experimental methodology and the laborious efforts to ensure the videos were clinically authentic have been reported elsewhere (Feldman et al., 1997; McKinlay et al., 1996).

We deliberately gave priority to obtaining a purposive sample (ensuring eligible physicians were recruited to fill each design cell and preserve orthogonality), rather than a random sample of physicians (designed to ensure the generalizability of results). The number of physicians (experimental subjects) required for the purposive sample is dictated by the magnitude of the primary experimental effect(s) to be detected, with at least 80% power, assuming a two-sided test statistic (significant $\alpha < 0.05$). For the estimation of main effects, a total of 192 physician subjects gives 80 percent power to detect an absolute difference of 20.4 percent for two groups, and an absolute difference of 24 percent for three groups.

Screening telephone calls were conducted to identify eligible physician subjects and an hour-long, in-person interview was scheduled. All protocols were reviewed by the NERI Institutional Review Board (IRB) and written informed consent was obtained from all subjects before beginning the experiment.

STATISTICAL ANALYSIS

For the BACH data the prevalence of undiagnosed T2DM and reported physician-diagnosed T2DM was estimated by race/ethnicity and SES and these rates were compared across race/ethnicity or SES levels using a chi-square statistic. The odds of (undiagnosed) diabetes were estimated using logistic regression for two models: (a) including terms for race/ethnicity and age (by decade only); (b) including terms listed in (a) with the addition of SES (lower, middle, upper) and (c) adding further terms (hypertension, gestational diabetes,

family history of diabetes, BMI, and physical activity). All analyses were weighted to reflect the sampling strategy and post-stratified to the population in Boston according to the 2000 census. Multiple imputation was used to replace missing data by estimated values. The SAS MI procedure (SAS Institute Cary, NC) was used to create 25 imputed data sets using a Markov chain Monte Carlo option. Less than 1% of the data were missing with the exception of income for which 4%, 11%, and 3% was missing for Black, Hispanic, and White participants respectively. For NHANES data, the prevalence of diabetes was estimated by race/ethnicity and SES using the survey weights for people aged 30–79 years, and analyzed as for the BACH data.

For the factorial experiment, an analysis of variance was used to estimate the un-confounded effects of all design factors including race/ethnicity, while simultaneously estimating all two-way and higher interactions.

RESULTS

How are Signs and Symptoms of Undiagnosed T2DM Patterned in the General Population?

Estimated rates for the combination (5+) of signs and symptoms indicative of undiagnosed diabetes among BACH participants are presented in Figure 1 which depicts these rates by race/ethnicity and SES, with 95% confidence intervals. There were no significant race/ethnic differences in the prevalence of the (undiagnosed) signs and symptoms indicative of diabetes within a socioeconomic level (lower class χ^2 p=.79, middle class χ^2 p=.34, upper class χ^2 p=.40). However, significant differences are evident by SES (χ^2 p<.0001), and they are consistent within each race/ethnic category. Figure 2 shows that when adjusting for only age and gender and not SES (panel a), the race/ethnic difference in undiagnosed signs and symptoms of T2DM is highly significant (p=.0007) (Black: Odds ratio (OR) 1.89, 95% Confidence Interval (CI) 1.32, 2.70; Hispanic: OR 2.21, CI 1.42, 3.46; White: OR 1.0 (reference)). However, when SES is added to the model (panel b), the race/ethnic differences are almost completely eliminated from the odds ratios, and are no longer significant (p=.519) (Black: OR 1.25, CI 0.85, 1.83; Hispanic: OR 1.19, CI: 0.74, 1.90); White OR 1.0 (reference). In a separate analysis (data not presented) SES was adjusted for the effects of age, gender and race/ethnicity (the equivalent of panel b in Figure 2). The results still revealed significant SES differences in undiagnosed T2DM. This indicates that race/ethnicity is a surrogate for SES, but that SES is not a surrogate for race/ethnicity. Undiagnosed signs and symptoms of T2DM in the community are significantly patterned by SES (rather than by race/ethnicity).

The Patterning of Physician-Diagnosed T2DM in the General US Population

To estimate the prevalence of physician diagnosed T2DM, BACH subjects were asked if they had ever been told by a health professional that they had specified medical conditions (one of which was diabetes). Self-reports of major illnesses have been found to correlate well with medical records (Okura, Urban, Mahoney, Jacobsen, & Rodeheffer, 2004). The rates of diagnosed T2DM in BACH are displayed in Figure 3 and reveal socioeconomic differences that are remarkably consistent with data already presented for the undiagnosed symptoms (Figure 1). Within each SES group, there are no race/ethnic differences (lower class χ^2 p=.22 middle class χ^2 p=.72, upper class χ^2 p=.24). There is a however a significant effect due to SES, either overall (chi-square p<.0001), or within each race/ethnic group (black chi-square p=.0001, Hispanic chi-square p=.0075, white chi-square p=.0001). Therefore, the apparent variation in diagnosed T2DM by race/ethnicity is likely due to SES and not to race/ethnicity per se. Figure 4 summarizes analyses comparable to those presented in Figure 2. In a model with only age and gender included (panel a), there are significant race/ethnic differences in the prevalence of diagnosed T2DM (p<.0001). These

race/ethnic differences are marginally significant once SES is added to the model (panel b, p=.04), and disappear once variables thought to be associated with the prevalence of T2DM (American Diabetes Association, 2011), specifically hypertension, gestational diabetes, family history of diabetes, body mass index, and physical activity, are added to the model (panel c, p=.28). As noted with respect to results presented in Figure 2, an equivalent adjustment of SES differences by race/ethnicity had little impact on the SES rates, confirming that race/ethnicity is a surrogate for SES, even for diagnosed rates.

Whether the significant influence of SES on T2DM evident in BACH is generalizable to the wider US population is demonstrated in Figure 5, which summarizes an equivalent analysis of NHANES data on reported diabetes diagnoses from 1999–2006 data and shows a strikingly similar relationship between race/ethnicity and SES. Again, the SES gradient is present within each race/ethnic category but not vice versa. In summary, the picture that emerges from the BACH data is corroborated by independent analysis of contemporaneous NHANES data – that the prevalence of diagnosed diabetes is significantly influenced by SES, but not by race/ethnicity. This consistency reinforces the generalizability of the strong SES gradient for undiagnosed diabetes found in the BACH data, as well as the SES rather than the widely accepted race/ethnic differences in diabetes.

How are Signs and Symptoms of Diabetes Diagnosed by Primary Care Providers?

Overall, 60.9 percent of the physicians recruited to the experiment concerning physician decision making provided a diagnosis of T2DM: 73.4 percent of the physicians' diagnosed T2DM when the "patient" was black, 60.9 percent when Hispanic and 48.4 percent when white (p=.009). Figure 6 summarizes these marked variations in diagnosis depending on the patient's race/ethnicity. Recall, while "patients" in the experiment were varied (by race/ethnicity, gender, age and SES), they all presented with exactly the same signs and symptoms of diabetes (Table 1). Our experimental design permits un-confounded estimation of the influence of race/ethnicity on diagnosis, while simultaneously controlling for the other patient attributes included (age, gender and SES). The race/ethnic differences in Figure 6 are fully adjusted for the "patient's" age, gender and SES, as in earlier Figures 2 and 4 (second panels). Reinforcing this, the percent of physicians giving a diabetes diagnosis was 64.5 percent for lower SES patients (janitor) versus 57.3 percent for upper SES patients (lawyer) (p=.265) and the corresponding level of certainty for lower SES patients was 24.4 compared to 20.4 for upper SES patients, (p=.241). In other words, in making an initial diagnosis, physicians focus more on the "patient's" race/ethnicity rather than their SES.

CONCLUSIONS AND IMPLICATIONS

Data from both epidemiologic surveys (BACH and NHANES) reveal that whether considering undiagnosed signs and symptoms of diabetes in the community, or reported diagnoses of diabetes, their distribution is strongly patterned by SES, adjusted for race/ethnicity (and that race/ethnic disparities are not evident once adjustment for SES is made). Complementary data from the factorial experiment reveal that physicians differentially diagnose diabetes by race/ethnicity, rather than by SES. Because an experimental methodology is employed, the estimated effects of race/ethnicity and SES are independent of each other and no further analytic adjustment is required.

The population-based survey results (Figures 1–5) contrast with those from our experiment concerning physician decision making, where we found significant variation by race/ethnicity, but no variation by SES (Figure 6). We hypothesize that this apparent discrepancy is due to the fact that US physicians, probably unconsciously, attend to a patient's more visible racial and ethnic characteristics while overlooking less obvious SES characteristics.

The significant effect of this is clearly reflected in the analysis of population-based epidemiologic data.

From a Bayesian perspective, a physicians' patterning of T2DM is presumed to be a logical consequence of their perception that the disease is more prevalent among minority groups—that is, it reflects statistical discrimination. Elsewhere (Maserejian, Lutfey, & McKinlay, 2009) we have shown (with respect to the diagnosis of coronary heart disease) that physicians base rates are often incorrect, and appear to be disregarded anyway —in other words there is little correspondence between the pattern of their diagnosis and the pattern of their base rates (apriori probabilities). Regardless of whether there is some difference in prevalence by race/ethnicity, this report suggests that attending primarily to race/ethnic variations is misplaced, and that the contribution of physician patterning of T2DM must be considered.

Our report has a number of strengths and some unavoidable limitations. First, with regard to strengths, use of two large community-based random sample surveys, with sufficient numbers of black, Hispanic and white subjects and detailed information on major indicators of SES is a distinct strength. The consistency of results between these two surveys provides strong evidence for an SES rather than a race/ethnicity gradient in rates of T2DM – both diagnosed and undiagnosed. Second, availability of self-reported signs and symptoms permits estimation of the prevalence of likely disease conditions in their undiagnosed state. With regard to potential limitations, first the measure of SES (Green, 1970) can be questioned since education and income may not have the same meaning across different race/ethnic groups (Kaufman, Cooper, & McGee, 1997). However, there is currently no consensus on a single best measure of SES for health research (Oakes & Rossi, 2003). We have compared our measure of SES with other indicators (e.g., poverty status based on income and household size, and responses to a question concerning "trouble paying for basics") and find good agreement. While only limited information on the "patient's" SES was provided to subjects in our experiment, namely occupation and dress, this was sufficient to cause physicians to propose consistently more actions for the upper SES "patient" (Shackelton, Marceau, Link, & McKinlay, 2009). Second, the BACH study had to exclude certain minority groups (such as Asians or Native Americans) because they are not well represented in the Boston area. However, we have found that the prevalence of many co-morbidities in BACH subjects to be similar to national surveys including NHANES, the National Health Interview Survey (NHIS), and CDC's Behavioral Risk Factor Surveillance System (BRFSS). Thus, with suitable modifications (due to different demographics), our findings appear to have national application. Third, the declining response rates in epidemiologic surveys raise the possibility of selection bias. The secular decline in response rates in population-based surveys, as distinct from convenience samples of patients, is an increasing concern for researchers. Working against an even higher response rate was BACH's demanding in-home, two hour interview on sensitive subjects (urologic symptoms) and the requirement of a blood draw and anthropometric measurements. Despite these concerns, BACH and NHANES results were remarkably consistent.

An advantage of the experimental approach is that it produces un-confounded estimates of likely influences of the patient variables included (race/ethnicity, SES, age) on physicians' clinical decisions. While experiments may provide excellent internal validity they necessarily raise threats to external validity (whether study physicians respond as they would with real patients). Four precautionary steps were taken to strengthen external validity (involvement of clinically active physicians to generate clinically authentic scenarios, insertion of questions concerning the typicality of the scenario, conducting the interviews in the practice office often sandwiched between real patients, and physician subjects were explicitly requested to view the video-based "patient" as one of their own patients, and to

respond as they normally would in everyday practice). Ninety two percent of physician subjects reported the filmed ‘patients’ were either typical or very typical of the real patients they encountered everyday, which gives some reassurance as to the external validity of the experimental findings. Generalizability of findings from the experimental component of this research can be limited by the extent to which the physician subjects represent relevant groups of physicians. As noted above, it was not possible to include international medical graduates (IMGs) in this study. Purposive sampling was employed to ensure all strata were filled with the number required to preserve orthogonality and the integrity of the experiment. With regard to the later two limitations, however, bias was eliminated in the racial/ethnic and SES comparisons of interest through randomization. We consider clinically authentic video-based vignettes a marked improvement on both written scenarios and use of standardized patients. Unlike written scenarios, video-based vignettes permit important nonverbal cues to be embedded (e.g., race, age, gender and obesity) without drawing specific attention to them in writing. While there was some resistance to the use of video-based scenarios when they were first introduced, they have been shown in many different studies to produce results that are both valid and useful (Veloski, Tai, Evans, & Nash, 2005; Dresselhaus, Peabody, Lee, Wang, & Luck, 2000; Peabody et al., 2000; McKinlay et al., 1996; Green, 1970).

In summary, this paper suggests that the signs and symptoms of T2DM, when undiagnosed in the general community, are patterned by SES and not race/ethnicity and that following diagnosis by a physician they are patterned by race/ethnicity. Elsewhere we have shown that race/ethnicity and SES in the US are almost totally confounded (Link & Mckinlay, 2010) such that measuring one is essentially measuring the other as well unless the study design provides for their independent estimation, as in the surveys and experiment analyzed here. Racial and ethnic minorities in the US are disproportionately of lower SES. Consequently, when physicians incorrectly attend to the highly visible race/ethnicity of a patient with diabetes signs and symptoms, while overlooking their likely less obvious SES, they may coincidentally produce prevalence rates that are close to the actual SES distribution of diabetes in the US population. In other words, they may get the right answer, but possibly for the wrong reason. The problem produced by this coincidental correctness is that any resulting efforts to reduce or eliminate disparities are likely to be misfocussed. Searching for causes and eventually interventions associated with race/ethnicity (like genetics, family history and biophysiology), while not unimportant, may distract from explanations and interventions specifically designed to address the real culprit – the significant effect of SES on the prevalence of T2DM in society.

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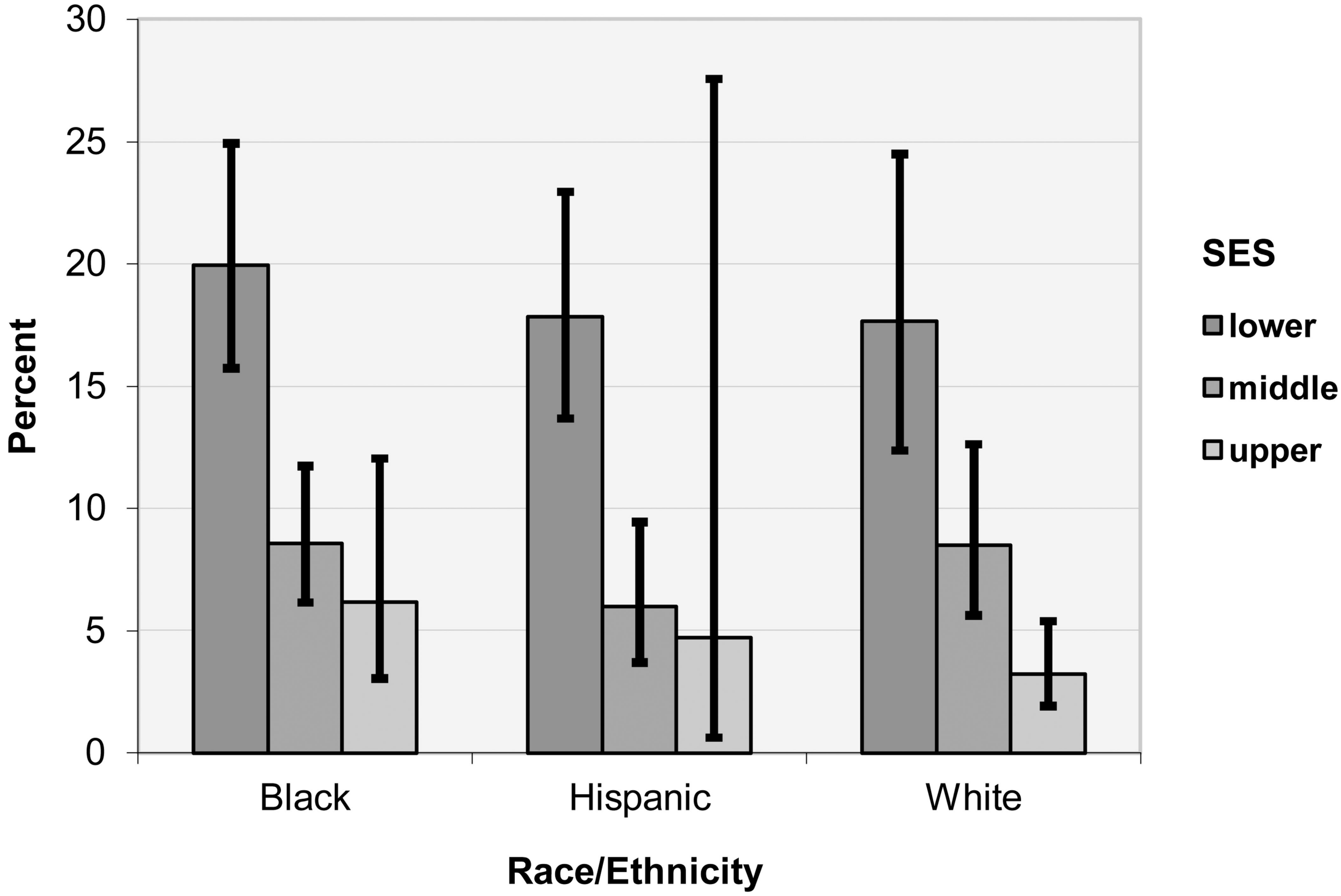

Figure 1. THE PREVALENCE OF UNDIAGNOSED SIGNS AND SYMPTOMS OF T2DM BY RACE/ETHNICITY AND SOCIO-ECONOMIC STATUS (with 95% confidence intervals).*

* The sample sizes for undiagnosed diabetes for lower middle and upper SES are: black (663, 692, 121) Hispanic (1086, 449, 63) white (326, 793, 563). Source: Data from the Boston Area Community Health Survey (2002–2005).

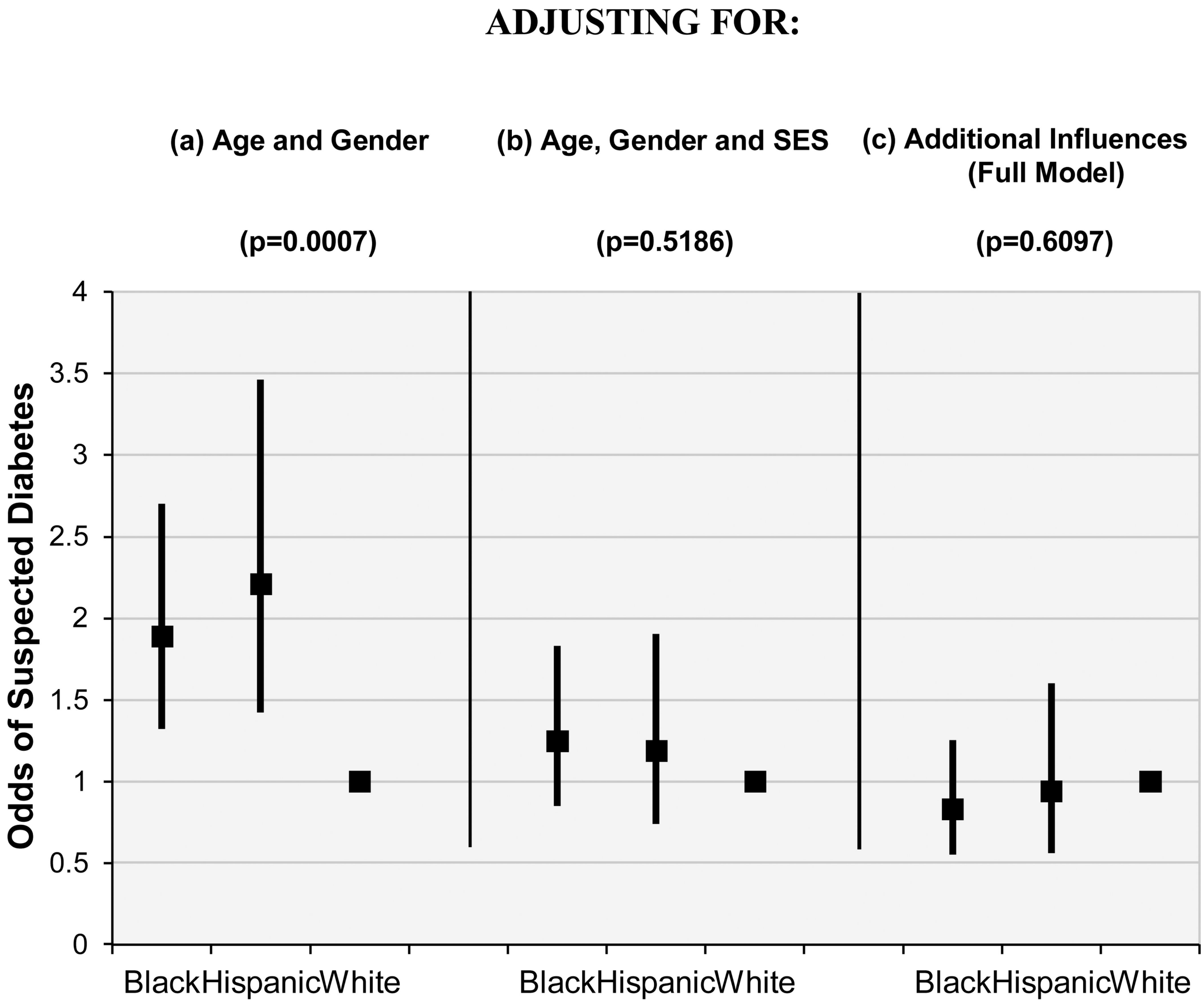

Figure 2. THE ODDS RATIOS FOR UNDIAGNOSED SIGNS AND SYMPTOMS OF T2DM AFTER ADJUSTING FOR DIFFERENT VARIABLES

This figure reveals a significant race/ethnic difference in the odds of reporting diabetes symptoms after adjusting for just age and gender (panel a). This difference becomes insignificant after adjusting for SES (panel b) and is even slightly reversed when additional variables reported to be related to T2DM are included (panel c). These additional variables include hypertension, family history of T2DM, body mass index, physical activity, health insurance status, trouble paying for basics and gestational diabetes.

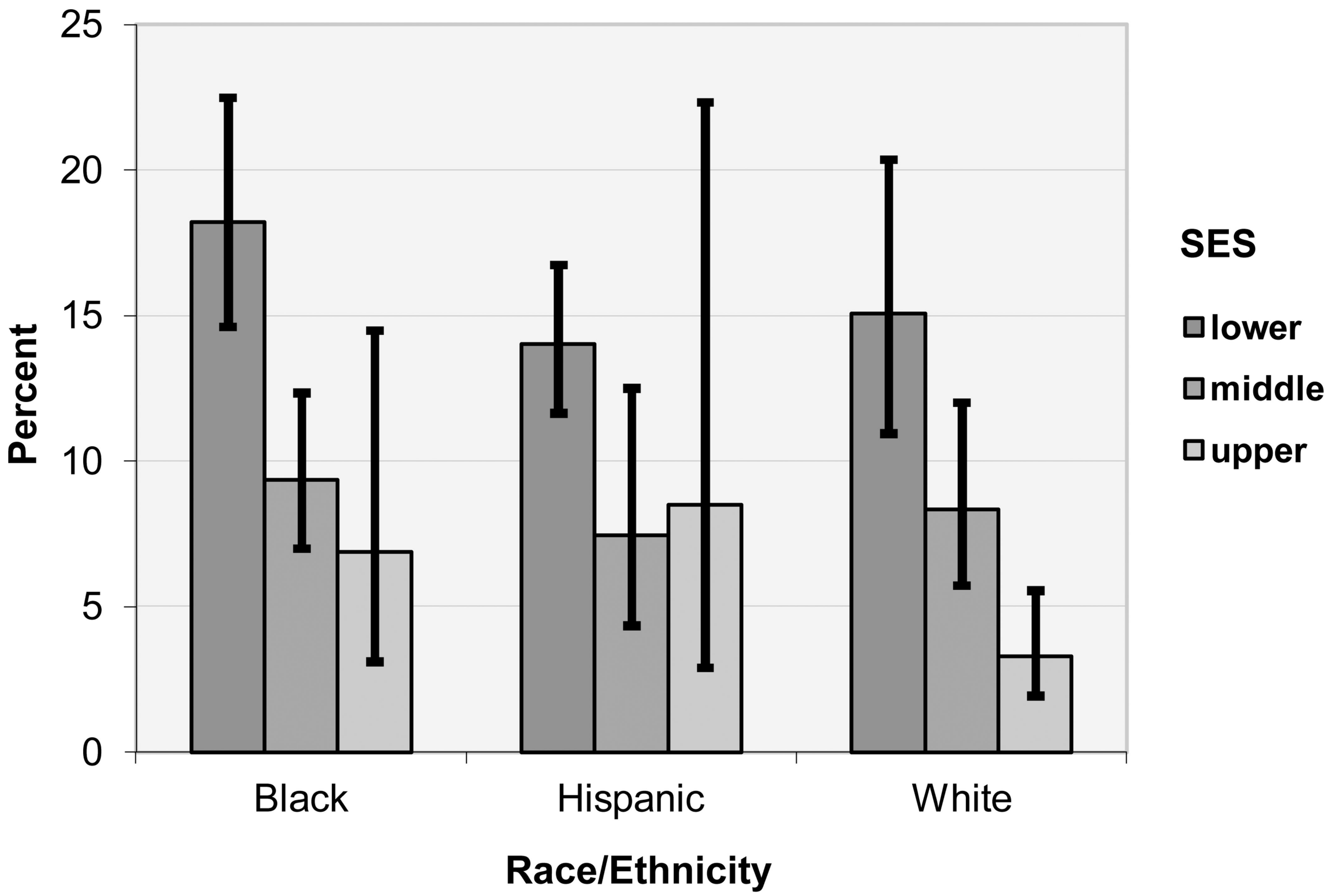

Figure 3. THE PREVALENCE OF PHYSICIAN DIAGNOSED T2DM IN THE BOSTON COMMUNITY, BY RACE/ETHNICITY AND SOCIO-ECONOMIC (with 95% confidence intervals)

There are no race/ethnic differences in diagnosed diabetes, but there are significant differences by SES, and these are present within each race/ethnic category.

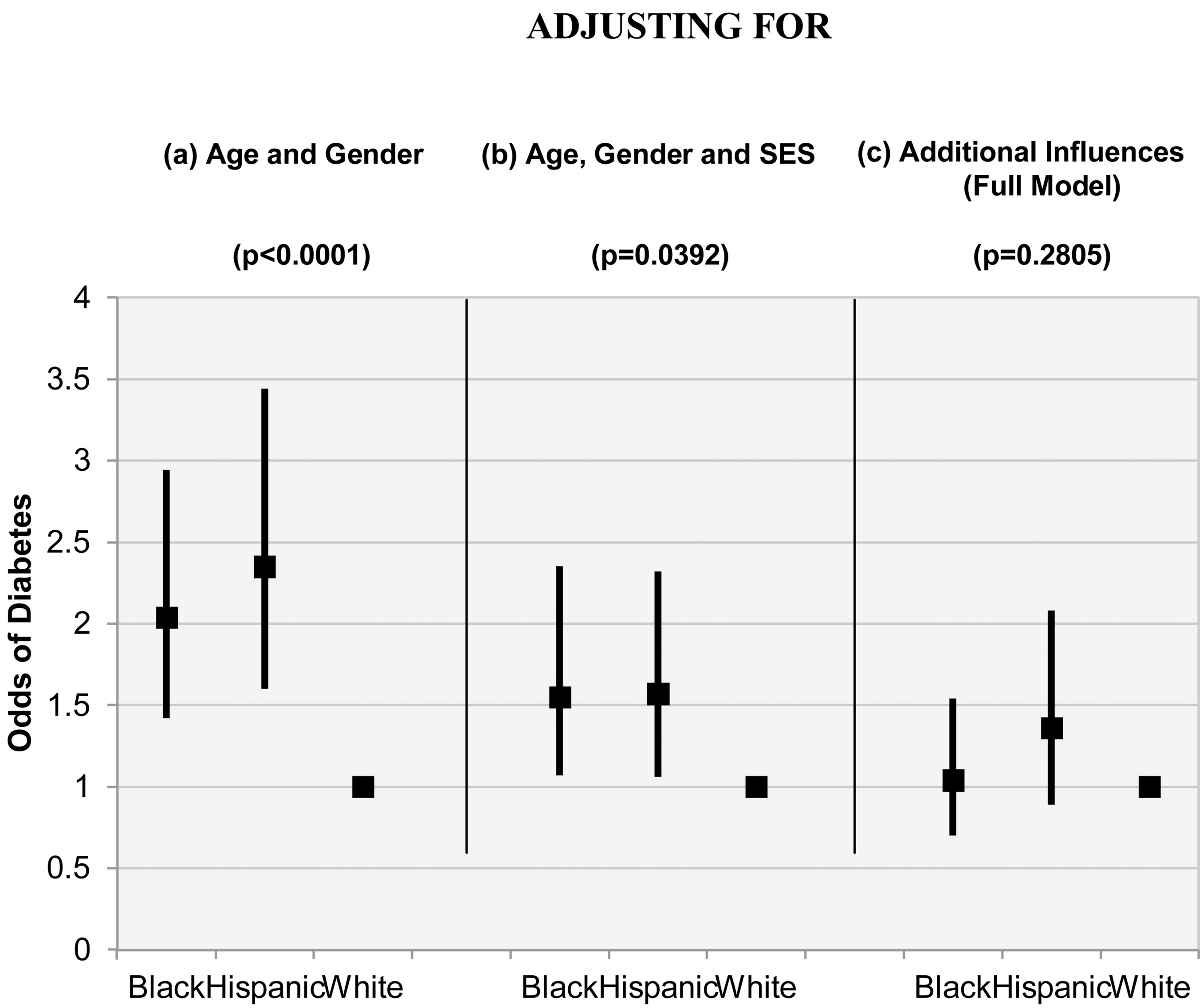

Figure 4. THE ODDS OF DIAGNOSED T2DM IN THE BOSTON COMMUNITY, AFTER ADJUSTING FOR DIFFERENT VARIABLES (with 95% confidence intervals)

This figure shows a significant race/ethnic difference in the odds of reporting diagnosed diabetes after adjusting for just age and gender (panel a). This becomes insignificant after adjusting for SES (panel b) and is slightly reversed when other influences are included (panel c).

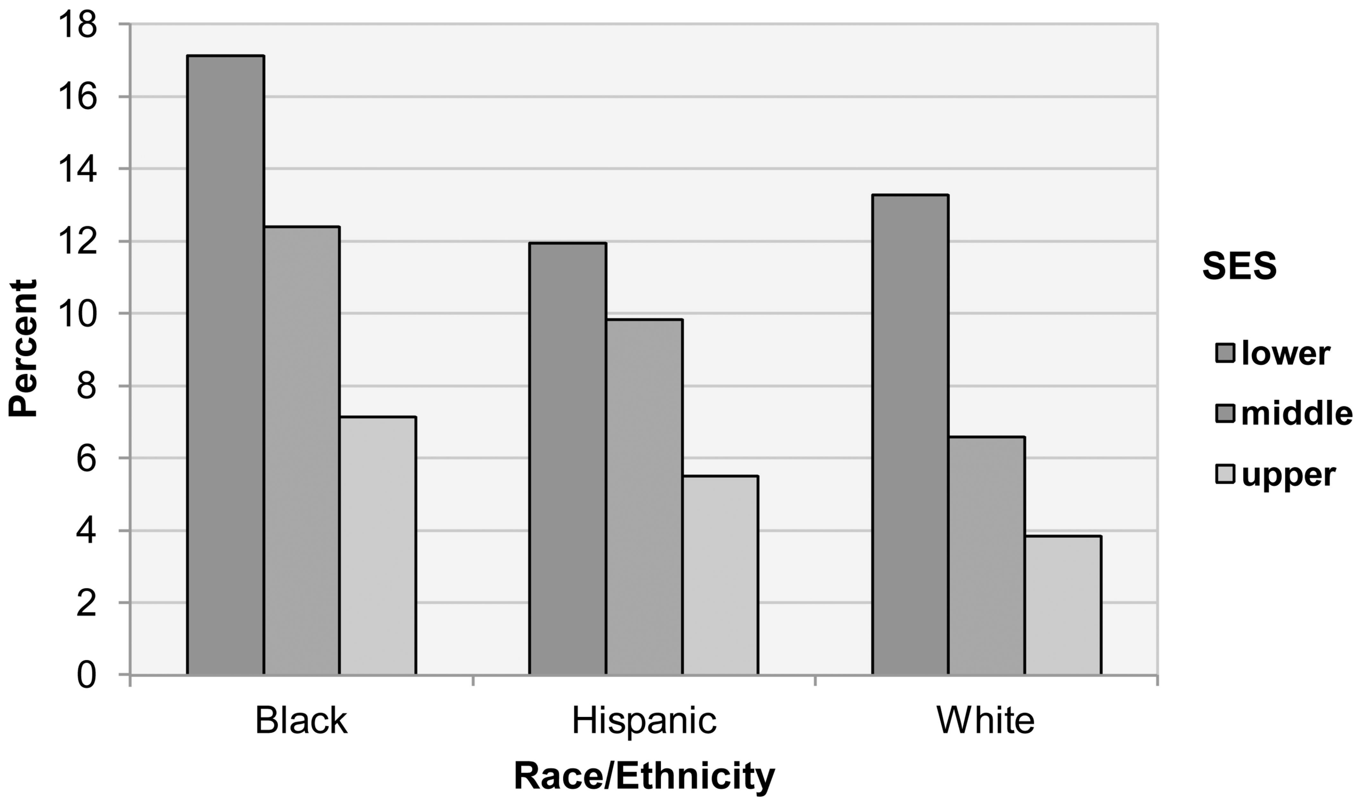

Figure 5. THE PREVALENCE OF DIAGNOSED T2DM BY RACE/ETHNICITY AND SOCIO-ECONOMIC STATUS AGE 30–79

Source: Data from the National Health and Nutrition Examination Survey (NHANES) 1999–2006.

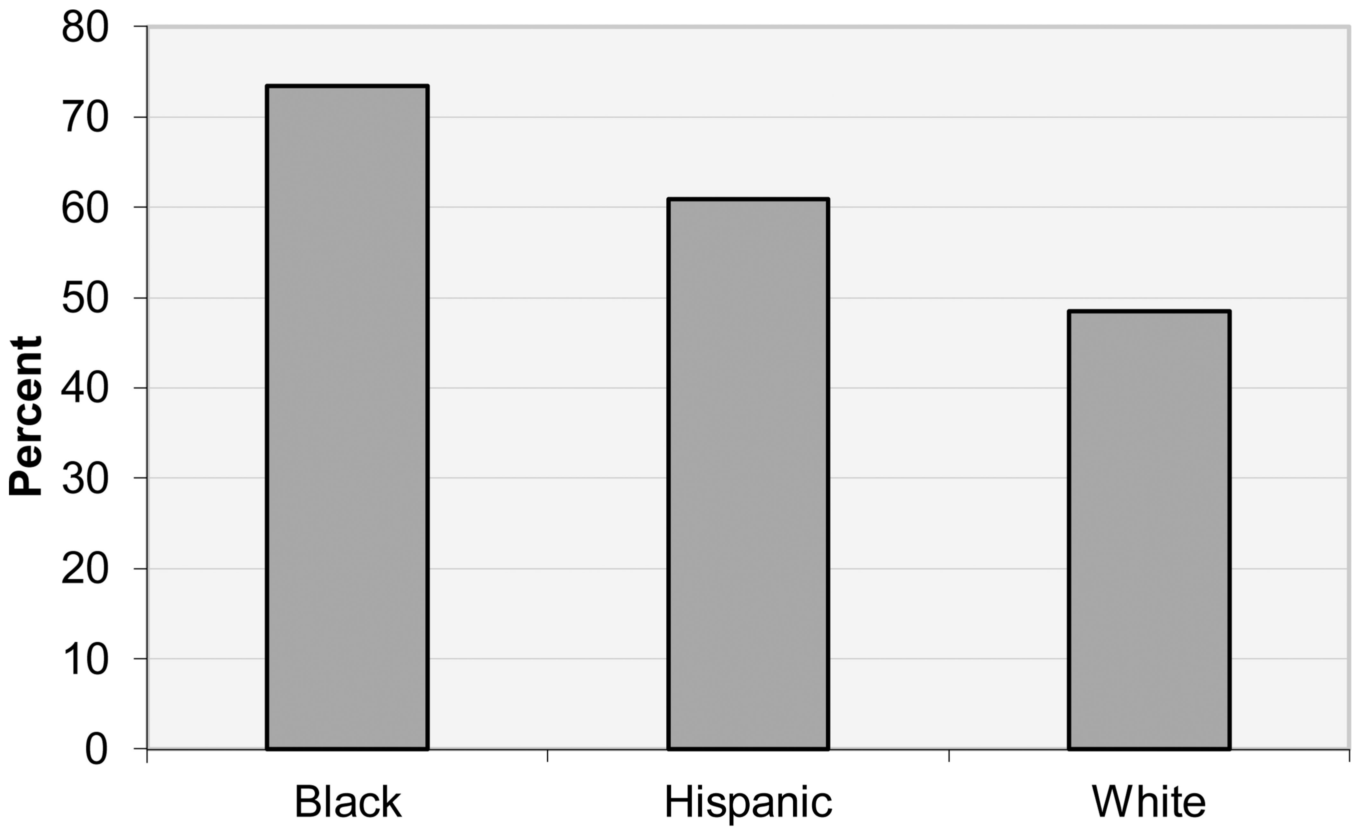

Figure 6. RACE/ETHNIC DIFFERENCES IN THE DIAGNOSIS OF DIABETES BY PRIMARY CARE PHYSICIANS

Physicians are significantly more likely to diagnose diabetes in black and Hispanic “patients”. The orthogonal design of the factorial experiment controls for the affect of age gender and SES. Diagnosis of diabetes by race/ethnicity: data from a balanced factorial experiment (N=192) (p=0.009).

TABLE 1

SYMPTOMS OF T2DM (WITH REALISTIC DISTRACTIONS) EMBEDDED IN A CLINICAL SCENARIO: A CASE SUGGESTING UNDIAGNOSED DIABETES

Signs and Symptoms	Distractions
• Thirst	Patient concern about heart disease
• Fatigue	High blood pressure (135/95)
• Frequent urination	Drinking a lot of caffeine
• Non-intentional weight loss for more than 3 months without changing diet	Hasn’t been to doctor in several years
• Not feeling well	
• Overweight	

NOTE: Since patients seldom present as “textbook cases” some minor distractions were embedded to increase the clinical authenticity of the scenarios.