# Assessing Racial and Ethnic Differences in Medical Student Knowledge, Attitudes and Behaviors Regarding Organ Donation

Teresa M. Edwards; Christian Essman; and J. Daryl Thornton, MD, MPH
*Cleveland, Ohio*

This study was funded through grants from the Ohio Department of Health Second Chance Trust Fund and Robert Wood Johnson Harold Amos Medical Faculty Development Program.

*Objectives:* Previous studies have demonstrated that informed healthcare providers could increase patient willingness to donate. We assessed medical students' knowledge and attitudes to determine their preparedness to encourage organ donation.

*Methods:* 500 first- and second-year students attending one of three Ohio medical schools completed the 41-item questionnaire (93% cooperation rate). The questions evaluated students' donation knowledge, training, exposure and perceived barriers as well as their willingness to donate.

*Results:* On univariate analysis, Asians (OR: 0.5, 95% CI: 0.2–0.9) and blacks (OR: 0.1, 95% CI: 0.1–0.2) were less willing than whites to donate. On multivariate analysis, race was no longer significantly associated with willingness to donate. Three factors were associated with a decreased donation willingness: wanting burial with organs intact (OR: 0.1, 95%CI: 0.1–0.2), having personal conflicts with donation (OR: 0.2, 95%CI: 0.1–0.6), and concern that carrying a donor card will lead to insufficient medical care (OR: 0.2, 95% CI: 0.1–0.4). Of note, knowledge was not associated with willingness to donate.

*Conclusion:* In this medical student cohort, minorities were less willing to donate. Three factors were associated with a decreased willingness to donate regardless of student race. Addressing these barriers may increase student donation willingness, and physicians should encourage donation discussions with their patients.

**Key words:** organ donation ■ education ■ knowledge ■ race/ethnicity

 From the Department of Medicine, MetroHealth Medical Center (Thornton, assistant professor), Office of Admissions (Essman, director of student relations), Case Western Reserve University (Edwards), Cleveland, OH. Send correspondence and reprint requests for *J Natl Med Assoc.* 2007;99:131–137 to: Dr. J. Daryl Thornton, Center for Reducing Health Disparities, MetroHealth Medical Center, 2500 MetroHealth Drive, Cleveland, OH 44109; phone: (216) 778-3732; fax: (216) 778-8401; e-mail: john.thornton@case.edu

## INTRODUCTION

As of September 2006, >93,000 Americans were registered on the Organ Procurement and Transplantation waiting list, and more than half were people of color.[1] Increasing the number of donors would make transplantation available to more patients and potentially save more lives. Healthcare professionals' knowledge, attitudes and behaviors are essential factors in fostering an environment that positively influences organ donation rates.[2] The unique and close relationship many physicians develop with their patients may further facilitate greater donation rates.[3] However, several barriers have been identified to physicians' involvement in the donation process, including discomfort with the subject, unwillingness to address the issue in a nonurgent setting, and a lack of adequate knowledge of the criteria for and process of donation.[4]

Adding donation and transplantation curriculum to medical school training may be the best means of enhancing physician knowledge of and involvement in the donation and transplantation process.[5] However, in order to develop effective educational opportunities for medical students, it is important to evaluate their existing level of knowledge and comfort with the topic of organ donation. To our knowledge, no study has rigorously assessed U.S. medical students' knowledge of organ donation, willingness to donate and barriers to donation.

We surveyed Ohio medical students to measure their knowledge and attitudes regarding donation and transplantation. We further explored the relationship between ethnicity and willingness to donate among this cohort of students in order to identify populations that might be more open to organ donation, and to optimize educational efforts directed toward more diverse segments of the population.

## METHODS

### Study Population

We sampled first- and second-year medical students attending one of three Ohio medical schools—Case Western Reserve University School of Medicine, The

Ohio State University College of Medicine, and the Ohio University College of Osteopathic Medicine—between January and April 2005. First- and second-year students were the focus because the didactic portion of the medical school curriculum at all three schools is during the first two years, making a future organ donation intervention easy to integrate. One of the authors (Essman) visited each medical school during the spring of 2005, and directly administered the questionnaire to students between medical school lectures when the most students were likely to be present. The students received no prior information or announcements before the questionnaires were administered in order to minimize response bias. Consent forms were administered with the questionnaires and information about the study that emphasized its voluntary nature. Immediately following completion, the questionnaires were collected. Institutional review boards at each participating medical school approved all study procedures.

## Questionnaire Content

The anonymous, previously validated[3] 15-minute, 41-item questionnaire was designed to gather information in five categories: knowledge, personal experience, opinions and barriers to donation and transplantation; student demographics; and anticipated future practice patterns (questionnaire available upon request). Students were asked about their willingness to become living or cadaveric organ donors, if they had discussed donation decisions with their family and whether they had prior exposure to someone who had donated or received an organ. The questionnaire was pilot-tested on

**Figure 1. Racial and ethnic differences in willingness to donate**

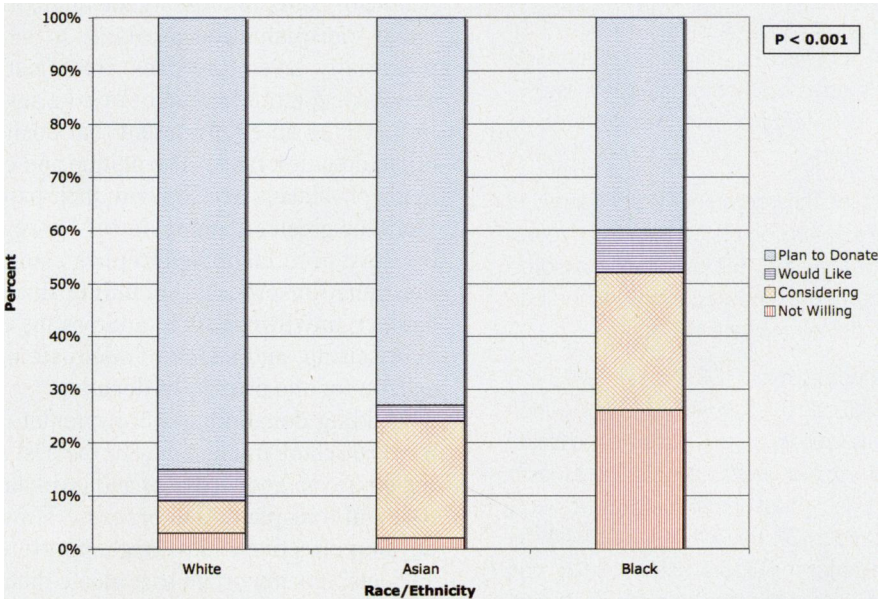


**Table 1. Medical student demographics**

| | All N (%) | White N (%) | Asian N (%) | Black N (%) | P Value |
|---|---|---|---|---|---|
| Women | 239 (50%) | 170 (49%) | 33 (58%) | 23 (66%) | 0.08 |
| School | | | | | **<0.001** |
| Case Western | 96 (19%) | 50 (14%) | 25 (44%) | 12 (34%) | |
| Ohio State University | 243 (49%) | 176 (50%) | 24 (42%) | 11 (31%) | |
| Ohio University | 161 (32%) | 127 (36%) | 8 (14%) | 12 (34%) | |
| First-year student | 264 (53%) | 185 (52%) | 36 (63%) | 20 (57%) | 0.3 |
| Age (mean ± SD) in years | 24 ± 2.3 | 24 ± 2.1 | 24 ± 2.9 | 25 ± 1.8 | **<0.01** |
| Race/Ethnicity | | | | | |
| White | 353 (79%) | | | | |
| Asian | 57 (13%) | | | | |
| Black | 35 (8%) | | | | |
| Latino | 13 (3%) | | | | |
| Born in United States | 437 (93%) | 334 (98%) | 45 (79%) | 27 (77%) | **<0.001** |

a group of 112 medical students who did not participate in the final study and were found to be highly reliable as assessed using internal consistency (r=0.9).

**Assessment of Knowledge Regarding Donation.** We assessed knowledge regarding donation and transplantation by the responses to 20 factual statements taken from questionnaires used in previous work by our group and others.[3,6-8] The questions assessed knowledge in seven distinct areas: 1) ethnic composition of the waiting list and disparities in waiting times; 2) the process of organ allocation; 3) fairness and equity of the organ allocation system; 4) funding of organ donation and transplant operations; 5) success of and quality of life following transplantation; 6) living donation; and 7) criteria for brain death. Possible choices for 16 items were "true," "false" and "don't know." Four questions had multiple choices for answers.

**Assessment of Student Donation Training and Exposure.** Students were asked whether they received formal coursework or training regarding donation and transplantation prior to and during medical school. They were also asked if they read donation or transplantation articles in medical literature and if they knew where to obtain answers to patient questions if they themselves did not know the answers. Additionally, students were asked if they knew persons who donated or received organs, and if they participated in the care or medical decision-making of a family member or loved one who had died.

**Assessment of Willingness to Donate Organs.** To examine students' level of willingness to donate organs, we asked them whether they agreed to three statements that allowed four possible ordinal responses. These responses were selected to measure the student's current stage in the decision-making process as an adaptation of the Transtheoretical Model of Health Behavior Change:[9,10]

1. "I have signed an organ donor card."
2. "I would like to become an organ donor but have not signed a donor card."
3. "I am considering becoming a donor but need more time to think about it."

Those that answered "no" to all three questions were considered unwilling to donate. These questions were analyzed as a four-point ordinal scale. Students were asked about their willingness to donate a kidney, while living, to family or to strangers. We also asked students if they had talked with their family regarding their decision to donate or not donate. These questions had possible responses of "yes," "no" or "don't know."

**Characterization of Ethnicity, Gender and Other Demographic Factors.** Student information was collected regarding age, race/ethnicity, gender, school of attendance and year in school. Students were asked about their race/ethnicity using the recommendations derived from current literature.[11,12] Possible choices included seven racial/ethnic backgrounds and allowed write-in responses. Students were encouraged to choose as many options as they felt accurately reflected their ethnic background. Students were also asked to choose from among eight different religions practiced, including "other" and "none."

## Statistical Analysis

The purpose of the analysis was to examine racial and ethnic differences in willingness to donate among Ohio medical students. Self-reported race and ethnicity were used as recommended in recent publications.[11,12] Race and ethnicity were analyzed as a single categorical variable (white, Asian and black) of the three predomi-

**Table 2. Medical student knowledge, training and exposure to organ transplantation**

| | All N (%) | White N (%) | Asian N (%) | Black N (%) | P Value |
|---|---|---|---|---|---|
| *Knowledge* | | | | | |
| % correct on 20 question knowledge test (mean ± SD) | 46 ± 18% | 47 ± 16% | 48 ± 19% | 46 ± 14% | 0.86 |
| *Donation Training* | | | | | |
| Prior to medical school | 55 (11%) | 39 (11%) | 7 (12%) | 3 (9%) | 0.86 |
| During medical school | 106 (22%) | 84 (24%) | 9 (16%) | 7 (20%) | 0.37 |
| Know where to find answer to patients' questions regarding donation | 207 (43%) | 150 (43%) | 28 (49%) | 12 (34%) | 0.37 |
| Read articles on donation | 92 (19%) | 63 (18%) | 14 (25%) | 6 (17%) | 0.49 |
| *Exposure* | | | | | |
| Care for patients who received transplants | 37 (8%) | 25 (7%) | 6 (11%) | 3 (9%) | 0.65 |
| Participated in the care of family member who died | 71 (15%) | 53 (15%) | 6 (11%) | 9 (26%) | 0.15 |
| Know someone who has donated or received | | | | | |
| Neither | 304 (61%) | 203 (57%) | 44 (77%) | 23 (66%) | 0.06 |
| Donor or recipient | 135 (27%) | 106 (30%) | 11 (19%) | 9 (26%) | |
| Donor and recipient | 60 (12%) | 44 (13%) | 2 (4%) | 3 (8%) | |

nant racial and ethnic groups in the cohort. In creating the categorical variable of ethnicity, only students who characterized themselves as a single ethnicity were included. Students who did not classify himself or herself as white, Asian or black were too few in number to be included in the final analysis.

Analyses were performed with regard to race/ethnicity and medical student knowledge, training, exposure to transplantation, as well as willingness to donate. Categorical variables were compared using a Chi square, ordinal variables using a Chi-squared test for trends, and mean values of continuous variables were compared using Students' t test and ANOVA. Bonferroni comparisons were used to analyze pairwise differences between two racial and ethnic groups in continuous or categorical outcomes. Nonparametric analyses, such as the Kruskal-Wallis test, were used when compared groups did not appear to have normal distributions or equal variances. Variables that were associated with willingness to donate in the univariate analysis were included in an ordinal logistic regression model with increasing willingness to donate as the outcome ordinal variable and each variable as the predictor of interest. The approximate test of the proportional odds assumption was used to ensure that the ratio of cumulative odds for willingness to donate was constant.[13] An additional multivariate analysis was used to identify the most significant barriers associated with students' unwillingness to donate. All statistical analyses were conducted using Stata® statistical software.[14]

## RESULTS

The questionnaire was disseminated to 537 students and completed and returned by 500 students (93% response rate). Response rates at each medical school varied between 90–98%. The demographics of the students are found in Table 1. The majority of the students were white (79%), born in the United States (93%) and in their first year of medical school (53%). The two other races and ethnicities most frequently indicated by students were Asian (13%) and black (8%). Despite allowing the students to choose multiple options, none of the students described themselves as being of mixed racial or ethnic background. The average student age was 24 ± 2.3 years, and 50% of the respondents were women. There was no difference between the race and ethnicity of the students and gender or year in medical school.

## Student Knowledge

Overall, students scored poorly on the 20 factual statements created to test knowledge of the organ donation and transplantation process, and answered more than half of the questions incorrectly (46% ± 18 correct, Table 2). When test results were stratified by race and ethnicity, there was no statistically significant difference in the scores (P=0.84). The students' lack of knowledge concerning donation was exemplified by their responses to the definition of brain death (data not shown). Only 28% of all students agreed with the statement "according to Ohio law, people who are brain dead are legally dead." The prevalence of correct statements among the students to this question was significantly lower than that cited for the general population of Ohio (34%, P<0.001).[3] The three racial and ethnic groups did not differ in the correctness of response to this question, although there was a statistically significant trend. Black (86%) and Asian (87%) students tended to answer correctly more often than white students (73%, P=0.02).

## Donation Training and Exposure

Most students (70%) had no training regarding donation or transplantation before or during medical school. This did not vary by ethnicity, with 68% of white, 77% of Asian, and 71% of black students reporting not having received donation training (P=0.35). Not surprisingly, few students felt they knew where to find answers to patients' questions regarding donation. This ranged from 49% of Asian students to 34% of black students (P=0.37).

Only 8% of all students reported caring for patients who had received a transplant. This finding is not surprising given the low exposure of first- and second-year

**Table 3. Medical students' support of organ donation and willingness to donate**

| Donation Characteristic | All N (%) | White N (%) | Asian N (%) | Black N (%) | P Value |
|---|---|---|---|---|---|
| Previously Thought about Donation | 479 (96%) | 349 (99%) | 54 (95%) | 24 (69%) | **<0.001** |
| Donated Blood within the Last Year | 125 (26%) | 98 (28%) | 14 (25%) | 5 (15%) | 0.25 |
| Talk to Family about Decision to Donate or Not Donate | 299 (60%) | 223 (63%) | 27 (47%) | 15 (43%) | **0.009** |
| Willingness to Donate | | | | | **<0.001** |
| Not willing | 25 (5%) | 11 (3%) | 1 (2%) | 9 (26%) | |
| Considering | 45 (9%) | 21 (6%) | 12 (22%) | 9 (26%) | |
| Would like to but haven't signed a donor card | 28 (6%) | 19 (6%) | 2 (3%) | 3 (8%) | |
| Signed donor card | 384 (80%) | 290 (85%) | 40 (73%) | 14 (40%) | |
| Willing to Donate Kidney while Living | | | | | |
| To a family member | 476 (96%) | 334 (95%) | 55 (96%) | 33 (94%) | 0.87 |
| To a stranger | 153 (32%) | 96 (28%) | 20 (38%) | 13 (39%) | 0.16 |

students to patients. The majority of students (61%) also reported not knowing anyone who had received or donated an organ. This result also did not differ by race or ethnicity (P=0.14). Although not statistically significant, 11% of Asian and 15% of white compared to 26% of black students reported being involved in the care of a family member who died (P=0.24).

## Willingness to Donate

The overwhelming majority (99%) of medical students in this study expressed support of the idea of organ donation with no significant difference by race. While all three groups acknowledged supporting donation, blacks (69%) were least likely to report previously thinking about donation (P<0.001, Table 3). Only 15% of black students had donated blood in the last year compared to 25% of Asian students and 28% of white students, but this difference was not statistically significant (P=0.25). Black (43%) and Asian students (47%) were the least likely to have talked with their families about the decision to donate or not donate compared to 63% of white students (P=0.009). Racial and ethnic differences in willingness to donate are found in Figure 1. Black (52%) and Asian (44%) students were significantly more likely to be "unwilling" to donate or "considering" donation than whites (14%, P<0.001). However, there was no statistically significant difference among the groups in willingness to donate a kidney while living. The majority of all of the students (96%) were willing to donate a kidney to a family member in need. However, few students (32%) were willing to donate a kidney to a stranger.

In a multivariate ordinal logistic regression model that adjusted for medical school, age, gender and religious preference, Asian (OR: 0.4, 95% CI: 0.2–0.9) and black (OR: 0.1, 95% CI: 0.1–0.3) medical students were significantly less likely than white medical students to be willing to donate (Table 4, model 1). Donating blood within the last year (OR: 2.6, 95% CI: 1.3–5.4) was associated with a higher willingness to donate. Increasing knowledge of the donation and transplantation process was not significantly associated with willingness to donate (OR: 1.1, 95% CI: 1–1.2). Further adjusting for whether students had talked with their family regarding their decision to donate or not donate was associated with increased donation willingness among all students regardless of race (OR: 3.6, 95% CI: 2.1–1.6). This did not alter the point estimates for the odds ratios (ORs) of willingness to donate among Asians and blacks, but the association between Asians and willingness to donate was no longer statistically significant (Table 4, model 2).

## Barriers to Donation

Table 5 lists the prevalence of barriers to donation, as noted by the students. The three groups responded differently—significantly—to each barrier. Further adjusting for these barriers in the multivariate ordinal logistic regression model of willingness to donate led to the discovery of three barriers that remained independently associated with a decreased donation willingness: 1) the desire to be buried with organs intact (OR: 0.1, 95% CI: 0.1–0.2); 2) personal conflict with the concept of organ donation (OR: 0.2, 95% CI: 0.1–0.6); and 3) concern that carrying a donor card will lead to insufficient medical care (OR: 0.2, 95% CI: 0.1–0.4, Table 4, model 3). In addition, the association between race and willingness to donate was no longer statistically significant, suggesting that these barriers account for at least some of the decreased willingness to donate among people of color. Discussing donation decisions with family remained significantly associated with donation willingness (OR: 3.1, 95% CI: 1.6–5.8).

**Table 4. Associations of willingness to donate and medical student characteristics**

| | Model 1 | Model 2 | Model 3 |
|---|---|---|---|
| **Characteristic** | **OR (95% CI)** | **OR (95% CI)** | **OR (95% CI)** |
| Race/Ethnicity (white = referent) | | | |
| Asian | **0.4 (0.2–0.9)** | 0.5 (0.2–1.1) | 0.5 (0.2–1.4) |
| Black | **0.1 (0.1–0.3)** | **0.1 (0.1–0.3)** | 0.5 (0.2–1.2) |
| Donated Blood within Last Year | **2.6 (1.3–5.3)** | **2.3 (1.1–4.7)** | 1.9 (0.8–4.4) |
| Talked with Family Regarding Decision to Donate or Not Donate | | **3.6 (2.1–6.2)** | **3.1 (1.6–5.8)** |
| Barrier to Donation | | | |
| Lack sufficient information regarding donation | | | 0.9 (0.5–1.7) |
| Donation is against religious viewpoints | | | 0.9 (0.2–4.3) |
| Trust that organs are allocated fairly | | | 1.1 (0.5–2.2) |
| Want to be buried or cremated with organs intact | | | **0.1 (0.1–0.2)** |
| Personal conflicts or moral objections to organ donation | | | **0.2 (0.1–0.6)** |
| Concerned that carrying a donor card will lead to insufficient medical care | | | **0.2 (0.1–0.4)** |

OR: odds ratio; All three models were further adjusted for religious preference, gender, age and school of attendance

## DISCUSSION

In this study of first- and second-year medical students attending one of three Ohio medical schools, we found that race and ethnicity were negative predictors of willingness to donate. In contrast, having donated blood within the last year and talking with family about the decision to donate or not donate were positive predictors of donation willingness. While many of the students had low knowledge of the donation and transplantation process, the overwhelming majority of students expressed support of the process. Nonetheless, <25% reported receiving donation coursework in medical school. This suggests a desire on the part of students to learn more about donation, as well as an opportunity for medical schools to positively impact organ donation and transplantation by educating future physicians about this important aspect of medicine. These findings become more noteworthy when realizing that a significant number of practicing physicians doubt their ability to discuss donation, are reluctant to ask family members and do not obtain donation consent from their patients.[4,15]

It is important to examine the influence of race and ethnicity on medical student knowledge and attitudes regarding donation. Evidence suggests that ethnic minority physicians are more likely to care for patients of their own race or ethnic group.[16,17] Therefore, ethnic minority medical students are the future providers for the group of patients most needed to donate. In addition, racial and ethnic concordance between patient and provider has been positively associated with higher patient satisfaction.[18-20] It is plausible that minority future physicians can utilize the positive rapport they develop with their patients to initiate a satisfying and informed discussion regarding organ donation. This ultimately may lead to increased organ donation, particularly among people of color.

While the majority of all the medical students in this study expressed support for the concept of donation, many of the black and Asian students were less willing to donate their own organs compared to white students unless they were contemplating living related donation. These results have been demonstrated in the general adult population[3,6-8,21,22] and even in adolescents,[23] but few studies have examined willingness to donate among U.S. health professionals. One study found that only 25% of family practice residents carry organ donor cards.[24] Surprisingly, fewer than half of healthcare professionals working in transplant centers have signed donor cards.[25] Neither of these studies, however, examined racial and ethnic differences in willingness to donate in detail nor identified the specific obstacles to donation in their cohort.

The barriers to donation identified in this study also parallel those cited in studies involving the general U.S. population.[3,7,8,21,22,26-28] The fact that each group of students identified different barriers as consequential signifies the importance of multifaceted and culturally competent interventions to increase donation. It is interesting, however, that the same three barriers—1) desire to be buried with organs intact, 2) personal conflict with organ donation, and 3) concern that carrying a donor card will lead to insufficient medical care—remained independently predictive of willingness to donate after adjusting for race and ethnicity. This indicates that some barriers to donation may transcend race and ethnicity. For those interested in increasing donation willingness, addressing these impediments seems paramount regardless of the race and ethnicity of the audience. Likewise, discussing donation with family remained positively associated with donation even after accounting for these barriers. This suggests that reluctance to donate may be decreased by encouraging students to involve their family in their decision-making.

Limitations of this study exist. Despite a 93% response rate, response bias may be present, and only those less willing to donate may have responded. However, the majority of students in this study supported the idea of donation, suggesting openness to the concept of donation and therefore opportunities for intervention. The number of students of color overall was low (25% of the cohort). This likely reflects the low number of

**Table 5. Medical students' perceived barriers to donation**

| Donation Characteristic | All N (%) | White N (%) | Asian N (%) | Black N (%) | P Value |
|---|---|---|---|---|---|
| Lack sufficient information regarding donation | 224 (45%) | 149 (42%) | 34 (60%) | 20 (57%) | **0.02** |
| Donation is against religious viewpoints | 21 (4%) | 5 (1%) | 5 (9%) | 6 (17%) | **<0.001** |
| Trust that organs are allocated fairly | 376 (76%) | 281 (80%) | 39 (68%) | 15 (43%) | **<0.001** |
| Want to be buried or cremated with organs intact | 76 (15%) | 38 (11%) | 10 (18%) | 16 (46%) | **<0.001** |
| Personal conflicts or moral objections to organ donation | 27 (5%) | 9 (3%) | 7 (12%) | 7 (20%) | **<0.001** |
| Want donated organs to go to persons of my choosing | 193 (39%) | 129 (37%) | 28 (50%) | 18 (53%) | 0.05 |
| Fear surgery or disfigurement | 218 (44%) | 145 (41%) | 35 (61%) | 17 (50%) | **0.015** |
| Concerned that carrying a donor card will lead to insufficient medical care | 89 (18%) | 50 (14%) | 11 (19%) | 18 (51%) | **<0.001** |

students of color enrolled in U.S. medical schools.[29] Despite the low numbers, we were able to detect statistically significant differences across the groups, demonstrating the substantial differences in viewpoints on this personal and complex topic. Only first- and second-year medical students participated in the study. It is possible that third- and fourth-year students have different attitudes regarding donation and have received donation training. While it is possible that their attitudes may change with increased exposure to patients, it is unlikely that they will have had uniform, formal didactic training regarding donation and transplantation during the later two years, as that curriculum occurs predominantly in a clinical setting that varies substantially for each student. This study was conducted in a single state, and, despite including students from several institutions across the state, the results may not be generalizable to medical students in other parts of the country.

This study demonstrates that among first- and second-year medical students attending one of three Ohio medical schools, minority race and ethnicity are negative predictors of willingness to donate. While the majority of the barriers to donation we examined were more prevalent in certain racial or ethnic groups, three barriers were found to be independently associated with a decreased willingness to donate regardless of the students' race or ethnicity. As the need to find organ donors becomes critical, especially among people of color, future studies should target existing deterrents to donation while continuing to identify and subsequently address new ones. Evaluations of the incorporation of a formal organ donation and transplantation curriculum on medical student donation willingness among them and their patients are encouraged.

## REFERENCES


1. (UNOS) UNfOS. The Organ Procurement and Transplantation Network: National Data. www.unos.org. Accessed 06/23/06.

2. Evanisko MJ, Beasley CL, Brigham LE, et al. Readiness of critical care physicians and nurses to handle requests for organ donation. *Am J Crit Care.* 1998;7(1):4-12.

3. Thornton JD, Curtis JR, Allen MD. Completion of advanced care directives is associated with willingness to donate. *J Natl Med Assoc.* 2006; 98(6):897-904.

4. Siminoff LA, Arnold RM, Caplan AL. Health care professional attitudes toward donation: effect on practice and procurement. *J Trauma.* 1995; 39(3):553-559.

5. Essman CC, Lebovitz DJ. Donation education for medical students: enhancing the link between physicians and procurement professionals. *Prog Transplant.* 2005;15(2):124-128.

6. Siminoff LA, Burant C, Youngner SJ. Death and organ procurement: public beliefs and attitudes. *Soc Sci Med.* 2004;59(11):2325-2334.

7. The Gallup Organization I. *The U.S. public's attitudes toward organ transplants/organ donation.* Princeton, NJ: Golin/Harris Communications; 1985.

8. The Gallup Organization I. *The U.S. public's attitudes toward organ transplants/organ donation.* Princeton, NJ: Dow Chemical Co.; 1990.

9. Prochaska JO, DiClemente CC. Stages and processes of self-change of smoking: toward an integrative model of change. *J Consult Clin Psychol.* 1983;51(3):390-395.

10. Prochaska JO, DiClemente CC. *The transtheoretical approach: crossing traditional boundaries of therapy.* Homewood, IL: Dow Jones-Irwin; 1984.

11. Burchard EG, Ziv E, Coyle N, et al. The importance of race and ethnic background in biomedical research and clinical practice. *N Engl J Med.* 2003;348(12):1170-1175.

12. Kaplan JB, Bennett T. Use of race and ethnicity in biomedical publication. *JAMA.* 2003;289(20):2709-2716.

13. Hosmer DW, Lemeshow S. *Applied logistic regression.* New York, NY: Wiley; 1989.

14. Stata® Statistical Software. Version 9. College Station: StataCorp LP; 2005.

15. Shilling LM, Norman ML, Chavin KD, et al. Healthcare professionals' perceptions of the barriers to living donor kidney transplantation among African Americans. *J Natl Med Assoc.* 2006;98(6):834-840.

16. Komaromy M, Grumbach K, Drake M, et al. The role of black and Hispanic physicians in providing health care for underserved populations. *N Engl J Med.* 1996;334(20):1305-1310.

17. Moy E, Bartman BA. Physician race and care of minority and medically indigent patients. *JAMA.* 1995;273(19):1515-1520.

18. Cooper LA, Beach MC, Johnson RL, et al. Delving below the surface. Understanding how race and ethnicity influence relationships in health care. *J Gen Intern Med.* 2006;21(suppl 1):S21-S27.

19. Cooper LA, Roter DL, Johnson RL, et al. Patient-centered communication, ratings of care, and concordance of patient and physician race. *Ann Intern Med.* 2003;139(11):907-915.

20. van Wieringen JC, Harmsen JA, Bruijnzeels MA. Intercultural communication in general practice. *Eur J Public Health.* 2002;12(1):63-68.

21. Boulware LE, Ratner LE, Cooper LA, et al. Understanding disparities in donor behavior: race and gender differences in willingness to donate blood and cadaveric organs. *Med Care.* 2002;40(2):85-95.

22. Manninen DL, Evans RW. Public attitudes and behavior regarding organ donation. *JAMA.* 1985;253(21):3111-3115.

23. Thornton JD, Wong KA, Cardenas V, et al. Ethnic and gender differences in willingness among high school students to donate organs. *J Adolesc Health.* 2006;39(2):266-274.

24. Falvo DR, Woehlke P, Tippy P. Family practice residents' attitudes toward organ donation. *J Fam Pract.* 1987;25(2):163-166.

25. Ettner BJ, Youngstein KP, Ames JE. Professional attitudes toward organ donation and transplantation: results of a 1986–1987 survey of transplant professionals. *Dial Transplant.* 1988;17(2):72-76.

26. Callender CO, Bayton JA, Yeager C, et al. Attitudes among blacks toward donating kidneys for transplantation: a pilot project. *J Natl Med Assoc.* 1982;74(8):807-809.

27. Creecy RF, Wright R, Berg WE. Discriminators of willingness to consider cadaveric kidney donation among black Americans. *Soc Work Health Care.* 1992;18(1):93-105.

28. Siminoff LA, Gordon N, Hewlett J, et al. Factors influencing families' consent for donation of solid organs for transplantation. *JAMA.* 2001; 286(1):71-77.

29. Colleges AoAM, Programs DoDPa. *Minorities in Medical Education: Facts and Figures 2005.* Washington, DC; 2005. ■