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Is Decedent Race an Independent Predictor of Organ Donor Consent, or Merely a Surrogate Marker of Socioeconomic Status?

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Abstract

Background—Studies have demonstrated that African American race is a strong predictor of non-donation. However, it is often and correctly argued that African American race is a crude explanatory variable that is a surrogate marker of socioeconomic status (SES), education and access to health care. We hypothesized that when controlling for these factors, African American race would cease to be a predictor of organ donation.

Methods—A retrospective review was performed of 1292 Alabama decedents approached for organ donation between 2006 and 2009. Multivariable logistic regression models were constructed to identify the most parsimonious model that could explain the variation in the log-odds of obtaining consent.

Results—Consent for donation was obtained from 49% of the decedent's families. Household income was a predictor of organ donor consent only in Caucasians. Surprisingly, household income was not statistically different between consented and non-consented African American

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decedents (\$25,147 vs. \$26,137; $p=0.90$). On multivariable analysis, education, urban residence and shorter distance between the decedent residence and donor hospital were significantly associated with obtaining consent for organ donation. On univariate analysis, the odds of donor consent in Caucasians compared to African Americans was 2.76 (95% CI 2.17 – 3.57). When controlling for SES and access to healthcare variables, the odds of donor consent increased to 4.36 (95% CI 2.88 – 6.61).

Conclusions—We interpret this result to indicate that there remains unknown but important factor(s) associated with both race and obtaining organ donor consent. Further studies are required to isolate and determine whether this factor(s) is modifiable.

Keywords

Socioeconomic Status; Organ Donation; Education; Marital Status

INTRODUCTION

Consent rates for organ procurement from deceased donors varies across the United States. Several studies have been performed to identify barriers for organ donor consent. Certain demographics have consistently been associated with non-donation. African American race is one of the most significant prognostic variables associated with non-donation. Multiple studies have demonstrated that African American race is a strong predictor of non-donation. (1-5) However, it is often and correctly argued that African American race is a crude explanatory variable that may be a surrogate marker of income, education and access to health care.(6-9) Studies suggest that the decreased socioeconomic status (SES) observed in African Americans compared to Caucasians accounts for much of the observed racial disparities in health.(10-12) However, even after adjustment for SES, there remains a clear decrease in access to medical care observed for African Americans as evidenced by geographic residential segregation and a decrease in the delivery of a broad range of medical procedures compared to Caucasians.(13-17) Therefore, it is not clear that African American race itself is an independent predictor of non-donation, or merely a surrogate marker of socioeconomic status and measures of access to health care. The impact of household income, education level, residence (urban vs. rural) and distance to donor hospital on deceased donor consent rates have not been fully evaluated. Our hypothesis is that lower household income, lower education level, rural residence and longer distance to the donor hospital will be strong predictors of non-donation. Furthermore, we hypothesize that when controlling for these SES variables and measures of access to healthcare, African American race will cease to be a significant predictor of organ donation.

RESULTS

a) Population Demographics

Compared to the general Alabama population, there were higher percentages of males and African Americans among potential donors whose families were approached for organ donation consent. Potential donors were also older than the general population and less likely to be married. Consent was obtained from 49% (637/1292) of the decedent's families over the 4-year study period. Although 38% of the 4.7 million people living in the state of Alabama are registered organ donors(18), only 18% (229/1292) of the decedents approached for consent were registered organ donors. (Table 1)

b) The Effect of Socioeconomic Status on Organ Donation Consent

i) Household income—Increasing household income was associated with consent for organ donation (Figure 1). For every \$10,000 increase in household income, the odds ratio

of obtaining donor consent was 1.33 (95% CI 1.19 – 1.48, $p<0.001$). Stratified by race, however, household income was a predictor of organ donor consent only in Caucasians. There is a clear stepwise increase in organ donation as a function of increasing household income in Caucasians although a similar trend was not observed in African Americans. (Figure 1) Household income was higher in Caucasian families in which consent was obtained compared to decedents in which consent was not obtained (\$35,305 vs. \$33,058; $p=0.001$). In contrast, household income was not significantly different between African American families in which consent was obtained compared to those in which consent was not obtained (\$25,147 vs. \$26,137; $p=0.90$).

ii) Education—A similar number of potential donors were high school graduates (74.9% vs. 75.3%, $p=0.28$) but fewer potential donors had obtained a bachelors degree (12.0% vs. 19%, $p<0.0001$; Table 1) compared to the general Alabama population. Stratified by race, there was no significant difference in the proportion of African Americans compared to Caucasians with a high school diploma (71.6% vs. 77.2%, $p=0.06$) or who had completed at least some college (26.9% vs. 32.1%, $p=0.09$).

Increased education was a significant predictor of organ donation. There was no significant difference between those decedents who had completed high school compared to those without a high school diploma whereas the odds ratio of organ donation for decedents who had completed some college compared to those without a high school diploma was 1.76 (95% CI 1.31 – 2.37, $p<0.001$). (Figure 2)

iii) Marital status—The highest consent rates were observed in the never married (55.5%) and divorced groups (54.5%), followed by the married group (45.5%), while the lowest consent rates were observed in the widowed group (35.9%). There was a negative relationship between married decedents and organ donor consent. Compared to decedents who were not married (including never married, widowed and divorced), the odds ratio of organ donor consent in married decedents was 0.75 (95% CI 0.56 – 0.92, $p=0.013$). The negative association between married decedents and organ donor consent was similar between African Americans and Caucasians.

c) The Effect of Urban vs. Rural Residence and Distance Between Decedent Residence and Donor Hospital on Organ Donation Consent

i) Urban vs. rural residence—Significantly fewer decedents whose families were approached for organ donation resided in a rural location (34.7% vs. 45.0%, $p<0.0001$; Table 1). Organ donor consent was significantly increased in decedents with an urban residential home address compared to a rural residential home address (OR 1.55, 95% CI 1.16 - 2.08, $p=0.0019$; Figure 3). The association between urban residence and organ donation was similar between Caucasians and African Americans. However, only 16.1% of African American decedents approached for organ donation consent had a rural address compared to 45.1% of Caucasians.

ii) Distance between decedent residence and donor hospital

Consent for organ donation was strongly correlated with the distance between the decedent home residence and donor hospital. The distance to the donor hospital was less than 100 miles in 143 decedents, between 100 and 200 miles for 771 decedents, and over 200 miles in 279 decedents. For every 100-mile interval further away from the donor hospital, the odds ratio of donor consent was 0.59 (95% CI 0.47 – 0.75, $p<0.0001$). The impact of distance between home address and the donor hospital on organ donor consent was similar between African Americans and Caucasians. However, African American decedents approached for organ donation were much more likely to live closer to the donor hospital ($p<0.0001$). For

example, 15% of African Americans lived within 100 miles of the donor hospital compared to only 10% of Caucasians. In contrast, only 15% of African Americans lived over 200 miles from the donor hospital compared to 28% of Caucasians.

d) Multivariable Analysis of Predictors of Decedent Organ Donor Consent

A multivariable analysis was performed to measure the strength of effect of race on organ donation when controlling for SES, education, marital status, residence (urban vs. rural) and distance to donor hospital. The model also controlled for other decedent demographics and organ center practices that previous work had demonstrated to be significantly associated with organ donor consent.(21) Caucasian race, urban residence, education beyond a high school diploma and shorter distance to hospital were significantly associated with organ donor consent on multivariable analysis. (Table 2) Surprisingly, household income was not significant when controlling for other variables. Models were developed examining income as a categorical predictor (quintiles and \$10,000 increments) as well as a continuous variable, with no change in association.

e) Effect of African American Race on Decedent Organ Donor Consent

On univariate analysis, the odds of donor consent in Caucasians compared to African Americans was 2.76 (95% CI 2.17 – 3.57, $p<0.001$). When controlling for SES and access to healthcare variables, the odds of donor consent in Caucasians compared to African Americans increased to 4.36 (95% CI 2.88 – 6.61, $p<0.001$). (Table 2)

DISCUSSION

There have been nationally sponsored, large-scale efforts to disseminate “best practice” organ donor approaches to decedents and their families, which have manifested in significant increases in donor consent and recovered organs in the past decade.(22) Unfortunately, organ donation recently has peaked in the US and even slightly decreased in the past 2 years.(23) Examination of nationally available organ procurement data suggests that organ donation goals are being met in most Caucasian decedents but a large disparity in organ donation exists in African American decedents.(23) One of the largest sources of unrealized potential organ donors is African American decedents.

Large qualitative research efforts have investigated the underlying reasons for why African American race is associated with non-donation.(24) Certain attitudes and beliefs are prevalent among African Americans unwilling to donate organs. A cultural mistrust of the medical system has been demonstrated to be a dominant non-donation attitude,(5, 25, 26) especially in older African Americans(27). Central to this concern is a fear that physicians will not do all they can to save the life of those identified as potential organ donors.(25, 28, 29) Other common beliefs impacting donation is that organ allocation is unfair(4, 29) and that there is a black market for organ donation(4). Such attitudes and beliefs may be strongly influenced in African Americans living in the South with knowledge of the Tuskegee Syphilis Study, arguably the most infamous biomedical research study in US history.(30)

Although African American race is statistically a strong predictor of non-donation,(1-5) African American race is also a well-established predictor of lower SES and poorer access to health care.(6-17) We hypothesized that when controlling for SES and access to health care, decedent African American race would fail to be a significant predictor of organ donation. Much to our surprise, the data seems to suggest exactly the opposite. SES and access to healthcare variables were actually masking the magnitude of effect of decedent race on organ donor consent. When controlling for SES and access to healthcare, the odds ratio of donor consent in Caucasians compared to African Americans increased from 2.76 to

4.36. Our multivariable model (Table 2) demonstrates that decedent race was the most highly weighted variable. This observation is partially explained by African Americans being more likely to have an urban residence address and live closer to the donor hospital compared to Caucasians. However, there remains unknown but important factor(s) associated with both African American race and obtaining organ donor consent. Contrary to our hypothesis, this factor does not appear to be household income, marital status, education level or disparities in healthcare access. Perhaps most surprising is the nearly identical household income in African American donors (\$25,147) and non-donors (\$26,137). The association between increasing household income and donor consent was observed only in Caucasians. (Figure 1) One interesting phenomena observed in the lowest income quintile group of Caucasians was a higher donation rate than in the next 2 quintile groups (Figure 1). Unfortunately, this study does not provide insights as to why this is the case although this interesting phenomena deserves further study.

As with all retrospective database studies, this investigation has limitations. First, the study population consists of decedents who died in Alabama and there were not significant number of Hispanics or Asians for analysis. Second, only 4% of the decedent families were approached by an African American requesting consent limiting the ability to measure the effect of requestor race on donor consent. Third, SES was calculated from the US census tract data and is limited by the data collection practices and assumptions used by the US Census Bureau(19). Fourth, some of the variables considered may be statistically similar such as shorter distance to donor hospital and urban residence. Finally, obtaining organ donor consent from the decedent's family is a complex multistep psychosocial process; the experiences, attitudes and decisions made by the families represented in this study may or may not be generalizable.

In conclusion, certain decedent SES factors and measures of access to healthcare variables are significantly associated with organ donor consent. Controlling for statistically significant SES and access to healthcare variables markedly increased the strength of effect of race on organ donor consent. We interpret this result to indicate that there remains unknown but important factor(s) associated with both race and obtaining consent that must be isolated and determined whether this factor(s) is modifiable.

MATERIALS AND METHODS

a) Study Population

Consistent with the referral practices of The Routine Death Notification Legislation (42 CFR Part 482)(31), hospitals that receive Medicare funding are mandated to notify the designated organ procurement organization of every death or imminent death. Organ donor referral data was obtained from the Alabama Organ Center electronic database. Ethics approval for this study was obtained from the University of Alabama Institutional Review Board Protocol #N100301001.

Between January 1, 2006 and December 31, 2009, the Alabama Organ Center received 3423 notifications. After a standardized telephone screening by an organ procurement specialist, the decision was made to request consent for organ donation from families of 1292 decedents (38%), who form the study population. The reasons for not approaching families of the remaining 2131 decedents for consent were that the potential candidate was not brain dead (including those failing to satisfy locally established guidelines for donation after cardiac arrest opportunities - 32%), sepsis/ multisystem organ failure (15%), medical concerns (14%), malignancy (13%), advanced age (10%), decedent death prior to referral process (4%), communication difficulties with referring hospital (4%), and other (8%).

During this study period, the Alabama Organ Center did not practice first person consent. Written consent was required from the decedent's family in all cases.

b) Methodology

We examined the following measures of SES and access to healthcare: household income, urban vs. rural residence as defined by the Alabama Rural Health Association(32), education and distance to donor hospital. Death certificates were obtained from the Alabama Department of Public Health Records(33) for the 1292 decedents for whom familial consent was requested. Specific data obtained include decedent's home address, education level, marital status, cause of death and hospital in which the patient was pronounced dead. Using the decedent's residence address and US Census Data(19), the median household income for the census block containing the decedent's address was determined. Finally, the distance between the decedent's home residence and death hospital was calculated.

c) Statistical Analysis

The dependent variable of interest in this study was familial consent for organ donation, as identified in the Alabama Organ Center electronic organ donor database. In addition to decedent race, independent variables examined in this study include household income, residence (urban vs. rural), education level and distance to the donor hospital. Examination of the data began by examining measures of central tendency (sample mean and median) as well as measures of dispersion (variance, standard deviations). The primary outcome variable, obtaining familial consent for organ donation, is dichotomous and, therefore, the analytic approaches focused upon both Pearson Chi-square analyses and logistic regression. Crude unadjusted odds ratios were initially calculated for each variable and compared between Caucasians and African Americans. To identify the most parsimonious model that could explain the variation in the log-odds of obtaining consent, multivariable logistic regression models were constructed. Measure of association is summarized with odds ratios with corresponding 95% confidence intervals. For all inferences, the probability of a Type I error (α) was set to 0.05. All analyses were conducted using the SAS 9.2 (Cary, NC).

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Abbreviations

OPTN	Organ Procurement and Transplantation Network
UNOS	United Network for Organ Sharing
SES	Socioeconomic Status
OR	Odds Ratio
95% CI	95% Confidence Interval

References

1. Guadagnoli E, McNamara P, Evanisko MJ, Beasley C, Callender CO, Poretsky A. The influence of race on approaching families for organ donation and their decision to donate. *Am J Public Health.* 1999; 89(2):244–7. PMID: 1508526. [PubMed: 9949758]
2. Minniefeld WJ, Yang J, Muti P. Differences in attitudes toward organ donation among African Americans and whites in the United States. *J Natl Med Assoc.* 2001; 93(10):372–9. PMID: 2594069. [PubMed: 11688917]

3. Boulware LE, Ratner LE, Cooper LA, Sosa JA, LaVeist TA, Powe NR. Understanding disparities in donor behavior: race and gender differences in willingness to donate blood and cadaveric organs. *Med Care*. 2002; 40(2):85–95. [PubMed: 11802081]
4. Morgan SE, Cannon T. African Americans' knowledge about organ donation: closing the gap with more effective persuasive message strategies. *J Natl Med Assoc*. 2003; 95(11):1066–71. PMID: 2594684. [PubMed: 14651373]
5. Siminoff LA, Lawrence RH, Arnold RM. Comparison of black and white families' experiences and perceptions regarding organ donation requests. *Crit Care Med*. 2003; 31(1):146–51. [PubMed: 12545008]
6. Kaufman JS, Cooper RS, McGee DL. Socioeconomic status and health in blacks and whites: the problem of residual confounding and the resiliency of race. *Epidemiology*. 1997; 8(6):621–8. [PubMed: 9345660]
7. Kaufman JS, Long AE, Liao Y, Cooper RS, McGee DL. The relation between income and mortality in U.S. blacks and whites. *Epidemiology*. 1998; 9(2):147–55. [PubMed: 9504282]
8. Bach PB, Pham HH, Schrag D, Tate RC, Hargraves JL. Primary care physicians who treat blacks and whites. *N Engl J Med*. 2004; 351(6):575–84. [PubMed: 15295050]
9. Schneider EC, Zaslavsky AM, Epstein AM. Racial disparities in the quality of care for enrollees in medicare managed care. *JAMA*. 2002; 287(10):1288–94. [PubMed: 11886320]
10. Williams DR. Race, socioeconomic status, and health. The added effects of racism and discrimination. *Annals New York Academy of Sciences*. 1999; 896:173–88.
11. Williams DR, Collins C. U.S. socioeconomic and racial differences in health. *Annals of Review of Sociology*. 1995; 21:349–86.
12. Williams DR, Yu Y, Jackson J, Anderson N. Racial differences in physical and mental health: socioeconomic status, stress and discrimination. *Journal of Health Psychology*. 1997; 2:335–51. [PubMed: 22013026]
13. Alba RD, Logan JR. Minority proximity to whites in suburbs: and individual-level analysis of segregation. *American Journal of Sociology*. 1993; 98:1388–427.
14. Collins C, Williams DR. Segregation and mortality: the deadly effects of racism? *Sociology Forum*. 1999; 14(3):493–521.
15. Council on Ethical and Judicial Affairs. Black-white disparities in health care. *JAMA*. 1990; 263(17):2344–6. [PubMed: 2182918]
16. McBean AM, Gornick M. Differences by race in the rates of procedures performed in hospitals for Medicare beneficiaries. *Health Care Financ Rev*. 1994; 15(4):77–90. [PubMed: 10172157]
17. Whittle J, Conigliaro J, Good CB, Lofgren RP. Racial differences in the use of invasive cardiovascular procedures in the Department of Veterans Affairs medical system. *N Engl J Med*. 1993; 329(9):621–7. [PubMed: 8341338]
18. Anonymous; Alabama Organ Center. [2011 March 30] Available from: <http://alabamaorgancenter.org/>
19. Anonymous; US Census Bureau. [2011 March 30] Available from: <http://www.factfinder.census.gov>
20. Anonymous; Alabama Community Healthy Marriage Initiative. [2011 March 30] Available from: <http://www.alabamamarriage.org>
21. Gray S, Hicks A, Redden D, Haque A, Fouad M, Eckhoff D, et al. Predictors of decedent consent in UNOS eligible donors. *Am J Transplantation*. 2011; 11(s1):62.
22. Anonymous; US Department of Health and Human Services: Donate the gift of life. [2011 March 30] Available from: <http://www.organdonor.gov/>
23. Anonymous; Organ Procurement and Transplantation Network. [2011 March 30] Available from: <http://optn.transplant.hrsa.gov/>
24. Kurz RS, Scharff DP, Terry T, Alexander S, Waterman A. Factors influencing organ donation decisions by African Americans: a review of the literature. *Med Care Res Rev*. 2007; 64(5):475–517. [PubMed: 17881619]

25. Callender CO, Bayton JA, Yeager C, Clark JE. Attitudes among blacks toward donating kidneys for transplantation: a pilot project. *J Natl Med Assoc.* 1982; 74(8):807–9. PMID: 2552972. [PubMed: 6752431]
26. Morgan S, Miller J, Arasaratnam L. Similarities and differences between African Americans' and European Americans' attitudes, knowledge, and willingness to communicate about organ donation. *Journal of Applied Social Psychology.* 2003; 33:693–715.
27. Minniefield WJ, Muti P. Organ donation survey results of a Buffalo, New York, African-American community. *J Natl Med Assoc.* 2002; 94(11):979–86. PMID: 2594182. [PubMed: 12443001]
28. Yuen CC, Burton W, Chiraseveenuprapund P, Elmore E, Wong S, Ozuah P, et al. Attitudes and beliefs about organ donation among different racial groups. *J Natl Med Assoc.* 1998; 90(1):13–8. PMID: 2608302. [PubMed: 9473924]
29. Siminoff LA, Saunders Sturm CM. African-American reluctance to donate: beliefs and attitudes about organ donation and implications for policy. *Kennedy Inst Ethics J.* 2000; 10(1):59–74. [PubMed: 11658155]
30. Katz RV, Kegeles SS, Kressin NR, Green BL, Wang MQ, James SA, et al. The Tuskegee Legacy Project: willingness of minorities to participate in biomedical research. *J Health Care Poor Underserved.* 2006; 17(4):698–715. PMID: 1780164. [PubMed: 17242525]
31. Anonymous; Electronic Code of Federal Regulations. [2011 March 30] Available from: www.gpoaccess.gov/ecfr/
32. Anonymous; Alabama Rural Health Association. [2010 March 23] Available from: <http://www.arhaonline.org/>
33. Anonymous; Alabama Department of Public Health. [2011 March 30] Available from: www.adph.org/vitalrecords/

Figure 1.

Increasing decedent household income was associated with consent for organ donation ($p < 0.001$). Stratified by race, however, household income was a predictor of organ donor consent only in Caucasians. There is a clear stepwise increase in organ donation as a function of increasing household income in Caucasians although a similar trend was not observed in African Americans.

Figure 2.

Increased education was a significant predictor of organ donation. There was no significant difference between those decedents who had completed high school compared to those without a high school diploma. Consent for organ donation was increased in decedents who had completed some college compared to those without a high school diploma was ($p < 0.001$). The association between increasing education and organ donor consent was similar in both African Americans and Caucasians. Data are restricted to decedents at least 25 years of age, consistent with US Census Bureau reporting(19).

Figure 3.

Organ donor consent was significantly increased in decedents with an urban residential home address compared to a rural residential home address ($p=0.0019$). The association between urban residential home address and organ donor consent was similar in both Caucasians and African Americans.

Table 1

Decedent demographics (compared to general Alabama population)

Variable	Decedents	Alabama Population *	Significance
Sample/ Population	1292	4,708,708	
Consent Obtained	637 (49.3)	n/a	
Registered Organ Donor	229 (17.7%)	38.0%	<0.0001
Age			<0.0001
Less than 18 years	134 (10.4%)	24.0%	
18 to 65 years	968 (75.0%)	62.2%	
Greater than 65 years	189 (14.6%)	13.8%	
Female Gender	561 (43.8%)	51.5%	<0.0001
African American Race	442 (34.2%)	26.3%	<0.0001
Education **			
High School Diploma	734 (74.9%)	75.3%	0.28
Bachelors Degree **	120 (12.2%)	19.0%	<0.0001
Married ***	544 (42.6%)	50.4%	<0.0001
Median Household Income ****	\$32,045	\$42,568	<0.0001
Rural Residence	34.7%	45.0%	<0.0001

* US Census Bureau(19)

** US Census Bureau(19) data for education is reported for individuals greater than 25 years of age thus only decedents over 25 years (n=980) were considered for analysis purposes. Decedent bachelor's degree is not reported on death certificate. For the purposes of this study, a bachelor's degree was assumed in decedents who had completed 4 or more years of education beyond high school.

*** Marriage data was restricted to decedents age 18 or older. Alabama state reference data is from Alabama Healthy Community Marriage Initiative.(20)

**** Median Household income reference data is from the US Census Bureau.(19)

Univariate and Multivariable analyses of socioeconomic factors and access to healthcare as predictors of donor consent. The multiple logistic regression model controls for age, gender, who approached the decedent's family, registry status and cause of death. The multivariable model has a concordance statistic (c-statistic) of 0.861 indicating good predictive ability of the multivariable model.

Table 2

Variable	Univariate Analysis			Multivariable Analysis		
	OR	95% CI	p value	OR	95% CI	p value
Caucasian Race	2.76	(2.17,3.52)	<0.001	4.36	(2.88-6.61)	<.001
Income *	1.27	(1.16,1.39)	<0.001	1.07	(0.94-1.21)	0.320
Married	0.75	(0.60,0.94)	0.013	0.91	(0.63-1.33)	0.635
Urban vs. Rural Residence	1.06	(0.81,1.39)	0.656	1.66	(1.14-2.41)	0.008
Education Level						
High School vs. < High School	1.03	(0.79,1.35)	0.804	1.23	(0.82-1.84)	0.309
Some College vs. < High School	1.76	(1.31,2.37)	<0.001	2.06	(1.30-3.26)	0.002
Distance to Hospital						
<100 miles vs. > 200 miles	1.96	(1.30,2.97)	0.002	2.17	(1.21-3.90)	0.009
100 - 200 miles vs. >200 miles	1.26	(0.95,1.67)	0.106	1.71	(1.14 -2.56)	0.010

* Models were developed examining income as a categorical predictor (quintiles and \$10,000 increments) as well as a continuous variables. Results were similar regardless of approach. The data for household income, modeling quintiles as a continuous variable, is presented.