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Effects of classroom education on knowledge and attitudes regarding organ donation in ethnically diverse urban high schools

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Abstract

School-based health education is a promising approach for improving organ donation rates, but little is known about its efficacy among ethnically diverse youth. The impact of a classroom intervention was examined in a multicultural high school population where students' ethnicities were 45% African American, 30% Asian American, and 33% Caucasian (allowing for multiracial choices). A baseline survey was administered to all health classes within 2 weeks prior to intervention. On the intervention day, classes randomly assigned to the intervention group received an educational session, followed by a second survey; in control classes, the second survey was taken before the educational session. At baseline, non-Caucasian ethnicity and male gender were each associated with lower levels of willingness to donate. Following the intervention, students in the intervention group demonstrated a significant increase in knowledge scores ($p<0.001$), as well as positive movement of opinion regarding willingness to donate ($p<0.0001$). Most importantly, the positive changes in opinion occurred independently of ethnicity and gender, in spite of these both being negative predictors of opinion at baseline. These results demonstrate that even a single classroom exposure can impact knowledge levels, correct misinformation, and effect opinion change on organ donation among an ethnically diverse adolescent population.

Keywords

Organ donation; ethnicity; adolescence; African American; Asian American

Introduction

Of the more than 103,000 patients awaiting organ transplantation in the United States, ethnic minority patients comprise 54% of the waiting list for all organs and 61% of the waiting list for kidney transplants (1). For all waiting recipients, the chances of finding a well-matched

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organ are predicated on a growing and genetically diverse organ donor pool, representing as broad a cross-section of histocompatibility profiles from the general population as possible. Previous studies, however, have shown that attitudinal and cultural factors can be strong deterrents to donation among ethnic minorities (2–12). To address these issues, public education programs have been designed to target adults of specific ethnic populations (13–16). However, the challenge for adolescent outreach in American public schools is to present donation education in a manner that will have relevance for students from all of the many ethnic groups represented in the average multicultural urban classroom.

Teenagers are asked to make a decision about organ donation when they obtain their first driver's license. Ideally, health education on organ donation and transplantation would be provided to teens near this time so that they would have on hand the factual information they need to make informed personal decisions at the licensing bureau. Our previous pilot in an ethnically diverse population of high school students at a single school had suggested that knowledge about organ donation could be increased by a culturally sensitive classroom exposure to the subject (7). Whether opinions were altered, however, was less clear. Although, surprisingly, it appeared that positive changes in opinion were more likely among the ethnic minority students than among European American (Caucasian) students, this trend did not reach statistical significance. A larger study population was clearly needed to determine whether a school-based intervention could truly affect attitudes and intentions toward organ donation among an ethnically and culturally diverse student population and whether such education would be sufficient to overcome initial negative bias.

Material and Methods

Study design

The project was conducted under the auspices of the University of Washington Human Subjects Review Committee and with the permission of principals and teachers at each of three urban high schools in the Seattle, Washington area, selected for their ethnic diversity. The survey instrument was developed by a multicultural team of researchers representing the fields of health services, epidemiology, behavioral science, and transplant medicine; in conjunction with two community health organizations serving African American and Asian American populations, respectively. The survey instrument and study design had been previously piloted and evaluated (6,7,9), and the questionnaire revised based on these results.

In this expanded study, a baseline (or first) questionnaire was administered to students in all 13 health science classes in the three high schools. No students or classes were excluded. In each school, the subsequent education or intervention session was delivered to all health classes on a single day within the following two weeks. On the day of the intervention, classes were randomized by coin flip at the beginning of class to intervention or control groups. Students in classes assigned to the intervention group received the educational session, after which they completed the second questionnaire. Students in the control classes completed the second questionnaire at the beginning of their classes, before receiving the health education session. The second survey in the control classes served as control for changes in knowledge or opinion that might have occurred from exposure to the initial survey, or to external influences, e.g. television or internet, during the period between the first and second surveys. This study design assured that students in the control classes also received the educational session, a prerequisite of the schools. The survey questionnaires from the first and second surveys were matched by unique individual student codes that were self-selected by each student and thus designed to maintain complete anonymity (7). No key to the student-selected codes was available either to the researchers or to the classroom teachers.

Educational Intervention

Given the time demands of the standard health science curricula, a single classroom session was chosen as an educational intervention that could feasibly be accommodated in most high schools. The 40-minute educational session was moderated by an African American or Asian American representative from one of the two partnering local community health agencies. Presentations were made by an African American and a European American organ transplant recipient, both young adults, who had received two different types of transplants (kidney and heart). A transplant surgeon delivered current medical information. A ten minute video featuring teenagers from several ethnic groups talking about organ donation (courtesy of LifeGift Organ Donation Center, Houston, TX) was then shown. A question and answer period followed each segment. The purpose and tone of the educational session was *not* to convince students to become organ donors, but rather to provide factual information to allow youths to make informed personal decisions at the licensing bureau when obtaining their drivers' licenses.

Survey Instrument

The first section of the 35-item questionnaire consisted of sixteen factual statements measuring knowledge in each of five areas: 1) composition of the transplant waiting list and waiting time disparities, 2) criteria for needing an organ transplant, 3) the biology of donor-recipient matching, 4) fairness of organ allocation, and 5) results after transplantation.

The second section elicited personal experience with organ donation and/or transplantation, as factors that might mitigate knowledge and/or opinions independent of the intervention. Further questions asked whether respondents had ever talked with their families about organ donation.

The third section solicited students' attitudes and opinions regarding posthumous organ donation. This section was designed to position the respondent's current state of thinking along a continuum of willingness to become an organ donor. The question "What is your opinion about donating your organs after death?" was accompanied by the following 4 choices:

- **a.** I would like to become an organ donor.
- **b.** I'm considering it but need more time to think about it.
- **c.** I am undecided about organ donation.
- **d.** I don't want to be an organ donor.

The final section solicited general demographic information.

Analysis

The study yielded 187 pairs of completed questionnaires that could be matched between the first (baseline) questionnaire and the second questionnaire, using the students' self-selected unique identifying codes (7). First and second questionnaire "matches" were then confirmed by ensuring that the home zip code, age, and classroom were identical on both questionnaires. So, although the student's identity remained anonymous, whether knowledge or opinions changed for each individual student could be assessed. In the demographic analyses, the Student's *t*-test was used for continuous variables, with values of $p < 0.05$ considered significant, and Pearson's chi square statistic for categorical variables. All analyses were performed using Stata/SE 9.0 software (StataCorp LP, College Station, TX).

The effect of the intervention on knowledge was assessed as the mean change in the percentage of correct responses for each of the 16 factual statements, compared between

intervention and control groups by two-tailed *t*-tests. The mean change in correct responses was divided by (or indexed for) the baseline knowledge level of the group for that item to control for any differences in baseline knowledge between classes randomly assigned to the intervention or control groups. As a separate analysis, changes in knowledge scores for each item and for the 16 knowledge statements in aggregate were also examined without indexing.

Changes in responses to the factual statements on transplant issues affecting ethnic minorities were analyzed by student ethnicity, again using two-tailed *t*-tests. Ethnicity was determined by self-identification, allowing students to select more than one ethnicity. Both African Americans and Asian Americans were sufficiently represented to allow subgroup analyses. As such, these two subgroups consisted of students who self-identified as being either wholly or partially of African American or Asian American heritage. The Asian American group comprised students who listed themselves as being Chinese, Japanese, Korean, South Asian, Southeast Asian, and/or Filipino American. Students who self-identified as African, as opposed to African American, were classified in the other non-European group and not included in the African American group. For comparison, the European American group consisted of students who selected Caucasian ethnicity only.

Changes in attitudes and opinions were evaluated as movement along a continuum of 4 possible responses, spanning negative to positive. Matching the pairs of first and second questionnaires allowed determinations to be made as to whether single individuals changed their attitudes and opinions. The numerical result on the second questionnaire minus the result on the first questionnaire was used as the indicator of change in opinion. Response (a) (see above) was scored with a value of 4, response (b) as 3, (c) as 2, and (d) as 1, so that movement toward more positive opinions constituted a positive score, whereas movement toward more negative opinions garnered a negative score. For example, a student who chose response (d) in the first survey and response (b) in the second survey received a change in score of +2. Likewise, a student who chose response (a) followed by (b) received a score of −1.

Ordinal logistic regression analysis was applied to examine the effects of potential modifying variables as predictors of initial willingness to donate on the baseline survey, and, separately, as predictors of changes in opinion between the first and second surveys. The approximate test of the proportional odds assumption was used to ensure that the ratio of cumulative odds for categories of willingness to donate was constant (17). For the latter, movement along the 4-stage continuum scale yielded six possible opinion change scores (from −3 to +3). These were collapsed into two categories: positive change (+1 to +3) and negative change (−3 to −1). If no change occurred, the score was recorded as zero.

Examined variables included ethnicity, age, gender, school, knowledge level at baseline, change in knowledge from baseline level following the intervention, personal experience with donation and/or transplantation, and having talked with one’s family about organ donation. Ethnicity was categorized as African American, Asian American, European American, or other non-European American selection. A student was considered to have had personal experience with donation/transplantation if a positive response was given to one of the following 4 questions on the questionnaire:

1. Do you actually know someone who has gotten an organ transplant?
2. Do you actually know someone who has been on the waiting list for an organ transplant?
3. Do you actually know someone who has donated an organ(s)?

4. Do you actually know someone who has signed up to be a bone marrow donor?

The effect of misinformation on baseline attitudes toward donation was examined by logistic regression analysis. Misinformation was classified into two categories: misinformation about the fairness and equity of the organ allocation system; and misinformation about success rates and efficacy of transplantation. Incorrect responses were counted as misinformation, but "don't know" responses were excluded from this analysis as not truly representing misinformation.

A student was considered to have misinformation about fairness and equity in the allocation system if he/she responded incorrectly to at least one of 4 factual statements regarding: 1) rich and famous people receiving priority in organ allocation; 2) buying and selling of organs in the United States; 3) existence of a computerized national matching system; and 4) financial barriers to transplantation. Holding misinformation about success rates and efficacy of transplantation consisted of an incorrect response to at least one of the 3 statements regarding: 1) survival rates after transplantation, 2) potential for long-term survival, and 3) potential for return to normal activities.

Results

Demographics

The demographic characteristics of the 187 students who completed both the first and second questionnaires are detailed in Table 1. Illustrating the broad diversity of this urban high school population, 45% of the students self-identified as being of African American descent, 30% as Asian American, 33% as European American, and 10% as American Indian. Students reporting to be of mixed ethnicity account for the total exceeding 100%.

Changes in knowledge

Table 2 compares the net changes in responses to each of the 16 knowledge-based statements from the first survey to the second survey. For 12 of the 16 statements, the increase in the percentage of students with correct responses on the second survey was significantly greater in the intervention than in the control group. These increases in knowledge were similar whether results were corrected for differences in baseline knowledge (as shown in Table 2) or whether changes in absolute scores were compared without indexing for baseline knowledge (data not shown). When responses to all the 16 knowledge questions were combined into an aggregate score, no differences were found between the scores of the intervention and control groups on the first (baseline) questionnaire ($p = 0.85$), whereas the scores on the second questionnaire were significantly higher in the intervention group than in controls ($p < 0.001$). Correspondingly, the net change in knowledge from baseline was significantly greater in the intervention group, compared to the control group ($p < 001$) in which essentially no change from baseline was seen.

Responses to 4 knowledge-based statements concerning transplantation issues for ethnic minority populations were analyzed separately for African American, Asian American, and European American students (Table 3). Among each ethnic group, the percentage of students in the intervention group who responded correctly nearly doubled from the first to second survey for each of these questions.

Attitudes and opinions at baseline

On the baseline questionnaire, 37% of students reported that they "would like to be an organ donor"; 25% indicated they were "considering it but needed more time to think about it", 28% were "undecided", and only 10% selected "I do not want to be an organ donor", with

no difference between control and intervention groups. On multivariate analysis, the factors that predicted positive opinions about organ donation on the baseline survey were female gender (odds ratio [OR] = 2.10; $p = 0.02$) and, to a lesser degree, higher baseline knowledge score (OR = 1.12; $p < 0.02$) (Table 4). The one factor that predicted unwillingness to donate at baseline was non-European American ethnicity. Compared to European American students, the odds ratio that students who self-identified as African American would have positive opinions about organ donation at baseline was 0.20 ($p < 0.001$); for Asian Americans 0.24 ($p = 0.001$), and for all other non-European Americans 0.21 ($p = 0.02$).

Being misinformed about fairness and equity in transplantation was not correlated either negatively or positively with baseline opinions on donation in this sample ($p = 0.35$). However, having misinformation about transplant success rates and efficacy did have a significant negative association with baseline willingness to donate ($p = 0.04$).

Changes in attitudes and opinions

Matched data from 153 students were available for analysis of attitudinal changes between the first and second surveys (Fig. 1). (Students who failed to respond to an opinion question on either the first or second survey were excluded from this analysis.) Overall, in the intervention group, 31% of students changed their opinions in a positive direction, 14% in a negative direction, and 55% remained unchanged. In the control group, 7% changed opinions positively, 8% negatively, and 85% were without change. On logistic regression analysis, receiving the intervention was significantly associated with positive movement along the willingness to donate opinion scale ($p < 0.0001$). The odds ratio that students receiving the intervention would have a positive change in willingness to donate by the second survey was 7.14, compared to students in the control group. Interestingly, students in the intervention group also had a higher likelihood of negative movement along the willingness/intention scale—with a 2.72 odds ratio of moving down the willingness scale, although this negative trend did not reach significance ($p = 0.065$).

Predictors of changes in opinion following the intervention were not the same as the predictors of baseline opinions (Table 5). Factors that predicted a positive movement along the opinion scale from the first to second survey were greater change in knowledge level following the intervention (OR = 1.42, $p < 0.001$), and younger age (OR with respect to age = 0.59, $p < 0.02$). No predictors of negative change reached significance. Of importance, ethnic minority heritage, gender, school, and even personal experience with donation/transplantation did not affect opinion change in response to the intervention (either in a positive or negative direction).

Discussion

In-school classroom teaching is a very feasible means to educate the adolescent public about organ donation and transplantation (7–9,11,18–21). Although prior studies have shown that classroom interventions can increase knowledge (8,19–23) and influence intentions to donate (18,19), these interventions have been conducted in schools with a majority of Caucasian students. The goal here was to test such an intervention in the multicultural setting characteristic of many American urban high schools, a context that brings in the strong influences of ethnicity (2–4,6–10,13,24–26), culture (27,28), and religion (3,10,11,13,19,25,26,29,30) on attitudes toward donation. Because health science classes are required for graduation in most high schools, incorporating organ donor education into health science curricula is a logical way to reach those teens who might be less motivated to seek out such information independently. Also, increasing the awareness of ethnic-specific issues in transplantation might itself impact willingness to donate, as has been seen in African-American adults (13,26,31). Adolescence is an appropriate time for such education

not only because teenagers will be asked to make a choice about becoming a donor when acquiring their first driver's licenses, but also because, at this age, these decisions have, by and large, not yet been made. At baseline, only a small fraction (10%) of this multiethnic cohort of teens indicated they had already decided against donation, whereas the majority (53%) were either "undecided" or "still thinking about it."

The lack of information and prevalence of misinformation about organ donation and transplantation among high school students is considerable and spans across all ethnic groups, as evident from Tables 2 and 3. However, being more knowledgeable about the subject at baseline had only a weak association with willingness to donate, as other research groups have also reported (32–34). Instead, in this study, it was the increase in new knowledge resulting from the intervention that was the strongest predictor of positive changes in opinion. This suggests that classroom education has the potential for increasing willingness to donate irrespective of baseline levels of scientific or medical knowledge, and thus should be widely applicable to all schools. Supporting this premise, the three high schools in this study, all ethnically diverse, had high, average, and low student body scores, respectively, on standardized state educational assessment tests (Seattle Public Schools data); however, despite different levels of academic performance, the changes in knowledge and opinions following this intervention were not different between these schools.

The complexity of decision-making on organ donation has been difficult to fit into standard behavioral change models; however, most research groups conceptualize such decision-making as being a process that evolves over time (13,24,27,35,36), captured here as movement along a continuum of opinions. The fact that nearly half of the students receiving the intervention reported a change in attitude suggests that minds have been opened to the subject of organ donation, even if students had not committed to becoming organ donors by the end of the session. Among teenagers, such changes in attitude have been found to be strong predictors of actions such as intent to talk to family (8), and to register as a donor (22). The lack of dramatic opinion change among the other half of the students in the intervention group is not unexpected from a single educational session, especially since the primary focus was to present factual information rather than to convince students to become organ donors. Although not specifically tested here, the impression of our team in the field is that such a low-pressure information-based presentation rather than a "marketing" approach is an effective way to initiate open discussion about the delicate subject of organ donation in multicultural settings.

Of interest, negative changes in opinion also occurred more frequently in the intervention group, although this trend did not reach statistical significance. Notably, no students in either group shifted more than one point in the negative direction, suggesting that students were not "turned off" by either the questionnaires or the subject matter.

Factors that were not predictive of opinion change were as important as those that were. Most notably, ethnicity was not a limiting barrier to positive changes in opinions following the intervention, even though it was the major determinant of initially negative attitudes toward donation. Likewise, gender and personal acquaintance with either organ donors or transplant recipients did not influence the potential for opinion change, although both have been shown to affect baseline attitudes toward donation (4,5,8,19,22,25,26,33,34). Thus, an important new finding here is that, at least for adolescents, the potential for classroom education to open minds and change attitudes toward donation could bridge and override previously-defined barriers of ethnicity and gender.

One limitation of the study design was randomization by classroom, a prerequisite of the local public school system, instead of by individual student. Despite classroom

randomization, the control group had more European American students. At baseline, however, knowledge levels and attitudes toward donation were found to be equivalent between the intervention and control groups. Another limitation was that the short duration of the study did not allow evaluation of further opinion changes over time, nor of subsequent actions taken toward signing up as a donor. These are now under investigation in an expanded study.

To replicate this program broadly, the personnel-intensive format might be replaced with interactive web-based modules and/or multicultural videos. However, for a media substitute, even a multicultural one, to provide the same impact and reassurances as a live interchange, it will likely need to be customized for different cities or regions of the country, since relevance and trust are usually defined in local terms (37). For example, the students in our classes quickly discerned that the video shown, even though purposely multicultural, did not reflect the geographic and ethnic composition of their peer groups, leading to comments questioning its relevance for their own concerns. Even with media modules, classroom discussion still plays an important role in allowing airing of misconceptions and fears so they may be directly addressed. Indeed, a Dutch program found that classroom discussion following a video proved more effective than a computer-based individual learning module in promoting intentions to register as an organ donor (18). However, a single, engaging, and knowledgeable discussion leader might suffice for this purpose. Here, discussion moderators were selected from partnering community health agencies that serve minority communities but are *not* directly involved in transplantation--not only to convey community support for donation, but also to dispel any skepticism about the motives behind the program, and to encourage open and candid discussion.

In summary, lifelong opinions may be formed during the teen years. This study demonstrates that a single 40-minute school-based health education module on organ donation and transplantation presented from a multicultural perspective can provide the information teens need to make this personal decision on donation an informed one. More importantly, even a short exposure to the subject matter can open minds and alter opinions, independent of ethnicity, gender, and personal experience.

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ABBREVIATIONS

OR	odds ratio
SEM	standard error of the mean

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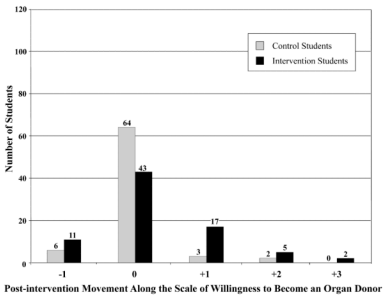

Figure 1.

Changes in willingness to donate between the first and second surveys. Net movement along the scale of levels of willingness to donate is characterized as the number of stages of positive or negative change for students in the control vs. intervention groups. No students had a negative change in willingness to donate of more than one stage.

Table 1

Demographic characteristics of surveyed students

	Control n = 91	Intervention n = 96	p value [c]
Mean age (S.D.)	16.6±1.4	15.9 ±1.3	<0.01
Percent Males	67.0	62.5	0.43
Language spoken at home			0.74
English only (%)	76 (83.5)	69 (71.9)	
Bi-lingual	12 (13.2)	17 (17.7)	
Not English	3 (3.3)	8 (8.3)	
Missing	0	2 (2.1)	
Father's education (%)			0.13
High School or less	22 (24.2)	29 (30.2)	
Some college or less	49 (53.9)	38 (39.6)	
Don't know/No response	20 (22.0)	29 (30.2)	
Mother's education (%)			0.04
High School or less	20 (22.0)	27 (28.1)	
Some college or more	59 (64.8)	45 (46.9)	
Don't know/no response	12 (13.2)	24 (25.0)	
Plan to attend college (%)	87 (95.6)	89 (92.7)	0.77
Ethnicity (%)[a]			
African American	38 (41.8)	46 (47.9)	0.62
European American	40 (44.0)	22 (22.9)	<0.01
Asian American[b]	27 (29.7)	30 (31.3)	0.80
American Indian	9 (9.9)	9 (9.4)	0.92
Hispanic American	2 (2.2)	5 (5.2)	0.49
Pacific Islander	1 (1.1)	3 (3.1)	0.49
African	2 (2.2)	2 (2.1)	0.96
Middle Eastern	2 (2.2)	0 (0)	0.21
Alaska Native	1 (1.1)	1 (1.0)	0.92

[a] The sum of the percentages exceeds 100 since selection of more than one ethnicity was permissible.

[b] Includes students self-identified as Chinese, Japanese, Korean, South Asian, Southeast Asian, and/or Filipino American.

[c] p value compares the mean values in each category between control and intervention groups (age: two-tailed *t*-test; other categories: Pearson's chi square statistic).

Table 2

Changes in knowledge: control vs. intervention groups

Factual knowledge statements[a]	Students responding correctly (%)				Change in % correct/ baseline
	Control		*Intervention*		
	First survey	Second survey	First survey	Second survey	p value[b]
Composition of the waiting list					
Almost one-half of the persons waiting for organ transplants in the U.S. are ethnic minorities. (T)	36.3	34.1	33.3	70.8	<0.001
African Americans wait longer for kidney transplants than Caucasian/Whites. (T)	39.6	33.0	35.4	72.9	<0.001
Asian Americans wait longer for kidney transplants than Caucasians/Whites. (T)	26.4	26.4	21.9	52.1	<0.001
Blood type doesn't make any difference when receiving a donated organ. (F)	61.5	57.1	62.5	68.8	0.22
Most organs received by people of color are donated by Caucasian/White donors. (T)	7.69	15.4	17.7	50.0	<0.001
Who may need an organ transplant					
People wouldn't need transplants if they took better care of their health. (F)	60.4	46.2	57.3	67.7	<0.001
More people die from automobile accidents and gun shot wounds than from heart disease. (F)	33.0	35.2	28.1	38.5	0.22
Fairness of the organ allocation system					
The local heart transplant program turns away about 30% of patients because of inability to pay (F)	11.0	23.1	14.6	37.5	0.10
A national computer system matches and distributes donated organs to the persons who are the sickest and to those who have been waiting the longest. (T)	48.4	40.7	39.6	78.1	<0.001
Sometimes organs can be sold for money in the United States. (F)	18.7	23.1	19.8	46.9	<0.001
Rich or famous people can receive organs before the people with the most need. (F)	27.5	24.2	27.1	72.9	<0.001
Transplant survival rates and results					
Transplant survival rates today are very high. (T)	50.6	48.4	36.5	70.8	<0.001
Transplant recipients can live more than 10 years after a transplant operation. (T)	51.7	48.4	30.2	55.2	<0.001
The patient's chance of surviving a transplant operation today is pretty low (F)	51.7	48.4	41.7	60.4	<0.001
A transplant operation has less than a 50/50 chance of allowing the recipient to return to normal activities (F)	15.4	20.9	13.5	32.3	<0.05
Living donation					
A patient can receive an organ transplant from a living donor (T)	80.2	76.9	68.8	75.0	0.23

[a] Factual statements are either true (T) or false (F); the correct answer is given in parentheses next to the statement.

[b] p value compares the mean change in percent correct responses divided by the baseline percent correct responses for that item between intervention and control groups (two-tailed *t*-test).

Table 3

Change in knowledge: issues related to ethnicity

	Students responding correctly (%)				Change in % correct/baseline
Factual knowledge statements	**First survey**	**Second survey**	**First survey**	**Second survey**	**p value[a]**
African-American students	*Control (n=38)*		*Intervention (n=45)*		
Almost one-half of the persons waiting for organ transplants in the U.S. are minorities. (T)	39.5	31.6	37.8	60.0	0.004
African-Americans wait longer for kidney transplants than Caucasian/Whites. (T)	57.9	44.7	40.0	73.3	0.001
Asians wait longer for kidney transplants than Caucasians/Whites. (T)	36.8	34.2	17.8	48.9	<0.005
Most organs received by people of color are donated by Caucasian donors. (T)	7.9	18.4	13.3	53.3	<0.01
Asian-American students	*Control (n=26)*		*Intervention (n=30)*		
Almost one-half of the persons waiting for organ transplants in the U.S. are minorities. (T)	23.1	38.5	26.7	70.0	0.02
African-Americans wait longer for kidney transplants than Caucasian/Whites. (T)	26.9	23.1	26.7	66.7	0.002
Asians wait longer for kidney transplants than Caucasians/Whites. (T)	19.2	23.1	23.3	50.0	0.08
Most organs received by people of color are donated by Caucasian donors. (T)	3.9	11.5	16.7	53.3	0.02
European-American (only) students	*Control (n=23)*		*Intervention (n=15)*		
Almost one-half of the persons waiting for organ transplants in the U.S. are minorities. (T)	47.8	39.1	33.3	86.7	<0.001
African-Americans wait longer for kidney transplants than Caucasian/Whites. (T)	34.8	39.1	33.3	80.0	0.003
Asians wait longer for kidney transplants than Caucasians/Whites. (T)	17.4	17.4	33.3	60.0	0.02
Most organs received by people of color are donated by Caucasian donors. (T)	13.0	17.4	20	53.3	0.05

[a] p value compares the mean change in percent correct responses divided by the baseline percent correct responses for that item between intervention and control groups (two-tailed *t*-test).

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Table 4

Predictors of willingness to donate at baseline

Variable	Odds Ratio	Std. Error	95% Confidence Interval	p value[a]
Ethnicity (Reference = European American):				
African American	0.20	0.08	0.85-0.45	<0.001
Asian American	0.24	0.11	0.10–0.57	0.001
Other non-European American	0.21	0.14	0.06-0.79	0.02
Knowledge score	1.12	0.06	1.02–1.25	<0.02
Gender (Reference = male)	2.10	0.69	1.11–3.98	0.02
School	1.17	0.22	0.80–1.71	0.41
Having talked with family	1.23	0.44	0.61–2.47	0.56
Age	1.02	0.13	0.80–1.33	0.83
Personal experience[b]	1.05	0.46	0.45–2.49	0.90

[a] Ordinal logistic regression analysis.

[b] Personal experience reflects personal knowledge of someone who has been an organ donor, signed up as a bone marrow donor, been on the waiting list for an organ transplant, or received an organ transplant.

Table 5

Predictors of attitudinal change from first to second surveys

A) Predictors of positive change in willingness to donate

Variable	Odds Ratio	Std. Error	95% Confidence Interval	p value[a]
Non-European American ethnicity	0.71	0.51	0.17–2.90	0.63
Change in knowledge score	1.42	0.13	1.18–1.71	<0.001
Gender (Reference = male)	0.56	0.33	0.18–1.74	0.32
School	1.87	0.72	0.88–4.00	0.10
Having talked with family[b]	0.29	0.19	0.08–1.02	0.05
Age	0.59	0.13	0.39–0.90	<0.02
Personal experience[c]	1.23	0.89	0.32–5.04	0.76

B) Predictors of negative change in willingness to donate

Variable	Odds Ratio	Std. Error	95% Confidence Interval	p value[a]
Non-European American ethnicity	0.54	0.45	0.10–2.81	0.46
Change in knowledge score	1.21	0.12	0.99–1.47	0.06
Gender	0.44	0.33	0.10–1.88	0.27
School	1.56	0.67	0.67–3.62	0.30
Having talked with family[b]	0.38	0.28	0.09–1.58	0.18
Age	0.64	0.18	0.37–1.10	0.11
Personal experience[c]	1.79	1.41	0.38–8.40	0.46

[a] Standard logistic regression analysis.

[b] Reference is an affirmative response to having talked with family.

[c] Personal experience reflects personal knowledge of someone who has been an organ donor, signed up as a bone marrow donor, been on the waiting list for an organ transplant, or received an organ transplant.