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Knowledge About Renal Transplantation Among African, Caribbean, and Black Canadian Patients With Advanced Kidney Failure

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Introduction: Variable transplant-related knowledge may contribute to inequitable access to living donor kidney transplant (LDKT). We compared transplant-related knowledge between African, Caribbean, and Black (ACB) versus White Canadian patients with kidney failure using the Knowledge Assessment of Renal Transplantation (KART) questionnaire.

Methods: This was a cross-sectional cohort study. Data were collected from a cross-sectional convenience sample of adults with kidney failure in Toronto. Participants also answered an exploratory question about their distrust in the kidney allocation system. Clinical characteristics were abstracted from medical records. The potential contribution of distrust to differences in transplant knowledge was assessed in mediation analysis.

Results: Among 577 participants (mean [SD] age 57 [14] years, 63% male), 25% were ACB, and 43% were White Canadians. 45% of ACB versus 26% of White participants scored in the lowest tertile of the KART score. The relative risk ratio to be in the lowest tertile for ACB compared to White participants was 2.22 (95% confidence interval [CI]: 1.11, 4.43) after multivariable adjustment. About half of the difference in the knowledge score between ACB versus White patients was mediated by distrust in the kidney allocation system.

Conclusion: Participants with kidney failure from ACB communities have less transplant-related knowledge compared to White participants. Distrust is potentially contributing to this difference.

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Patients from communities marginalized by race and/or ethnicity are less likely to receive LDKT compared to White patients in several jurisdictions, including Canada.[1–7] In this analysis, we focus on patients who identify as African, Caribbean or Black. To emphasize the diverse ethnic, cultural, and linguistic backgrounds and experiences of Black Canadians, the term "African, Caribbean and Black" has increasingly be used.[8] Some of these communities have resided in Canada for many generations, others have migrated to Canada in recent decades. In 2016, >55% of Canada's ACB population were foreign-born.[9]

In North America, race is used to assign individuals to groups based on perceived attributes such as skin color and other physical features, which are also assumed to be related to ancestral, genetic, biological, cultural, political, and socioeconomic differences.[10,11] The meaning or categorization of people based on race is related to the complex interrelated historical, social, economic, and political processes. The inequities and hierarchical structure of society also contribute to the social

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construction of race, considering its intersection with gender (social construct: man, woman, other categories), sex (biological construct: male, female), ethnicity, disabilities, social class, immigrant status, and other identity characteristics. This social construction serves to position individuals in society and to determine their access to opportunities pertaining to, among other things, health, and healthcare. Instead of "race" the term "racialized" is used to indicate the social construction of the categories that identify or categorize people other than those who are White.

Therefore, the inequities faced by racialized group members at both individual and institutional levels cannot be explained by biological differences, but by how race and relatedly, racism and racialization, operate among the social determinants of health.[12–14] As such, racialized individuals' interactions with the healthcare system are affected by health inequities, the micro-aggressions and macro-aggressions they have experienced and the perceived lack of attention to their needs.[15–17] In the case of ACB communities, anti-Black racism specifically contributes to health inequities that they experience.[12,18] In this context, anti-Black racism refers to the belief system that serves to frame the policies and practices in Canadian institutions, including healthcare, with their embedded inequities that are sustained by the prejudice, stereotyping, and discrimination that Black people experience within the healthcare system. On a day-to-day level, this is manifested as lack of service in Black communities and the absence of culturally safe and culturally informed care.[19–21]

Inequities in accessing kidney care, specifically LDKT, among African American patients have been documented in the United States(US)[22–24] and in Canada.[2] The magnitude of inequities remains unchanged.[3,13] The potential reasons remain largely unexplored, and may include, among other things, lower transplant-related knowledge, lack of awareness of LDKT or its advantages, misunderstandings about the risks involved, and concerns about donor safety.[25–30] Transplant education could increase knowledge, improve trust, and support patients in their exploration of LDKT.[26,28,31] However, studies indicate that there is an unwillingness among members of ACB communities to pursue LDKT because of their lack of trust in the healthcare system,[32,33] and in the system related to deceased organ donation.[34–36] Distrust is also likely related to knowledge gaps.[37] Educational interventions that aim to promote trust have been associated with an increased willingness to pursue LDKT.[38,39]

In this study, we compared transplant-related knowledge between ACB and White Canadian patients with advanced chronic kidney disease (CKD), using the KART questionnaire.[40] We hypothesize that participants from ACB communities have less kidney transplant-related knowledge compared to White participants. We also assessed the extent to which distrust in the kidney allocation system contributes to observed differences in transplant-related knowledge.

METHODS

Study Design, Participants, Data Sources, and Variables

This is a secondary analysis of cross-sectional data from our research database, the Comprehensive Psychosocial Research Data System (REB#17-5916). The database houses data from studies assessing different aspects of the illness experience of patients with various stages of CKD to facilitate secondary analysis.

Participants who provided data for this analysis had been recruited into 2 original studies. One study recruited patients who had been referred for pretransplant assessment at the Ajmera Transplant Centre, University Health Network. Participants in that study had been referred from 12 to 14 renal programs. In addition, potential transplant candidates from 3 dialysis units in Toronto were recruited. The other dataset was sampled from the baseline data of a pilot study using the Explore Transplant Ontario transplant education package. For participants who participated in both studies only the first dataset was retained for this analysis. The primary studies were approved by the University Health Network Research Ethics Board and by the ethics boards of the participating hospitals (#2016-011-M, #2016-003-M; #16-249; #NEP-18-016; #377-2017; #17-0061). All study procedures were conducted in accordance with the standards of the University Health Network research ethics board and with the 1964 Helsinki Declaration and its later amendments. Patients with dementia and/or severe cognitive impairment, severe acute illness (both determined by the managing team) as well as non-English speaking patients were excluded from the original studies. Participants were recruited during scheduled dialysis or clinic visits. An electronic data capture system (Data-Driven Outcomes System – DADOS, Techna Institute, University Health Network, Toronto, Canada) was used for questionnaire administration, utilizing tablet devices.

For this study, we used data from adults ($>$18 years of age) with advanced CKD (estimated glomerular filtration rate $<$30 ml/min per1.73 m^2) and patients on maintenance dialysis. Kidney transplant recipients with a functioning kidney graft, and individuals who had missing KART score[40] or data regarding racialized status were excluded.

Self-reported sociodemographic characteristics included racialized status, immigrant status, age, sex, education, marital status, and employment. Socioeconomic status was assessed using self-reported income and the material deprivation index of the Ontario Marginalization Index (OMI). The OMI is an area level index that links postal code to census-based data. Weighted scores for each postal code in Ontario were ranked to generate quintiles and sorted from the least deprived (1) to the most deprived (5).[41] In our analysis, these quintiles were categorized into low deprivation (quintiles 1 and 2), moderate deprivation (quintile 3), and high deprivation (quintiles 4 and 5). Clinical information such as blood hemoglobin levels, serum albumin levels, renal replacement therapy modality, and comorbidities (assessed by the Charlson Comorbidity Index) was captured from medical records using a standardized data extraction form.

Exposure Assessment and Classification

The primary exposure of interest was racialized status. Racialized status was self-reported and extracted from responses to the question: "Which of the following best describes your racial or ethnic group? (Options included: Black-African [e.g., Ghanaian, Kenyan, Somali], Black-Caribbean [e.g., Barbadian, Jamaican], Black-North American [e.g., Canadian and American], White -European [e.g. English, Italian, Portuguese, Russian], White – North American [e.g., Canadian and American], etc.)." This question followed the format utilized in Canadian census data collection and the Toronto Public Health "Health Equity Data Collection Research Project" Report.[1,3,42,43] Results were then grouped into 3 main categories as follows: (i) White Canadian, (ii) ACB (African, Caribbean, and Black Canadians [Black North Americans]), and (iii) Other (including South and East Asian, Middle Eastern, and other participants).

Outcome Assessment and Classification: KART Questionnaire

The primary outcome of interest was transplant-related knowledge score (herein referred to as KART score) obtained by the KART questionnaire.[40] The questionnaire contains 10 statements with true or false and a third "Don't know" option, and 5 multiple-choice questions pertaining to the risks and benefits of kidney transplantation (KT). The 15-item KART questionnaire was developed through rigorous psychometric testing using the Item Response Theory to allow for the estimation of reliability of the scale at different levels of the knowledge spectrum.[40] In our study, wording of some of the KART items were modified to reflect the local healthcare system context. KART scores range from 0 to 30, with higher scores indicating more kidney transplant knowledge.[40] In our primary analyses, we used KART scores as continuous variable. In addition, we categorized the scores by generating tertiles. The association between racialized status and responses to dichotomized individual items (correct vs. incorrect/don't Know) was also analyzed. We also analyzed responses to an exploratory question about distrust in the fairness of the deceased donor kidney allocation system: "Patients who are rich are more likely to get a kidney from the waiting list than patients who are poor."

Statistical Analysis

Categorical variables were described using frequencies and percentages, whereas continuous variables were described using mean and SD for normally distributed data, and median and interquartile range for skewed data. The association between racialized status and participant characteristics was assessed using chi-square test for categorical variables, 1-way analysis of variance for normally distributed variables, and Kruskal-Wallis test for skewed continuous variables. The association between racialized status versus KART score tertiles, and the association between racialized status versus answers to individual questionnaire items was assessed using chi-square test.

To assess independent associations between racialized status and transplant-related knowledge, we built multivariable adjusted linear regression for the KART score, as well as ordinal and binary logistic regression models for the KART tertiles and individual items, respectively. Participants identifying as "White" were the reference category in both sets of regression models. Selection of covariates potentially associated with exposure, outcome, or both (immigrant status, age, gender, marital status, education and employment status, material deprivation index of the OMI, transplant history, treatment modality, and Charlson Comorbidity Index score), was guided by data from the literature and clinical experience.

The multivariable models were sequentially fitted with an increasing number of covariates. Model 1 was univariable; model 2 included model 1 and immigrant status; model 3 included model 2 and sociodemographic covariates (age, gender, marital status, education, employment status and OMI); and Model 4 included model 3 plus clinical covariates (transplant history, treatment modality, Charlson Comorbidity Index score).

Missingness was 2% to 15%. Multiple imputation by chained equations was used to address missing data. This method replaces missing values with a set of imputed values in different imputed datasets based on the joint distribution of existing variables entered into the imputation model. Analyses were performed on 5 complete imputed datasets, and the results were combined using Rubin's rules. Statistical analyses were performed using STATA 15.0 (StataCorp, College

Station, TX). A 2-sided P-value of <0.05 was considered statistically significant.

To assess if the effect of ACB status on knowledge is, at least in part, mediated by "distrust," we used quasi-Bayesian approximation, as implemented in the mediation package in R (R Foundation for Statistical Computing, Vienna, Austria).[44] We report the estimated average causal mediation effect, average direct effect, total effect, and proportion of total effect attributable to the mediator, along with 95% CIs and P-value. Alpha = 0.05 is used as the threshold for statistical significance. The mediation analysis was performed using R Version 3.6.2

RESULTS

Of the 1795 participants assessed for eligibility in the database, a total of 577 participants were included in the analysis (Supplementary Figure S1). Mean (SD) age of the cohort was 57 (14) years; 63% were male, 43% were White Canadians, 25% ACB Canadians, and 32% were Other (Table 1.). In the sample, 71% of White versus 37% of ACB participants reported an annual income >$30,000 (CAN) ($P < 0.001$). In addition, 64% of White versus 42% of ACB participants had >12 years of education ($P < 0.001$). A greater proportion of ACB (86%) versus White (27%) participants were immigrants ($P < 0.001$). The overwhelming majority of both ACB and White participants (95% vs. 98%, respectively) indicated English as their first language or that they speak English fluently or very well. The median [interquartile range] KART score was lower for ACB compared to White participants (16 [8] vs. 18 [7], $P < 0.001$) (Table 1). Furthermore, 26% of White versus 45% of ACB participants had KART scores in the lowest tertile ($P < 0.001$) (Table 1).

In linear regression analysis, the continuous KART score was significantly associated with ACB status (B = −2.45 [95% CI: −3.74 to −1.16, $P < 0.001$). The coefficient estimate was substantially smaller after

Table 1. Baseline sociodemographic and clinical characteristics by racialized status

		Racialized status			
Variable	Total (N = 577)	White participants (n = 246)	ACB participants (n = 147)	Other participants (n = 184)	P-Value
Mean age (SD)	57 (14)	59 (13)	58 (13)	55 (14)	0.677
Male, n (%)	361 (63)	156 (63)	87 (59)	118 (64)	0.611
Education, ≥ 12 yrs, n (%)	334 (60)	152 (64)	60 (42)	122 (69)	<0.001
Marital status, n (%)					0.001
Single, never married	131 (23)	48 (20)	47 (32)	36 (20)	
Married, domestic partnership or common law	306 (54)	146 (60)	58 (39)	102 (57)	
Widowed, divorced, or separated	131 (23)	48 (20)	42 (29)	41 (23)	
Self-reported annual income >30,000 CAD/yr, n (%)	244 (57)	141 (71)	35 (37)	68 (52)	<0.001
Employment, n (%)					<0.001
Employed	142 (25)	76 (32)	20 (14)	46 (26)	
Unemployed	33 (6)	6 (2)	11 (8)	16 (9)	
Other (retired, student, on social assistance)	383 (69)	159 (66)	111 (78)	113 (65)	
OMI, n (%)					<0.001
Low deprivation	151 (28)	92 (39)	17 (13)	42 (24)	
Moderate deprivation	92 (17)	48 (20)	14 (11)	30 (17)	
High deprivation	299 (55)	98 (41)	100 (76)	101 (58)	
Immigrant status, immigrant, n (%)	306 (56)	63 (27)	122 (86)	121 (70)	<0.001
Time on dialysis, >3 yrs, n (%)	169 (36)	56 (29)	60 (45)	53 (37)	0.052
Kidney replacement therapy, n (%)					<0.001
Hemodialysis	420 (73)	160 (65)	126 (86)	134 (73)	<0.001
Peritoneal dialysis	75 (13)	38 (15)	15 (10)	22 (12)	
None	81 (14)	48 (20)	5 (3)	28 (15)	
Previous kidney transplant, yes, n (%)	123 (23)	54 (24)	31 (21)	38 (22)	0.811
Diabetes, yes, n (%)	269 (47)	108 (44)	77 (52)	84 (46)	0.264
CCI score, ≥4, n (%)	237 (48)	103 (50)	67 (52)	67 (42)	0.175
Mean (SD) hemoglobin (g/dl)	111 (15)	112 (14)	109 (13)	110 (17)	0.176
Mean (SD) serum albumin (g/dl)	38 (4)	38 (5)	38 (4)	38 (4)	0.339
Median KART score (IQR)	17 (8)	18 (7)	16 (8)	15 (10)	<0.001
KART score by tertile, n (%)					<0.001
Lowest	214 (37)	64 (26)	66 (45)	84 (46)	
Middle	183 (32)	80 (33)	49 (33)	54 (29)	
Highest	180 (31)	102 (41)	32 (22)	46 (25)	

ACB, African, Caribbean, and Black; CAD, Canadian Dollars; CCI, Charlson Comorbidity Index; IQR, interquartile range; KART, knowledge assessment of renal transplantation; OMI, Ontario marginalization index.

adjusting for immigrant status, but ACB status remained significantly associated with KART score (B = −1.51 [95% CI: −2.98 to −0.03, $P = 0.045$). This association remained significant even after multivariable adjustment in the final model (B = −1.76, 95% CI: −3.32 to −0.21, $P = 0.026$) (Table 2). In addition to ACB status, older age, female sex, >12 years of education, and a history of previous kidney transplant were significantly associated with KART score in the final multivariable model in the expected direction.

In unadjusted ordinal logistic regression, ACB versus White participants were more likely to be in the lower tertiles (odds ratio [OR]: 2.45, 95% CI: 1.67–3.58, $P < 0.001$) (Table 3). After adjusting for immigrant status, sociodemographic and clinical covariates, the association remained statistically significant (OR: 2.14, 95% CI: 1.32–3.46, $P = 0.007$). We also tested the potential interaction between racialized status versus immigrant status or material deprivation categories. Formal interaction terms in the regression models were nonsignificant.

To gain more detailed understanding about potentially important areas of knowledge gaps among ACB participants, we assessed the association between racialized status and incorrect/“don’t know” answers to individual items of the KART questionnaire (Figure 1, Supplementary Tables S1 and S2). Importantly, more than half of the participants, irrespective of racialized status, gave incorrect or “don’t know” answers to the majority (11/15) of the items. Compared to White participants, ACB participants were more likely to give incorrect or “don’t know” answer for approximately half of the items (Supplementary Table S1). The difference was >15% for items (KART 13 and 14) pertaining to the cost or financial aspects of transplant. ACB participants were

Table 2. Multivariable linear regression to assess the independent association between ACB racialized status and transplant knowledge (KART) score

Model	Regression Coefficient- ACB participants	95% Confidence interval	*P*-value
1	−2.45	−3.74 to −1.16	<0.001
2	−1.51	−2.98 to −0.03	0.045
3	−1.81	−3.37 to −0.25	0.023
4	−1.76	−3.32 to −0.21	0.026

ACB, African, Caribbean, and Black.
Model 1: racialized status (3 category).
Model 2: model 1 + Immigrant status (yes/no).
Model 3: model 2 + age, gender, marital status, education, employment status, Ontario marginalization index.
Model 4: model 3 + transplant history, treatment modality, Charlson comorbidity index.
In this analysis the continuous KART score is the dependent variable. Racialized status (ACB or White or other) is the primary exposure or independent variable. Participants who identified as “White” are the reference group. To clarify, we only show the parameters obtained for the ACB group. The coefficients indicate that ACB participants had on average ~ 2-point lower KART scores (coefficients 2.45 to 1.76 in the different models), i.e., they answered approximately 2 more items inaccurately, compared to White participants.

Table 3. Ordinal logistic regression estimating the odds ratio of being in a tertile other than the highest of KART scores for ACB participants (reference: White participants; base outcome: highest tertile)

Tertile	Model	ACB participants OR	95% Confidence Interval	*P*-value
	1	2.45	1.67–3.58	<0.001
	2	1.82	1.18–2.82	0.007
	3	2.18	1.35–3.53	0.001
	4	2.14	1.32–3.46	0.002

ACB, African, Caribbean, and Black; KART, Knowledge Assessment of Renal Transplantation; OR, odds ratio.
Model 1: racialized status (3 category).
Model 2: model 1 + immigrant status (yes/no).
Model 3: model 2 + age, gender, marital status, education, employment status, Ontario marginalization index.
Model 4: model 3 + transplant history, treatment modality, Charlson comorbidity index.
In this analysis, the dependent variable is the categorized KART score (by tertiles). Racialized status (ACB or White or other) is the primary exposure or independent variable. Participants who identified as “White” are the reference group. To clarifyy, we only show the parameters obtained for the ACB group.

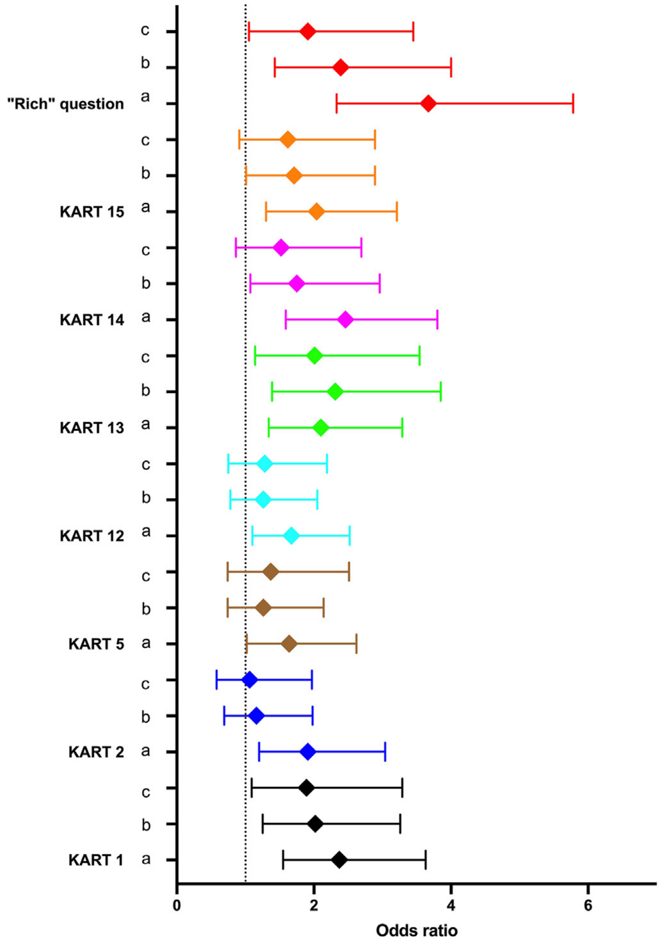

Figure 1. Odds ratios of ACB participants giving an incorrect or “I don’t know” answer to selected items (estimated by binary logistic regression; reference: white participants)
For the wording of the specific item, please, see Table S1.
a-univariable model: ACB vs. white participants
b-model including racialized status + immigrant status (yes/no)
c-fully adjusted model: racialized status + immigrant status (yes/no); age, gender, marital status, education, employment status, Ontario marginalization index, transplant history, treatment modality, Charlson comorbidity index score. KART, Knowledge Assessment of Renal Transplantation.

also more likely to give incorrect/don't know answer about benefits of transplant (KART 5, 6, 12, and 15) and the risk of live donation (KART 1).

We further analyzed selected items, for which ACB participants were significantly more likely to not know the correct answer, using multivariable logistic regression (Figure 1, Supplementary Table S2). For several items, these associations became statistically insignificant upon adjusting for immigrant status or additional covariables. However, ACB versus white participants were significantly more likely to think that donors would lose half of their kidney function (fully adjusted OR: 1.89, 95% CI: 1.09–3.29, $P = 0.023$). In addition, ACB versus White participants were significantly more likely to not know details about coverage of the cost of transplant medications (fully adjusted OR: 2.01, 95% CI: 1.14–3.54, $P = 0.015$) (Figure 1, Supplementary Table S2).

ACB participants were also more likely to think that rich patients were more likely to receive a transplant, which may reflect distrust in the deceased donor kidney allocation system (fully adjusted OR: 1.91, 95% CI: 1.05–3.45, $P = 0.033$) (Figure 1, Supplementary Table S2). In a mediation analysis, there was a statistically significant overall effect of ACB status on KART score (estimate: -2.46, 95% CI: -3.62 to -1.16, $P < 0.001$). However, we estimate that over half of the apparent knowledge gap between ACB versus White participants is attributable to potential distrust (as reflected by the answer to the "rich more likely to receive a transplant" item) (proportion of effect mediated: 0.54, 95% CI: 0.31–1.07, $P < 0.001$).

DISCUSSION

Our study suggests that patients with kidney failure who are from ACB communities have less complete kidney transplant-related knowledge in multiple domains, compared to White patients. Some of the knowledge differential may be related to immigrant status. Furthermore, based on our exploratory analysis, we hypothesize that some of the transplant knowledge difference between ACB versus White participants might be mediated by distrust in the kidney allocation system. These results should not be used to blame ACB patients for the inequitable access to LDKT, but to point to the lack of culturally tailored and responsive pretransplant education and to the experiences with discrimination they may have faced.

In addition, to improve pretransplant education for ACB patients, it will be important to focus on system-level policies, process, and practices (transplant referral and eligibility criteria, organ allocation, navigation support for transplant assessment, etc.) that contribute to inequities in accessing best kidney care for patients from ACB communities in Canada.

To facilitate the interpretation of our results, we provide a brief description of the kidney care system in Ontario. Canada has a publicly funded, universally accessible healthcare system, which is provincially administered. In the province of Ontario, advanced kidney care (dialysis and predialysis care) is provided by 26 provincial regional CKD programs, caring for over 24,000 patients each year; about half of them are potentially transplant eligible.[45] CKD program staff educate patients and families on their treatment options, and refer patients for pretransplant evaluation to 1 of 6 transplant centers in Ontario, after completion of most of the transplant workup. This is different from the US, where a patient's contact information is forwarded to a transplant center to make a referral. As a result, it is conceivable that many Canadian patients with advanced kidney failure may have higher transplant knowledge compared to patients in the US before their assessment at the transplant program.

Our findings are important because transplant-related knowledge is potentially modifiable through pretransplant patient education.[26,28,31] However, pretransplant education initiatives will need to consider the distrust that is present in these communities. Partnering with communities to codevelop culturally safe and tailored transplant education tools could improve credibility and acceptability of the information.[34,46–51]

In our study ACB patients had lower transplant knowledge compared to White patients, which is consistent with the findings of other studies[25–27,29,30,52–54] Patients with more transplant-related knowledge were more likely to pursue transplantation and complete transplantation evaluation more quickly.[55] The level of knowledge related to donation and transplantation was associated with favorable attitude toward organ donation among Nigerian immigrants in Spain.[56]

According to a UK-based study, Black Caribbean or African patients were less likely to be aware of the possibility of donating kidneys after death and more likely to feel inadequately informed.[57] A qualitative study among African American patients on hemodialysis identified that insufficient knowledge about kidney disease and treatment options was coupled with poor experiences with health care professionals, who were dismissive, did not explain procedures even when asked, and spent an inadequate amount of time with patients.[53] A UK-based qualitative study found that misinformation from informal sources led to the circulation of and belief in various myths and misconceptions related to organ donation. Most participants believed that public health information on organ donation did not tailor donation-related health information to the needs of Black communities.[54]

We found that ACB participants were more likely than White participants to give incorrect or "don`t know" answer for items pertaining to the financial aspects of transplant. Similarly, in a US study, African Americans expressed uncertainty about which transplant-related costs were covered by health insurance.[58] Transplant candidates may have significant concerns and uncertainties about the impact of LDKT on their finances, or the finances of their potential donors. However, having financial aid for donors available was not effective to increase LDKT rates in a recent randomized study in the US.[59]

In addition, we found that ACB participants had less knowledge regarding the potential risks and benefits of KT compared to White participants. This may be an important barrier to pursuing KT. Better understanding of the benefits and risks of KT may improve decision-making for the patient and provide more opportunities for clinicians to address patients' concerns.[60]

Some of the socioeconomic differences between ACB and White participants may have contributed to the observed differences, because the difference between these groups disappeared for some of the individual items in the fully adjusted models, which accounted for education level and material deprivation. Furthermore, immigrant status and fewer years of education may account for some of the knowledge differential observed. Lower health literacy, language barrier, and lack of information on how to navigate the healthcare system may account in part for the lower transplant knowledge among immigrant participants.[61,62]

Immigrants also experience cultural discordance upon arrival in North America, which is further exacerbated by the lack of culturally competent care.[63,64] In one study, African immigrants noted that they were reluctant to visit the office of health care providers because of the provider's lack of understanding of their health care needs.[65] The lack of culturally safe and responsive care may deter immigrants from trusting health care providers, and thus, prevent them from receiving and accepting information regarding transplantation.[46]

Acculturation represents an important construct for understanding inequitable access to health care and to health for minority populations.[66–68] Acculturation is the dual process of cultural and psychological change that takes place as a result of contact between cultural groups and their individual members.[69] Language barrier is an aspect of acculturation, which contribute to differential health-related knowledge and access to care.[66] The degree of acculturation for culturally diverse communities and for immigrants is determined by highly interconnected socioeconomic factors (e.g., income, ethnicity, citizenship and immigration status, gender, age, geographical location, education, and types of jobs).[67–69] The level of discrimination and racism is also an important determinant of acculturation.[67,68] All these factors may have also contributed to the observed differences in transplant-related knowledge in our sample.

Based on an exploratory analysis, we hypothesize that about half of the difference in the knowledge between ACB and White patients may be attributable to distrust about the fairness of the transplant allocation system. This likely reflects distrust in the broader healthcare system and in health care professionals,[70] which in part stems from a history of medical experimentation on Black communities. Previous studies have documented mistrust in the healthcare system among racialized patients[32,33,71,72] and transplant system.[34–36,70] ACB patients have indicated an interest in LDKT if educational interventions are done in groups with other ACB patients,[73] and if education is provided by someone who shared their background. Therefore, there is a need for culturally responsive educational interventions that address both LDKT knowledge and work to develop trust among ACB communities. Tailored pretransplant education, such as the Living ACTS and Explore Transplant @ Home program, have already shown promise in increasing transplant knowledge in African American communities.[74,75]

Although other racialized communities, for example, South and East Asians in Canada also have lower access to kidney transplant and live donor kidney transplant,[1,2] and may have lower transplant-related knowledge, in this work we focus on patients from ACB communities only. This decision was informed by sample size considerations, and by acknowledging the need to focus on specific communities to highlight their specific circumstances. Such an approach can also best guide the codevelopment of community focused information and health promotion materials.

Strengths of this study include a relatively large sample size, and a clinically and sociodemographically diverse sample. These factors increase the generalizability of the results. However, the limitations of this study should be noted. Ours was a convenience sample, which limits generalizability. Specifically, patients who are more likely to have gaps in transplant-related knowledge, may have been more likely not to participate in this study. This could have led to bias; it may have been differential across exposure groups. Further, non-English speakers were excluded from the sample; therefore, their experiences are not represented in these findings. Moreover, Canada's healthcare system is publicly funded with universal access to healthcare, and this may further limit generalizability of the results. In addition, racialized status was categorized into White, ACB, and others. Although individuals within each category may share some common experiences, these groups are not homogenous. We used the OMI to account for socioeconomic status in our analysis, which is an area-level index and may not accurately reflect individual characteristics, which may have led to false assignments of deprivation status. We assessed self-reported education level to account for differences in education attainment. We acknowledge that quality of education can significantly differ between different countries of origin, and this may have had an impact on our results. Importantly, we assessed distrust with only one item, which has not been validated for this purpose before, and we did not use more complex validated tools to assess trust in the healthcare system. Finally, we cannot rule out the impact of residual confounding on the results of this analysis.

In this study ACB patients with kidney failure had lower transplant-related knowledge compared to White participants. Limited knowledge may contribute to lower motivation to explore, pursue, and receive KT or LDKT.[53,54] Future studies should explore if culturally tailored and safe transplant education[76] will improve equitable access to kidney transplant and LDKT for patients with kidney failure from ACB communities.

DISCLOSURE

All the authors declared no competing interests.

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Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request, conditional on IRB approval.

AUTHOR CONTRIBUTIONS

Conceptualization and interpretation of data, and interpretation of results was by all authors. MH and IM proposed the analysis models. MH, JG, VG, NY, and IM coordinated the administration of the project. Each author contributed important intellectual content during manuscript drafting or revision and agrees to be personally accountable for the individual's own contributions and to ensure that questions pertaining to the accuracy or integrity of any portion of the work, even one in which the author was not directly involved, are appropriately investigated and resolved, including documentation in the literature if appropriate.

SUPPLEMENTARY MATERIAL

Supplementary File (PDF)

Figure S1. Study flow chart.

Table S1. Proportion of participants that answered individual knowledge items on the KART survey with the incorrect answer or "don't know" option, by racialized status.

Table S2. Logistic regression estimating the odds of giving an incorrect or "I don't know" answer to selected items (reference: white participants).

STROBE Statement.

REFERENCES

1. Mucsi I, Bansal A, Famure O, et al. Ethnic background is a potential barrier to living donor kidney transplantation in Canada: a single-center retrospective cohort study. *Transplantation*. 2017;101:e142–e151. https://doi.org/10.1097/TP.0000000000001658
2. Yeates KE, Schaubel DE, Cass A, Sequist TD, Ayanian JZ. Access to renal transplantation for minority patients with ESRD in Canada. *Am J Kidney Dis*. 2004;44:1083–1089. https://doi.org/10.1053/j.ajkd.2004.08.031
3. Vedadi A, Bansal A, Yung P, et al. Ethnic background is associated with no live kidney donor identified at the time of first transplant assessment-an opportunity missed? A single-center retrospective cohort study. *Transpl Int*. 2019;32:1030–1043. https://doi.org/10.1111/tri.13476
4. Purnell TS, Luo X, Cooper LA, et al. Association of race and ethnicity with live donor kidney transplantation in the United States from 1995 to 2014. *JAMA*. 2018;319:49–61. https://doi.org/10.1001/jama.2017.19152
5. Killian AC, Shelton B, MacLennan P, et al. Evaluation of community-level vulnerability and racial disparities in living donor kidney transplant. *JAMA Surg*. 2021;156:1120–1129. https://doi.org/10.1001/jamasurg.2021.4410
6. Wu DA, Robb ML, Watson CJE, et al. Barriers to living donor kidney transplantation in the United Kingdom: a national observational study. *Nephrol Dial Transplant*. 2017;32:890–900. https://doi.org/10.1093/ndt/gfx036
7. Ismail SY, Luchtenburg AE, Kal VGJA, et al. Modifiable factors in access to living-donor kidney transplantation among diverse populations. *Transplantation*. 2013;96:586–590. https://doi.org/10.1097/TP.0b013e31829b754c
8. Etowa J, Tharao W, Mbuagbaw L, et al. Community perspectives on addressing and responding to HIV-testing, pre-exposure prophylaxis (PrEP) and post-exposure prophylaxis (PEP) among African, Caribbean and Black (ACB) people in Ontario, Canada. *BMC Public Health*. 2022;22:913. https://doi.org/10.1186/s12889-022-13093-0

9. Maheux H, Do D. Diversity of the black population in Canada: an overview. Statistics Canada. Accessed September 4, 2022. https://www150.statcan.gc.ca/n1/pub/89-657-x/89-657-x2019002-eng.htm
10. James CE. *Seeing Ourselves: Exploring Race, Ethnicity And Culture*. 4th ed. Thompson educational Publishing, Inc.; 2010.
11. Montagu A. The concept of race. In: Das Gupta T, James CE, Maaka R, Galabuzi G-E, Andersen C, eds. *Race and Racialization: Essential Readings*. Canadian Scholars' Press; 2018: 15–24.
12. Dryden O, Nnorom O. Time to dismantle systemic anti-black racism in medicine in Canada. *CMAJ*. 2021;193:E55–E57. https://doi.org/10.1503/cmaj.201579
13. El-Dassouki N, Wong D, Toews DM, et al. Barriers to accessing kidney transplantation among populations marginalized by race and ethnicity in Canada: a scoping review part 2-East Asian, South Asian, and African, Caribbean, and Black Canadians. *Can J Kidney Health Dis*. 2021;8:2054358121996834. https://doi.org/10.1177/2054358121996834
14. Price-Haywood EG, Burton J, Fort D, Seoane L. Hospitalization and mortality among black patients and white patients with Covid-19. *N Engl J Med*. 2020;382:2534–2543. https://doi.org/10.1056/NEJMsa2011686
15. Norton JM, Moxey-Mims MM, Eggers PW, et al. Social determinants of racial disparities in CKD. *J Am Soc Nephrol*. 2016;27:2576–2595. https://doi.org/10.1681/asn.2016010027
16. Williams DR, Sternthal M. Understanding racial-ethnic disparities in health: sociological contributions. *J Health Soc Behav*. 2010;51(suppl):S15–S27. https://doi.org/10.1177/0022146510383838
17. Williams DR, Wyatt R. Racial bias in health care and health: challenges and opportunities. *JAMA*. 2015;314:555–556. https://doi.org/10.1001/jama.2015.9260
18. Maina IW, Belton TD, Ginzberg S, Singh A, Johnson TJ. A decade of studying implicit racial/ethnic bias in healthcare providers using the implicit association test. *Soc Sci Med*. 2018;199:219–229. https://doi.org/10.1016/j.socscimed.2017.05.009
19. Alliance BH. Anti-black racism. Accessed May 16, 2022. https://blackhealthalliance.ca/home/antiblack-racism/
20. Siddiqi A, Shahidi FV, Ramraj C, Williams DR. Associations between race, discrimination and risk for chronic disease in a population-based sample from Canada. *Soc Sci Med*. 2017;194:135–141. https://doi.org/10.1016/j.socscimed.2017.10.009
21. Phelan JC, Link BG. Is racism a fundamental cause of inequalities in health? *Annu Rev Sociol*. 2015;41:311–330. https://doi.org/10.1146/annurev-soc-073014-112305
22. Navaneethan SD, Singh S. A systematic review of barriers in access to renal transplantation among African Americans in the United States. *Clin Transplant*. 2006;20:769–775. https://doi.org/10.1111/j.1399-0012.2006.00568.x
23. Epstein AM, Ayanian JZ, Keogh JH, et al. Racial disparities in access to renal transplantation–clinically appropriate or due to underuse or overuse? *N Engl J Med*. 2000;343:1537–1544. https://doi.org/10.1056/NEJM200011233432106
24. Gore JL, Danovitch GM, Litwin MS, Pham PT, Singer JS. Disparities in the utilization of live donor renal transplantation. *Am J Transplant*. 2009;9:1124–1133. https://doi.org/10.1111/j.1600-6143.2009.02620.x
25. Hunt HF, Rodrigue JR, Dew MA, et al. Strategies for increasing knowledge, communication, and access to living donor transplantation: an evidence review to inform patient education. *Curr Transplant Rep*. 2018;5:27–44. https://doi.org/10.1007/s40472-018-0181-1
26. Waterman A, Rodrigue J. Transplant and organ donation education: what matters? *Prog Transplant*. 2009;19:7–8. https://doi.org/10.7182/prtr.19.1.d2441w863vr16812
27. Kucirka LM, Grams ME, Balhara KS, Jaar BG, Segev DL. Disparities in provision of transplant information affect access to kidney transplantation. *Am J Transplant*. 2012;12:351–357. https://doi.org/10.1111/j.1600-6143.2011.03865.x
28. Rodrigue JR, Paek MJ, Egbuna O, et al. Making house calls increases living donor inquiries and evaluations for blacks on the kidney transplant waiting list. *Transplantation*. 2014;98: 979–986. https://doi.org/10.1097/tp.0000000000000165
29. Redeker S, Massey EK, Boonstra C, et al. Implementation of the kidney team at home intervention: evaluating generalizability, implementation process, and effects. *Transpl Int*. 2021;34:2317–2328. https://doi.org/10.1111/tri.14011
30. Waterman AD, Peipert JD. An explore transplant group randomized controlled education trial to increase dialysis patients' decision-making and pursuit of transplantation. *Prog Transplant*. 2018;28:174–183. https://doi.org/10.1177/1526924818765815
31. Hamid M, Rogers E, Chawla G, Gill J, Macanovic S, Mucsi I. Pretransplant patient education in solid-organ transplant: a narrative review. *Transplantation*. 2022;106:722–733. https://doi.org/10.1097/TP.0000000000003893
32. Boulware LE, Cooper LA, Ratner LE, LaVeist TA, Powe NR. Race and trust in the health care system. *Public Health Rep*. 2003;118:358–365. https://doi.org/10.1093/phr/118.4.358
33. Halbert CH, Armstrong K, Gandy OH Jr, Shaker L. Racial differences in trust in health care providers. *Arch Intern Med*. 2006;166:896–901. https://doi.org/10.1001/archinte.166.8.896
34. Callender CO, Bayton JA, Yeager C, Clark JE. Attitudes among blacks toward donating kidneys for transplantation: a pilot project. *J Natl Med Assoc*. 1982;74:807–809.
35. Boulware LE, Troll MU, Wang NY, Powe NR. Perceived transparency and fairness of the organ allocation system and willingness to donate organs: a national study. *Am J Transplant*. 2007;7:1778–1787. https://doi.org/10.1111/j.1600-6143.2007.01848.x
36. Russell E, Robinson DH, Thompson NJ, Perryman JP, Arriola KR. Distrust in the healthcare system and organ donation intentions among African Americans. *J Community Health*. 2012;37:40–47. https://doi.org/10.1007/s10900-011-9413-3
37. Bogart LM, Towe VL, Storholm ED, et al. Associations of HCV knowledge and medical mistrust with being screened for HCV and offered HCV treatment among people with HIV. *J Health Care Poor Underserved*. 2021;32:1019–1033. https://doi.org/10.1353/hpu.2021.0077
38. Waterman AD, Peipert JD, Cui Y, et al. Your path to transplant: a randomized controlled trial of a tailored expert system intervention to increase knowledge, attitudes, and pursuit of kidney transplant. *Am J Transplant*. 2021;21:1186–1196. https://doi.org/10.1111/ajt.16262
39. Weng FL, Peipert JD, Holland BK, Brown DR, Waterman AD. A clustered randomized trial of an educational intervention during transplant evaluation to increase knowledge of living

donor kidney transplant. *Prog Transplant*. 2017;27:377–385. https://doi.org/10.1177/1526924817732021

40. Peipert JD, Hays RD, Kawakita S, Beaumont JL, Waterman AD. Measurement characteristics of the knowledge assessment of renal transplantation. *Transplantation*. 2018;103:565–572. https://doi.org/10.1097/tp.0000000000002349
41. Matheson FI, Dunn JR, Smith KLW, Moineddin R, Glazier RH. Development of the Canadian Marginalization Index: a new tool for the study of inequality. *Can J Public Health*. 2012;103: S12–6. https://doi.org/10.1007/BF03403823
42. Wray R, Agic B, Bennett-AbuAyyash C, et al, for the Tri-Hospital + TPH Steering Committee. *We ask because we care: The Tri-Hospital + TPH health equity data collection research project: Full Report*. Toronto: ON. Accessed October 8, 2023. http://torontohealthequity.ca/wp-content/uploads/2017/05/We-Ask-Because-We-Care-Report.pdf
43. Statistics Canada. Population group of person. Updated April 03, 2019. Accessed July 26, 2019. https://www23.statcan.gc.ca/imdb/p3Var.pl?Function=DECI&Id=279329
44. Tingley D, Yamamoto T, Hirose K, Keele L, Imai K. mediation: R package for Causal Mediation Analysis. *J Stat Softw*. 2014;59:1–38.
45. Wang C, Naylor KL, Luo B, et al. Using administrative health care databases to identify patients with end-stage kidney disease with no recorded contraindication to receiving a kidney transplant. *Can J Kidney Health Dis*. 2022;9:20543581221111712. https://doi.org/10.1177/20543581221111712
46. Ahmed R, Marshall L-J, Edwards B, et al. *Exploring the information needs of African, Caribbean, and Black Community Members regarding Living Donor Kidney Transplantation in Toronto, Ontario. presented at*. CST Virtual Canadian Transplant Summit; 2021.
47. Ameling JM, Auguste P, Ephraim PL, et al. Development of a decision aid to inform patients' and families' renal replacement therapy selection decisions. *BMC Inform Decis*. 2012;12: 140. https://doi.org/10.1186/1472-6947-12-140
48. Cabacungan AN, Ellis MJ, Sudan D, et al. Associations of perceived information adequacy and knowledge with pursuit of live donor kidney transplants and living donor inquiries among African American transplant candidates. *Clin Transplant*. 2020;34:e13799. https://doi.org/10.1111/ctr.13799
49. Callender CO, Miles PV. Minority organ donation: the power of an educated community. *J Am Coll Surg*. 2010;210:708–715. https://doi.org/10.1016/j.jamcollsurg.2010.02.037
50. Britt RK, Britt BC, Anderson J, Fahrenwald N, Harming S. "Sharing Hope and Healing": a culturally tailored social media campaign to promote living kidney donation and transplantation among Native Americans. *Health Promot Pract*. 2020;22:786–795. https://doi.org/10.1177/1524839920974580
51. Gordon EJ, Reddy E, Gil S, et al. Culturally competent transplant program improves Hispanics' knowledge and attitudes about live kidney donation and transplant. *Prog Transplant (Aliso Viejo Calif)*. 2014;24:56–68. https://doi.org/10.7182/pit2014378
52. Mucsi I, Novak M, Toews D, Waterman A. Explore transplant Ontario: adapting the explore transplant Education Program to facilitate informed decision making about kidney transplantation. *Can J Kidney Health Dis*. 2018;5:2054358118789369. https://doi.org/10.1177/2054358118789369
53. Salter ML, Kumar K, Law AH, et al. Perceptions about hemodialysis and transplantation among African American adults with end-stage renal disease: inferences from focus groups. *BMC Nephrol*. 2015;16:49. https://doi.org/10.1186/s12882-015-0045-1
54. Davis C, Randhawa G. "Don't know enough about it!": awareness and attitudes toward organ donation and transplantation among the black Caribbean and black African population in Lambeth, Southwark, and Lewisham, United Kingdom. *Transplantation*. 2004;78:420–425. https://doi.org/10.1097/01.Tp.0000128341.81362.0f
55. Rodrigue JR, Paek MJ, Egbuna O, et al. Readiness of wait-listed black patients to pursue live donor kidney transplant. *Prog Transplant*. 2014;24:355–361. https://doi.org/10.7182/pit2014337
56. Ríos A, Carrillo J, López-Navas AI, et al. Nigerian residents in Spain have poor awareness of organ donation and transplantation. *Transplant Proc*. 2018;50:2264–2267. https://doi.org/10.1016/j.transproceed.2018.03.070
57. Morgan M, Hooper R, Mayblin M, Jones R. Attitudes to kidney donation and registering as a donor among ethnic groups in the UK. *J Public Health (Oxf)*. 2006;28:226–234. https://doi.org/10.1093/pubmed/fdl045
58. Ganji S, Ephraim PL, Ameling JM, Purnell TS, Lewis-Boyer LL, Boulware LE. Concerns regarding the financial aspects of kidney transplantation: perspectives of pre-transplant patients and their family members. *Clin Transplant*. 2014;28:1121–1130. https://doi.org/10.1111/ctr.12428
59. Boulware LE, Sudan DL, Strigo TS, et al. Transplant social worker and donor financial assistance to increase living donor kidney transplants among African Americans: the TALKS Study, a randomized comparative effectiveness trial. *Am J Transplant*. 2021;21:2175–2187. https://doi.org/10.1111/ajt.16403
60. Nwanji V, Ghahramani A, Dauleh M, Ghahramani N. Knowledge about benefits of kidney transplantation: a survey of dialysis patients. *Ann Urol Nehrol*. 2021;2.
61. Ng E, Omariba DWR. Immigration, generational status and health literacy in Canada. *Health Educ J*. 2013;73:668–682. https://doi.org/10.1177/0017896913511809
62. Jones J, Rosaasen N, Taylor J, et al. Health literacy, knowledge, and patient satisfaction before kidney transplantation. *Transplant Proc*. 2016;48:2608–2614. https://doi.org/10.1016/j.transproceed.2016.07.018
63. Omenka OI, Watson DP, Hendrie HC. Understanding the healthcare experiences and needs of African immigrants in the United States: a scoping review. *BMC Public Health*. 2020;20:27. https://doi.org/10.1186/s12889-019-8127-9
64. Zghal A, El-Masri M, McMurphy S, Pfaff K. Exploring the impact of health care provider cultural competence on new immigrant health-related quality of life: a cross-sectional study of Canadian newcomers. *J Transcult Nurs*. 2020;32: 508–517. https://doi.org/10.1177/1043659620967441
65. Adekeye O, Kimbrough J, Obafemi B, Strack RW. Health literacy from the perspective of African immigrant youth and elderly: a PhotoVoice project. *J Health Care Poor Underserved*. 2014;25:1730–1747. https://doi.org/10.1353/hpu.2014.0183
66. Solis JM, Marks G, Garcia M, Shelton D. Acculturation, access to care, and use of preventive services by Hispanics: findings

from HHANES 1982-84. *Am J Public Health*. 1990;80(suppl):11–19. https://doi.org/10.2105/ajph.80.suppl.11

67. Fox M, Thayer Z, Wadhwa PD. Acculturation and health: the moderating role of socio-cultural context. *Am Anthropol*. 2017;119:405–421. https://doi.org/10.1111/aman.12867
68. Fox M, Thayer Z, Wadhwa PD. Assessment of acculturation in minority health research. *Soc Sci Med*. 2017;176:123–132. https://doi.org/10.1016/j.socscimed.2017.01.029
69. Rodriguez-Alcala ME, Qin H, Jeanetta S. The role of acculturation and social capital in access to health care: a meta-study on Hispanics in the US. *J Community Health*. 2019;44:1224–1252. https://doi.org/10.1007/s10900-019-00692-z
70. Robinson DH, Perryman JP, Thompson NJ, Lamonte Powell C, Jacob Arriola KR. Exploring Donotion-related knowledge attitudes, beliefs and distrust among African Americans. *J Natl Med Assoc*. 2015;107:42–50. https://doi.org/10.1016/S0027-9684(15)30050-X
71. Armstrong K, Ravenell KL, McMurphy S, Putt M. Racial/ethnic differences in physician distrust in the United States. *Am J Public Health*. 2007;97:1283–1289. https://doi.org/10.2105/ajph.2005.080762
72. Okorodudu DO, Okorodudu DE. An issue of trust-vaccinating Black patients against COVID-19. *Lancet Respir Med*. 2021;9:228–229. https://doi.org/10.1016/s2213-2600(21)00002-3
73. Weng FL, Davis LA, Ohman-Strickland PA, Waterman AD. Destination transplant: protocol for a parallel-group randomized trial of an educational intervention to increase kidney transplant among black people on the transplant waiting list. *Transplant Direct*. 2021;7:e683. https://doi.org/10.1097/txd.0000000000001136
74. Arriola KR, Powell CL, Thompson NJ, Perryman JP, Basu M. Living donor transplant education for African American patients with end-stage renal disease. *Prog Transplant*. 2014;24:362–370. https://doi.org/10.7182/pit2014830
75. Waterman AD, Peipert JD, McSorley AM, Goalby CJ, Beaumont JL, Peace L. Direct delivery of kidney transplant education to black and low-income patients receiving dialysis: a randomized controlled trial. *Am J Kidney Dis*. 2019;74:640–649. https://doi.org/10.1053/j.ajkd.2019.03.430
76. Patzer RE, McPherson L, Redmond N, et al. A culturally sensitive web-based intervention to improve living donor kidney transplant among African Americans. *Kidney Int Rep*. 2019;4:1285–1295. https://doi.org/10.1016/j.ekir.2019.05.771