Race and Sex Contributions to Differences in Access to Cardiac Transplantation

Kelly A. Hyles[1,2], Olivia O. Okoli[1,2], Matthew Leipzig[2], Katy Pines[2], Maria E. Currie, MD[2].
[1]Stanford School of Medicine & [2]Department of Cardiothoracic Surgery

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Abstract

It has been well-documented that minority patients, particularly Black and Hispanic patients, have increased morbidity and mortality following heart transplantation. The reasons for these disparities remain to be understood and are crucial for a path toward equitable care.

On the other hand, there have been conflicting results regarding the role of sex in post-transplantation cardiothoracic outcomes, with some studies reporting no difference in survival, while others have reported survival favoring either male or female recipients.

Many studies focus on post-transplantation outcomes regarding race and sex, but few focus on analyzing the disparities in access to care that these marginalized populations face in receiving heart transplantation. We hypothesize that patients from marginalized backgrounds will have less access to heart transplantation and will present with a more urgent status at listing.

Methods

This study included all patients within the United Network for Organ Sharing database who underwent isolated adult cardiac transplantation. We performed regression adjustments on education, employment and insurance type to measure the direct effect of race and sex on status at listing. Our study utilizes directed-acyclic graphs (DAGs) to better understand the relationship between race, sex, and access to cardiac transplantation. Causal diagrams of this nature are particularly useful in studying health disparity and outcomes that are related to social, environmental, or economic disadvantage.

We hypothesized that race and sex affect status at listing, and that socioeconomic factors mediate this relationship.

Results

**Table 1: Baseline Characteristics for Heart Transplantation Recipients by Race**

Characteristic	White, N = 49,038	Black, N = 11,311	Hispanic, N = 4,478	Asian, N = 1,613
Age	56 (48, 62)	51 (41, 59)	53 (43, 60)	54 (43, 61)
Gender				
Male	38,529 (79%)	7,508 (66%)	3,373 (75%)	1,263 (78%)
Female	10,509 (21%)	3,803 (34%)	1,105 (25%)	350 (22%)
Highest Education Level				
Associate/Bachelor degree	6,613 (20%)	1,302 (14%)	362 (10%)	359 (28%)
College/Technical School	8,609 (26%)	2,586 (29%)	775 (22%)	319 (25%)
Grade School (0-8)	829 (2.5%)	247 (2.7%)	588 (17%)	51 (3.9%)
High School (9-12) Or GED	13,320 (41%)	4,334 (48%)	1,609 (46%)	310 (24%)
Post-College Graduate Degree	3,160 (9.7%)	507 (5.6%)	114 (3.3%)	251 (19%)
Work for Income				
No	21,249 (90%)	7,006 (93%)	2,737 (93%)	1,001 (86%)
Yes	2,394 (10%)	528 (7.0%)	199 (6.8%)	163 (14%)
Insurance Type				
Private Insurance	23,666 (62%)	4,574 (45%)	1,669 (42%)	890 (62%)
Public Insurance	14,768 (38%)	5,490 (55%)	2,305 (58%)	535 (38%)

Table 2: Baseline Characteristics for Heart Transplantation Recipients by Sex

Characteristic	N	Female, N = 15,948	Male, N = 51,183	p-value
Age	67,131	53 (41, 60)	56 (47, 62)	<0.001
Ethnicity	66,612			<0.001
White		10,509 (67%)	38,529 (76%)	
Black		3,803 (24%)	7,508 (15%)	
Hispanic		1,105 (7%)	3,373 (7%)	
Asian		384 (2%)	1,401 (3%)	
Highest Education Level	46,852			
Associate/Bachelor degree		2,243 (19%)	6,468 (18%)	
College/Technical School		3,120 (27%)	9,309 (26%)	
Grade School (0-8)		419 (3.6%)	1,317 (3.7%)	
High School (9-12) Or GED		5,045 (43%)	14,770 (42%)	
Post-College Graduate Degree		828 (7.1%)	3,231 (9.2%)	
Work for Income	35,701			<0.001
No		8,290 (92%)	24,089 (90%)	
Yes		748 (8.3%)	2,574 (9.7%)	
Insurance Type	53,950			
Private insurance		7,325 (55%)	22,184 (55%)	
Public insurance		6000 (45%)	18441 (45%)	

Key Findings & Conclusion

- Compared to white patients, Black, Hispanic and Asian patients are more likely to present with a higher status at listing, signifying a more urgent case.
- Male recipients are more likely to have a higher status at listing compared to female recipients.
- The observed difference in status at listing suggests that these groups may have delayed or less access to heart transplantation.
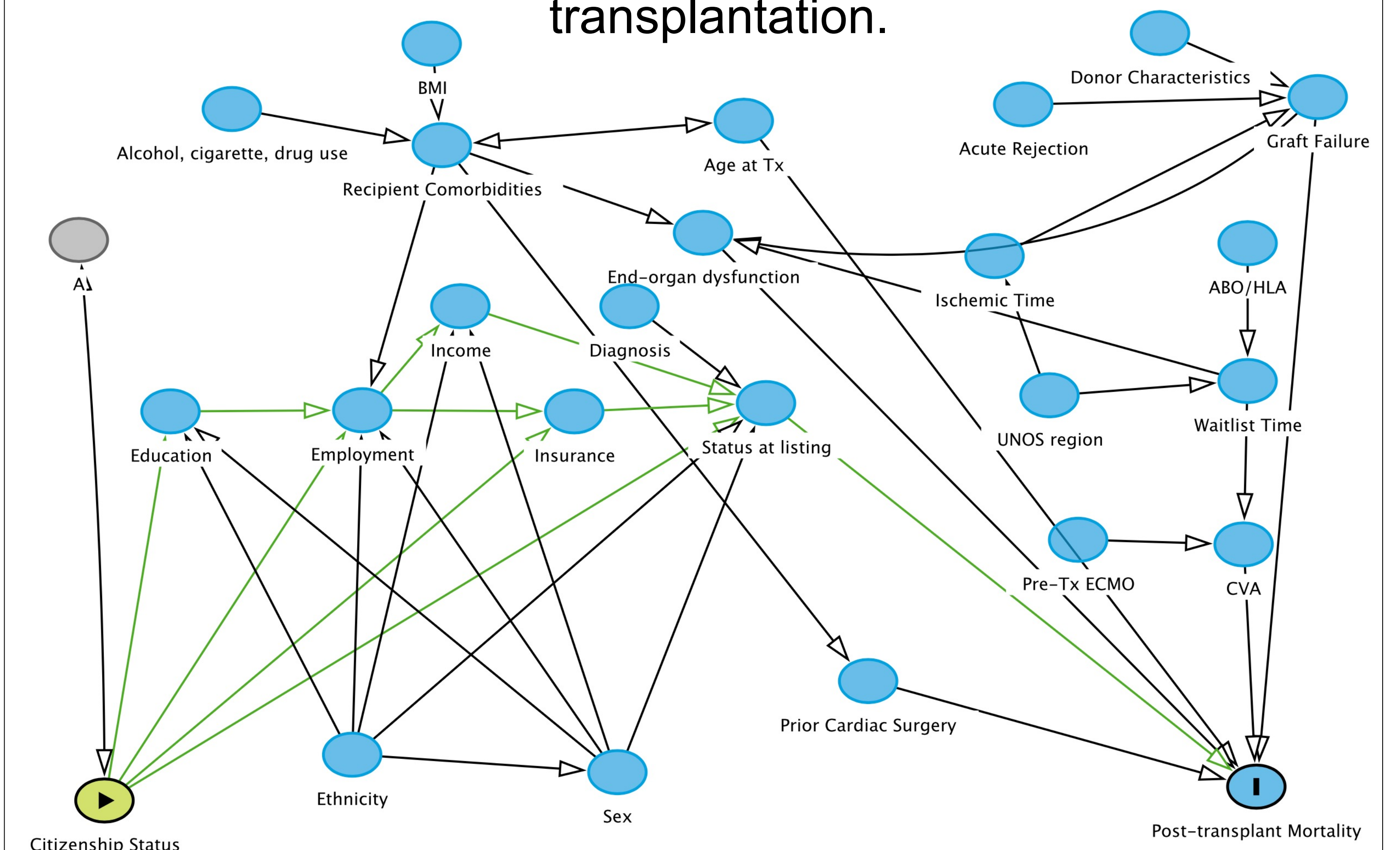
The use of causal diagrams, such as DAGs, can help us clarify bias when analyzing health disparities for historically disadvantaged factors, including race and sex.

Future Directions

- Elucidate the systems that affect the status at listing for these patients, including pre-waitlist factors.
- More precise markers of socioeconomic status and records of access to life-saving procedures, such as heart transplantation.
- Modify the hypothesized causal pathways for access to and outcomes of heart transplantation based on further research

Acknowledgments