HHS Public Access

Author manuscript

Rehabil Psychol. Author manuscript; available in PMC 2020 May 01.

Published in final edited form as:

Rehabil Psychol. 2019 May ; 64(2): 229–236. doi:10.1037/rep0000260.

Impact of Racial-Ethnic Minority Status and Systemic Vulnerabilities on Time to Acute TBI Rehabilitation Admission in an Urban Public Hospital Setting

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Abstract

Purpose/Objective: Racial/ethnic minorities and other vulnerable social groups experience health care disparities. There is a lack of research exploring how time to acute rehabilitation admission is impacted by race/ethnicity and other marginalizing systemic vulnerabilities. The purpose of this study is to investigate whether race/ethnicity and other sociodemographic vulnerabilities impact expediency of acute rehabilitation admission following traumatic brain injury (TBI).

Research Method/Design: This study is a secondary analysis of an existing dataset of 111 patients admitted for acute TBI rehabilitation at an urban public hospital. Patient groups were defined by race/ethnicity (People of color or White) and vulnerable group status (high or low vulnerable group membership [VGM]).

Results: White patients are admitted to acute TBI rehabilitation significantly faster than people of color. After taking vulnerabilities into account, high VGM people of color experience the most severe injuries and take the longest to receive acute TBI rehabilitation. Despite small differences in injury severity, low VGM people of color take longer to be admitted to acute TBI rehabilitation than White patients. High VGM White patients have less severe injuries yet take longer to be admitted to acute rehabilitation than low VGM White patients. Finally, notable differences exist between White patients and patients of color on rater-based injury severity scales that are discordant with severity as measured by more objective markers.

Conclusions/Implications: Overall, findings indicate that sociodemographic factors including race/ethnicity and systemic vulnerabilities impact injury severity and time to acute TBI rehabilitation admission.

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Keywords

health disparities; racial-ethnic minorities; rehabilitation; traumatic brain injury

Introduction

Racial-ethnic minority groups are rapidly growing in the United States, yet they remain largely underserved in the health care system. People of color receive poorer care and have poorer health outcomes compared with Non-Hispanic Whites for both preventable and treatable conditions (Barr, 2014). The inferior quality of care that such disadvantaged groups receive is attributable to lack of access to health services, provider and institutional biases, and reduced health literacy, among other factors (Agency for Healthcare Research and Quality, 2016).

Although the negative health consequences of social inequality are well established (National Research Council Committee on Future Directions for Behavioral and Social Sciences Research at the National Institutes of Health, 2001; Williams, 2001), attempts to explain this inequality that focus only on a single demographic factor, such as racial-ethnic status, often fall short of explaining health disparities. Disparities in access to health care in general— and rehabilitation services in particular—are compounded when individuals with disabilities also are members of other vulnerable social groups (e.g., low SES, racial-ethnic minority groups, non-English speakers, older adults), with membership in multiple vulnerable groups shown to have quantifiable effects on health and psychosocial outcomes (Seng, Lopez, Sperlich, Hamama, & Reed Meldrum, 2012).

As racial-ethnic minorities and other marginalized vulnerable groups become an increasingly large proportion of the U.S. population, understanding health disparities and the barriers to rehabilitation facing these individuals becomes increasingly urgent and represents a major social justice concern. In August 2016, the Executive Board of the American Psychological Association's Division of Rehabilitation Psychology reaffirmed social justice as a guiding value in Rehabilitation Psychology, voting to adopt mission and vision statements which included "To champion disability as a human rights and social justice issue" (Rath & Langer, 2019). Espousing a social justice perspective in rehabilitation psychology underscores the necessity of responding to the systematic inequalities which marginalize various vulnerable social groups. To achieve this goal, it is incumbent upon rehabilitation psychologists to better understand the impact of vulnerable group membership on disability and access to rehabilitation.

Traumatic brain injury (TBI) is one major public health concern leading to high rates of mortality and disability (Hyder, Wunderlich, Puvanachandra, Gururaj, & Kobusingye, 2007). Approximately 10 million individuals sustain TBI each year (Humphreys, Wood, Phillips, & Macey, 2013), with survivors often left with chronic physical, cognitive, and psychological impairments in need of rehabilitation services (Centers for Disease Control and Prevention, 2017). Racial-ethnic minorities are at disproportionate risk for experiencing disparities in TBI rehabilitation outcome (Arango-Lasprilla & Kreutzer, 2010; Gary et al., 2009; Shafi et al., 2007), and disparities related to racial/ethnic status and SES have been examined

throughout the TBI rehabilitation literature (e.g., Corrigan et al., 2012; Cuthbert et al., 2011; Heffernan et al., 2011; McQuistion et al., 2016). Nonetheless, prior research has not specifically addressed multiple vulnerable group memberships in accounting for disparities in rehabilitation access and outcomes. This represents a significant shortcoming in the literature, as TBI patients— especially those in urban public hospital settings—frequently experience multiple systemic vulnerabilities associated with adverse health outcomes, such as medical and psychiatric comorbidities or a history of incarceration, homelessness, and/or problematic substance use (McDermott et al., 2014a, 2014b).

In an examination of factors that predict acute hospitalization discharge disposition for adults with TBI, Cuthbert et al. (2011) found that vulnerabilities such as older age, racial-ethnic minority status, and low SES contribute to the decision to discharge directly to home or subacute care, rather than acute TBI rehabilitation. However, for those individuals who do receive acute TBI rehabilitation, little is known about how racial-ethnic minority status and other vulnerabilities impact the amount of time it takes for one to be admitted. Disparity in "time to rehabilitation admission" is an important factor to examine, as earlier rehabilitation admission is associated with improved neurologic outcomes (Gray & Burnham, 2000), shorter rehabilitation length of stay, lower rehabilitation costs, as well as improved functional ability at discharge (Kunik, Flowers, & Kazanjian, 2006). Additionally, faster admission provides an opportunity for patients to receive collaborative care, including behavioral health, earlier in their rehabilitation (Fisher & Dickinson, 2014), which may contribute to these positive outcomes. The goal of the present study is to examine the role racial-ethnic minority status and other sociodemographic group memberships play in delaying or expediting admission to acute TBI rehabilitation, over and above the role played by severity of injury.

Method

Participants and Setting

Data for the present study draws from the time period (approximately 2 years) in which information on all vulnerabilities of interest was collected. Participants were 111 acute TBI rehabilitation inpatients (92 men, 19 women; ages 17–91, $M = 47.6$, $SD = 19.2$) treated at a large urban public hospital, a major component of our TBI Model System (TBIMS)-designated brain injury rehabilitation program. As TBI is a condition that predominantly affects young men, the gender disparity in the sample is consistent with brain injury patient populations, particularly among racial/ethnic minority patients (Burnett et al., 2003). Consistent with its mission of treating the medical needs of the underserved, the hospital provides acute inpatient brain injury rehabilitation services to patients regardless of insurance coverage, medical and psychiatric history, social circumstances, support system, immigration status, or cultural background.

All procedures were approved by our local institutional review board, and all participants met criteria for inclusion in the TBIMS National Database (TBIMS NDB), which includes (a) TBI of at least moderate severity; (b) age ≥16 years at the time of injury; (c) admission to a TBIMS acute care hospital within 72 hr postinjury; (d) participation in comprehensive rehabilitation at a TBIMS-designated brain injury inpatient program; and (e) informed

consent provided by the patient or legal guardian (Dijkers, Harrison-Felix, & Marwitz, 2010). Further information about TBIMS inclusion criteria is available at www.tbindsc.org.

Baseline demographic information for the sample is provided in Table 1, including age, years of education, race/ethnicity, marital status, and injury severity.

Measures

Time to acute rehabilitation admission.—Total number of days from date of injury to date of acute inpatient TBI rehabilitation admission was calculated for each participant and examined as the primary outcome measure for the present study.

Injury severity.—Duration of loss of consciousness (LOC) was calculated as total number of days from date of injury to date when the participant was first able to follow simple commands. Additional injury severity variables, including Glasgow Coma Scale (GCS) and duration of posttraumatic amnesia (PTA) were included in supplementary analyses.

Racial-ethnic minority status.—Racial-ethnic minority status was dichotomized as White and Person of Color (POC). The POC group included the following U.S. census–defined racial-ethnic groups: Black, Asian/Pacific Islander, Native American, Hispanic, or "Other" (unspecified). The White group included all other individuals. These individuals, while not representing any U.S. census–defined racial-ethnic group, include many low SES Eastern-European immigrants who share many of the sociodemographic vulnerabilities (e.g., language barriers, lack of insurance, unstable housing) typically associated with racial-ethnic minority groups (Bushnik, 2014).

Vulnerable group membership.—Based on previous research identifying critical factors impacting outcome in urban TBI rehabilitation samples (Kucukboyaci, Long, Smith, Rath, & Bushnik, in press; McDermott et al., 2014a, 2014b), the following variables were included in analyses to reflect systematic vulnerabilities: problematic substance use, age ≥65 years, history of psychiatric illness, psychiatric hospitalization, medical comorbidities, non-English speaking, homelessness, history of incarceration, and undocumented immigration status. All variables except homelessness, history of incarceration, and undocumented immigration status were collected using standard TBIMS variable definitions (see www.tbindsc.org). To more accurately assess the number of individuals living with homelessness (the "hidden homeless;" Crawley et al., 2013), our expanded definition of homelessness also captured history of homelessness and housing instability, in addition to TBIMS-defined homelessness on the date of injury (i.e., asking the patient "where do you live now?"). In addition to TBIMS-defined incarceration for a conviction of a felony, we also captured incarceration for misdemeanors or overnight jail stays/holdings that still expose individuals to a high-risk environment. Further, undocumented immigration status information was collected via self-report or available medical records.

Statistical Analyses

Principal analyses.—We performed secondary analyses on an existing data set. Following visual examination of the data by stem-and-leaf plot for 122 sequential

admissions to the urban public hospital component of our TBIMS program, 11 participants were identified as outliers based on the major outcome variable of interest for the present study (i.e., “time to acute rehabilitation admission”), leaving 111 cases for analysis.

Binary information denoting presence or absence of each of the nine target vulnerabilities was coded, and total number of vulnerable group memberships (VGM) was calculated for each participant. Based on a median split, “Low VGM” was defined as membership in 0, 1, or 2 vulnerable groups, whereas “High VGM” was defined as membership in 3 or more vulnerable groups.

Independent-samples *t* tests were conducted to compare the two broad racial/ethnic groups (i.e., “White” vs. “POC”) across demographic variables, injury severity (LOC), and time to acute rehabilitation admission. To evaluate the impact of additional systemic vulnerabilities on rehabilitation outcome, participants were divided into four groups based on racial-ethnic grouping and level of vulnerability (i.e., Low VGM White, High VGM White, Low VGM POC, and High VGM POC groups), and ANOVAs were conducted to compare groups on severity of injury and time to acute rehabilitation admission.

Supplementary analyses.—To further elucidate the impact of injury severity on time to acute rehabilitation admission, supplementary analyses examined group differences in injury severity using two additional, potentially more subjective, measures (i.e., PTA and GCS). Specifically, following removal of seven and six outliers, respectively, *t* tests were run to examine racial/ethnic group (i.e., White vs. POC) differences in length of PTA (total days) as well as GCS (total score). In addition, one-way ANOVAs were performed to examine differences in length of PTA and GCS score by VGM level.

Results

Principal Findings

Vulnerability prevalence rates are presented in Table 2. The most commonly observed vulnerabilities included a history of problematic substance use (50.5%) and being non–English-speaking (36.9%). Noteworthy in this sample are the 25.2% history of incarceration and 23.4% history of homelessness. An additional finding of interest is that 56.6% of White patients and 48.1% POC endorsed a history of problematic substance use. Notable findings are also present within vulnerabilities. Specifically, 100% of undocumented patients are POC. Similarly, the majority of patients who are non–English-speaking (87.8%), have a history of homelessness (84.6%), have a medical comorbidity (82.2%), have a history of incarceration (75%), and have a previous psychiatric hospitalization (70%) are POC. Overall, 93.7% of the patient population has at least one vulnerable group membership with an average of 2.4 vulnerable groups per person. Of note, when broken down by individual race/ethnicity (i.e., Black, Hispanic, Asian/Pacific Islander, White, and Other), there were no significant differences observed in terms of high or low vulnerability group membership nor total number of vulnerable groups. However, Hispanic patients were more likely to be non–English-speaking than other racial/ethnic groups. Further, Black and Hispanic patients made up approximately 77% of patients with a history of homelessness.

The POC group had significantly longer time to acute rehabilitation admission (M = 14.19, SD = 8.29), as compared with the White group (M = 10.40, SD = 9.52), $t(109) = -2.05$, p = .043. A t test examining group differences indicated no significant differences between groups on severity of injury as indicated by duration of loss of consciousness (LOC). However, a trend was observed with White participants (M = 8.22, SD = 9.18) tending to have lower LOC scores than POC (M = 13.28, SD = 12.67, p = .066).

To examine the impact of VGM level on time to rehabilitation admission, a one-way ANOVA was conducted. Although no significant differences were found for the overall model, $F(3, 111) = 1.52$, p = .215 (see Table 3), post hoc comparisons using the Tukey's HSD test (see Table 4) were run to better understand the interplay of vulnerability and race/ethnicity as differences had been established in time to acute rehabilitation across racial/ethnic lines. Analyses showed a trending mean difference with the White Low VGM group's time to rehabilitation admission tending to be shorter (M = 9.79, SD = 9.68) than both the POC Low VGM group (M = 13.87, SD = 9.02, p = .089) and the POC High VGM group (M = 14.60, SD = 7.32, p = .055).

Significant differences were observed in injury severity (LOC) by VGM, $F(3, 83) = 3.83$, p = .013 (see Table 5). Post hoc Tukey's tests (see Table 6) indicated that the High VGM POC group (M = 17.94, SD = 14.90) had significantly longer LOC than the Low VGM White (M = 8.44, SD = 8.26, p = .008), High VGM White (M = 7.78, SD = 11.34, p = .023), and Low VGM POC groups (M = 9.72, SD = 9.43, p = .008).

Supplementary Findings

Posttraumatic amnesia.—Significant differences in length of posttraumatic amnesia (PTA) also were found, with POC having more days in PTA (M = 24.49, SD = 18.46), than White participants (M = 11.00, SD = 10.44), $t(102) = -3.60$, p = .002.

A one-way ANOVA was used to examine differences in length of PTA across VGM levels and significant differences were found for the overall model, $F(3, 100) = 6.09$, p = .001 (see Table 7). Post hoc tests (see Table 8) revealed that the High VGM POC group (M = 28.32, SD = 15.55) had significantly greater length of PTA than the Low VGM White (M = 7.56, SD = 6.14, p = .000) and High VGM White groups (M = 16.00, SD = 13.44, p = .034). In addition, the Low VGM White group had significantly shorter length of PTA than the Low VGM POC group (M = 21.32, SD = 20.13, p = .005).

Glasgow Coma Scale.—A significant group difference in GCS scores was found, with the POC group (M = 9.58, SD = 3.82) receiving significantly lower scores than the White group (M = 12.07, SD = 2.93), $t(103) = 3.17$, p = .002.

For GCS scores across VGM levels, significant differences were noted, $F(3, 101) = 4.17$, p = .008 (see Table 9). Post hoc results (see Table 10) indicated that the Low VGM POC (M = 9.61, SD = 3.84) and High VGM POC groups (M = 9.53, SD = 3.86) had significantly lower GCS scores (p = .002 and p = .003, respectively) than the High VGM White group (M = 13.50, SD = 2.51).

Discussion

The impact that race/ethnicity and systemic vulnerabilities have on the time that it takes to be admitted to acute TBI rehabilitation was explored in a diverse sample of 111 TBI patients. Overall, this was a group with multiple vulnerabilities. The present sample comprised 73% POC. Especially noteworthy in this sample are the 25.2% history of incarceration and 23.4% history of homelessness, which speak to the high-risk patient population served at this urban public hospital. Almost all the patients (93.7%) fall into at least one vulnerable group. Within vulnerabilities there is an overrepresentation of people of color. Although this may be partly explained by the majority of the sample being POC, this finding warrants further exploration. Being members of multiple vulnerable groups creates a unique constellation of difficulties and adverse outcomes. These patients live in a perfect storm—where many factors work against their recovery from brain injury, highlighting the need for rehabilitation psychologists to rise to the challenge of providing the right (and enough) services.

Injury severity as indicated by duration of loss of consciousness (LOC) was found to be similar for POC and White patients overall, though on average, people of color take four days longer to follow simple motor commands post injury. When vulnerability level is considered, high vulnerable group membership (VGM) people of color experience significantly more severe injuries (LOC) than all other groups. No differences in injury severity levels (LOC) are observed within the White patient groups or between White patients and low VGM people of color. Yet, despite similar injury severity, low VGM White patients are admitted to acute TBI rehabilitation approximately two days faster than high VGM White patients and four days faster than low VGM people of color. Considering the importance of time to rehabilitation admission following brain injury (Kunik et al., 2006), these findings have notable implications and raise important questions.

Further research is warranted to understand why high VGM people of color are at greater risk for more severe brain injuries as compared with White patients and people of color with greater privileges. Specifically, understanding environmental, societal, or systemic factors that make high VGM people of color susceptible to more severe brain injury is a necessary step in reducing risk for this vulnerable group. Seatbelt use is reported to be lower in people of color (U.S. Department of Transportation, National Highway Traffic Safety Administration, 2009), which is a risk for more severe brain injury in the case of motor vehicle accidents, though the findings of the current study suggest it is not simply race/ethnicity but also intersectionality with other vulnerable group statuses that may explain the risk. Further research on risk prevention in vulnerable communities of color is essential in minimizing risk for these communities via the creation of culturally appropriate educative strategies and interventions. Health literacy and knowledge also may be involved.

It is possible that high VGM populations may not recognize the need for immediate medical care following an accident or blow to the head that may be perceived as mild. For example, brain swelling or bleeding following a fall or accident may not have immediate symptoms, making people feel that there is no need to seek medical care. Nonetheless, considering that

high VGM White patients did not demonstrate high injury severity, the role of race/ethnicity as it pertains to access to medical information must be considered.

Socioeconomic status, older age, and race/ethnicity are linked to longer delays from 911 calls to arriving at the emergency department (Kleindorfer et al., 2006). These delays may help explain the disparities in injury severity observed in this sample. Additionally, considering the experience of low SES communities of color with emergency personnel like the police, mistrust of emergency workers may interfere with seeking the appropriate medical attention in a timely manner. Further investigation of the complex relationship between intersectionality/multiple vulnerabilities and health risks/disparities is clearly necessary.

People of color performed significantly worse on administered assessments of severity of injury (i.e., GCS, PTA), as compared with a more objective indicator (duration of LOC). The discrepancies observed along racial/ethnic and VGM lines on the various severity indicators are outside the scope of the current study, and will be examined in future investigations. The impact of culture on neuropsychological assessment is well established in the literature (Ardila, 2007; Manly, 2008; Rivera Mindt, Byrd, Saez, & Manly, 2010), yet there remains a paucity of research examining cultural biases in these supposedly objective, rater-based evaluations of brain injury severity.

In terms of time from injury to acute TBI rehabilitation, White patients were admitted to acute rehabilitation after approximately 10 days, whereas people of color took 14 days to be admitted. When examined by race/ethnicity and vulnerability level, low VGM White patients were admitted into acute TBI rehabilitation the fastest, whereas high VGM people of color took the longest. Although injury severity might partly explain the differences between these two groups, observed differences in the vulnerability groups warrant discussion. First, although injury severity of low VGM people of color did not differ significantly from that of White patients (regardless of VGM status), low VGM people of color took four days longer to be admitted to acute TBI rehabilitation than low VGM White patients and two days longer than high VGM white patients. Further, although low VGM people of color had notably less severe injuries than high VGM people of color, there is only a 1-day difference in time to acute TBI rehabilitation admission following injury. This suggests that there are nonmedical factors delaying people of color getting acute TBI rehabilitation with the same expediency as White patients. This finding is concerning and requires more investigation as receiving rehabilitative care as close to injury as possible is beneficial to TBI patients. Further research is vital in understanding whether these disparities can be attributed to systemic barriers such as health insurance, lack of patient advocacy, or cultural biases. Differences within the White patient population in terms of time to rehabilitation following injury are also noteworthy. In this context we note that the experience of disability may be modified by the presence of some privileged identities (e.g., being of higher SES or white). TBI can happen to anyone, but the effect on any individual may largely be modified, minimized, or exacerbated by who that person is in terms of their racial-ethnic background, gender, sexual orientation, age, and social class (Nettles & Balter, 2012).

High VGM White patients present with slightly less severe injuries than low VGM White patients, yet take two days longer to be admitted to acute TBI rehabilitation. Similar to the injury severity findings between high and low VGM people of color, these results indicate that there are factors beyond race/ethnicity at play. Further research is warranted to understand the barriers experienced by vulnerable White patient populations. This is especially important as the health care disparities experienced by people of color is well established in the literature, but less is known about these issues in vulnerable White patient populations, particularly in the context of TBI and rehabilitation.

Limitations

We performed secondary analyses of an existing data set and were limited by the variables included in this data set. Variables such as sexual orientation and income were not available for analysis. Our method of dichotomizing vulnerabilities and simply adding them up is another significant limitation. Although the notion of multiple vulnerabilities— easily counted based on the number of disadvantaged statuses one holds—is appealing in its simplicity, the idea of adding up one's vulnerabilities, essentially adding one's exposure to sexism to one's exposure to racism and so on, misses the ways in which these identities and systems of oppression intersect (Grollman, 2014), particularly in the context of intersectionality being a multiplication of vulnerabilities rather than an addition of them (Nadal et al., 2015). Our approach overlooks the complex and often variable interaction between different forms of social oppression. Disability, racial-ethnic minority status, age, SES, and other vulnerabilities interact in variable and complex ways in shaping daily experience of institutional discrimination prevalent in our society against oppressed groups (Nettles & Balter, 2012). It is likely that multiple marginalized identities interact to create distinct experiences of systemic inequity, putting individuals with TBI at risk in unique ways beyond the additive risks of their individual group memberships. Further, the study sample is predominantly male. Though men are more likely to experience a TBI, the study findings may not generalize to the experiences of female TBI patients.

Additionally, the current study focuses on a single site within a multisite project, which may limit its generalizability. However, the site utilized for the present study is uniquely diverse and warrants its own investigations to better understand the needs of this varied and marginalized patient population. This also minimizes potential confounds that may be present when examining disparities across multiple, less diverse settings.

Lastly, dichotomizing race/ethnicity into White and People of Color minimizes the role that each individual race/ethnicity may play regarding vulnerabilities. In the current sample, the only observed relationships with specific race/ethnicities were in language barriers and history of homelessness. Nevertheless, there are racial/ethnic differences across individual groups that may not have been assessed in the current study that warrant further research.

Future Directions and Conclusion

Future research must focus on the disparities mentioned, as well as on how vulnerabilities differentially impact risk for injury severity and time to receiving care. For example, are people of color with a history of incarceration and psychiatric hospitalization less likely to

seek immediate medical attention than people of color with medical comorbidities over the age of 65, thus risking greater injury severity? Exploring vulnerable populations that were outside the scope of the present study is also necessary. For example, investigating multiple vulnerabilities in TBI patients injured from intimate partner violence may provide valuable information in how to improve care for this vulnerable group. Additionally, further research focusing on TBI and vulnerabilities in women is warranted.

The findings of the current study highlight differences in injury severity based on the intersection of race/ethnicity and multiple vulnerabilities, as well as differences in time to rehabilitation based on race/ethnicity and privilege in TBI patient populations. To date, no study has examined the impact of race/ethnicity and vulnerabilities in time to acute TBI rehabilitation. This investigation represents a vital first step in understanding how intersectionality impacts patient risk and care and is paramount to ensuring equity in health care regardless of race/ethnicity or privilege.

Acknowledgments

The authors thank Hilary Bertisch and Michelle Smith for their helpful comments on this article. This work was supported by the following grants from the National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR), Administration for Community Living (ACL), Department of Health and Human Services (HHS): 90DPTB0010, (*Rusk TBI Model System*; Tamara Bushnik, Project Director) and 90ARHF0001 (*Rusk Advanced Rehabilitation Research Training Postdoctoral Fellowship*; Joseph F. Rath, Project Director). The contents of this article do not necessarily represent the policy of NIDILRR, ACL, or HHS, and readers should not assume endorsement by the Federal Government.

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Impact and Implications

Although racial/ethnic minorities experience health care disparities following TBI, research on the combined effects of race/ethnicity with other marginalized identities has been neglected. This study is the first to demonstrate the impact of race/ethnicity and other systematic barriers on time to acute rehabilitation admission following TBI. This study confirms that even in a diverse, metropolitan public hospital, people of color wait longer to receive acute rehabilitation services following TBI. Culturally appropriate educational information regarding brain injury, as well as increased provider awareness of unconscious biases that inform clinical decision making, should underpin policy development and service delivery to ensure that people of color receive acute TBI rehabilitation with the same expediency as White patients.

Table 1

Participant Demographics

Characteristic	*n* (%)	*M* (*SD*)	Range
Gender			
Male	92 (82.9)		
Female	19 (17.1)		
Age		48.41 (19.67)	(17–91)
Years of education		11.27 (4.6)	(1–20)
LOC	93	15.96 (10.47)	(0.5–112)
GCS	105	10.27 (3.75)	(3–15)
PTA	104	20.99 (17.72)	(0–71)
Days from injury to rehab		17.54 (16.9)	(2–88)
Race/Ethnicity			
White	30 (27.0)		
Black	22 (19.8)		
Asian/Pacific Islander	13 (11.7)		
Native American	1 (0.9)		
Hispanic Origin	41 (36.9)		
Other	4 (3.6)		
Marital status			
Single (never married)	60 (54.1)		
Married	26 (23.4)		
Divorced	11 (9.9)		
Separated	7 (6.3)		
Widowed	7 (6.3)		
Primary language			
English	70 (63.1)		
Spanish	26 (23.4)		
Other Language	15 (13.5)		

Note. $N = 111$. For GCS scale, lower scores indicate greater injury severity. For PTA and LOC, higher scores indicate greater injury severity. LOC = loss of consciousness or days to follow command; GCS = Glasgow Coma Scale; PTA = posttraumatic amnesia.

Table 2

Vulnerability Prevalence Rates for Current Sample

	Total sample[a]		Within race		Within vulnerability	
Vulnerability	**White *n* (%)**	**POC *n* (%)**	**White %**	**POC %**	**White %**	**POC %**
Undocumented immigration status	0 (0.0)	8 (7.2)	0.0	9.9	0.0	100
Non–English-speaking	5 (4.5)	36 (32.4)	16.7	44.4	12.2	87.8
Older than 65 years	10 (9.0)	11 (9.9)	33.3	13.6	47.6	52.3
History of:						
Homelessness	4 (3.6)	22 (19.8)	13.3	27.2	15.4	84.6
Problematic substance abuse	17 (15.3)	39 (35.1)	56.6	48.1	30.4	69.6
Medical co morbidity	6 (5.4)	28 (25.2)	20.0	34.5	17.6	82.2
Mental health diagnosis	11 (9.9)	22 (19.8)	36.7	27.2	33.3	66.7
Previous psychiatric hospitalization	6 (5.4)	14 (12.6)	20.0	17.3	30.0	70.0
Incarceration	7 (6.3)	21 (18.9)	23.3	25.9	25.0	75.0

Note. White = White race group; POC = people of color group.

[a] $N = 111$.

Table 3

Summary of ANOVA for Time to Rehabilitation Admission by Group

Group	Sum of squares	*df*	Mean square	*F*
Between groups[a]	311.82	3	103.94	1.32
Within groups	7981.74	101	79.03	

[a] $p = .274$.

Table 4

ANOVA Comparisons of Time to Rehabilitation Admission by Group

				95% CI	Tukey's HSD Comparisons			
Group	***n***	***M***	***SD***	**[LL, UL]**	**1**	**2**	**3**	**4**
1. White low VGM	19	9.79	9.68	[5.83, 13.74]	—	.614	.088	.055
2. White high VGM	11	11.45	9.61	[6.26, 16.65]	1.65	—	.410	.298
3. POC low VGM	46	13.87	9.01	[11.33, 16.41]	4.08	2.42	—	.709
4. POC high VGM	35	14.60	7.32	[11.69, 17.51]	4.81	3.15	0.730	—

Note. Mean differences are provided in the lower portion of Tukey's HSD comparisons; *p* values are provided in upper portion of the same columns. CI = confidence interval; LL = lower limit; UL = upper limit; VGM = vulnerable group membership; POC = people of color or minority race status.

Table 5

Summary of ANOVA for LOC by Group

Group	Sum of squares	*df*	Mean square	*F*
Between groups[a]	1475.56	3	491.85	3.83
Within groups	10666.76	83	128.52	

Note. LOC = loss of consciousness or days to follow command.

[a] $p = .013$.

Table 6

ANOVA Comparisons of LOC by Group

				95% CI	Tukey's HSD Comparisons			
Group	***n***	***M***	***SD***	**[LL, UL]**	**1**	**2**	**3**	**4**
1. White low VGM	18	8.44	8.26	[4.34, 12.55]	—	.886	.700	.008
2. White high VGM	9	7.78	11.34	[−.94, 16.49]	.67	—	.649	.023
3. POC low VGM	34	9.72	9.43	[1.62, 6.43]	1.28	1.94	—	.007
4. POC high VGM	26	17.94	14.90	[11.93, 23.96]	9.50	10.16	8.22	—

Note. Mean differences are provided in the lower portion of Tukey's HSD comparisons; *p* values are provided in upper portion of the same columns. CI = confidence interval; LL = lower limit; UL = upper limit; VGM = vulnerable group membership; POC = people of color or minority race status; LOC = loss of consciousness or days to follow command.

Table 7

Summary of ANOVA for PTA by Group

Group	Sum of squares	*df*	Mean square	*F*
Between groups[a]	4996.91	3	1665.64	6.08
Within groups	32368.99	100	237.71	

Note. PTA = posttraumatic amnesia.

[a] $p = .001$.

Table 8

ANOVA Comparisons of PTA by Group

				95% CI	Tukey's HSD Comparisons			
Group	***n***	***M***	***SD***	**[LL, UL]**	**1**	**2**	**3**	**4**
1. White low VGM	16	7.56	6.14	[4.29, 10.84]	—	.564	.025	.000
2. White high VGM	11	16.00	13.44	[6.97, 25.02]	8.43	—	.762	.145
3. POC low VGM	43	21.46	20.13	[15.26, 27.66]	13.90	5.46	—	.276
4. POC high VGM	37	28.32	15.55	[22.89, 33.74]	20.76	12.32	6.85	—

Note. Mean differences are provided in the lower portion of Tukey's HSD comparisons; *p* values are provided in upper portion of the same columns. CI = confidence interval; LL = lower limit; UL = upper limit; VGM = vulnerable group membership; POC = people of color or minority race status; PTA = posttraumatic amnesia.

Table 9

Summary of ANOVA for GCS by Group

Group	Sum of squares	*df*	Mean square	*F*
Between groups[a]	161.50	3	53.83	4.16
Within groups	1305.02	101	12.92	

Note. GCS = Glasgow Coma Scale.

[a] $p = .008$.

Table 10

ANOVA Comparisons of GCS by Group

				95% CI	Tukey's HSD Comparisons			
Group	***n***	***M***	***SD***	**[LL, UL]**	**1**	**2**	**3**	**4**
1. White low VGM	19	11.32	2.90	[9.91, 12.72]	—	.409	.308	.334
2. White high VGM	10	13.50	2.50	[11.71, 15.29]	2.18	—	.013	.017
3. POC low VGM	46	9.61	3.84	[8.47, 10.75]	−1.70	−3.89	—	1.00
4. POC high VGM	30	9.53	3.85	[8.09, 10.97]	−1.78	−3.96	.84	—

Note. Mean differences are provided in the lower portion of Tukey's HSD comparisons; *p* values are provided in upper portion of the same columns. CI = confidence interval; LL = lower limit; UL = upper limit; VGM = vulnerable group membership; POC = people of color or minority race status; GCS = Glasgow Coma Scale.