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Quality and Equity in Wheelchairs Used by Veterans

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Abstract

Objective: In this study of Veterans with spinal cord injury (SCI) or amputated limb (AL), our objectives were to (a) compare patient demographics, medical factors, cultural and psychosocial characteristic by race; (b) compare wheelchair quality by race; and, (c) assess the independent associations of patient race and the other factors with wheelchair quality.

Design: Cross sectional cohort study

Setting: Three VA Medical Centers affiliated with academic medical centers.

Participants: Of 516 eligible participants, 482 completed the interview. Analyses were restricted to white (WH) and African American (AA) participants. Because there was no variation in wheelchair quality among AL patients (n=42), they were excluded from all but descriptive analyses leading to a final sample size of 421.

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Intervention: NA

Main Outcome Measure: Wheelchair quality as defined by the Medicare Healthcare Common Procedure Coding System

Results: We found race differences in many of our variables, but not in quality for manual (OR=0.67, 95% CI: 0.33–1.36) or power (OR=0.82, 95% CI: 0.51–1.34) wheelchairs. Several factors, including age (OR=0.96, 95% CI: 0.93–0.99) and income (OR=3.78, 95% CI: 1.43–9.97) were associated with wheelchair quality. There were no significant associations of cultural or psychosocial factors with wheelchair quality.

Conclusions: Although there were no racial differences in wheelchair quality, we found a significant association of older age and lower income with poorer wheelchair quality among Veterans. Efforts are needed to raise awareness of such disparities among VA wheelchair providers and to take steps to eliminate these disparities in prescription practice across VA sites

Keywords

spinal cord injury; healthcare disparities; wheelchair quality

The Veterans Affairs Healthcare System (VA) serves numerous Veterans with spinal cord injury (SCI) and amputated limbs (AL)[1–4] who rely on wheelchairs for physical functioning, quality of life (QOL), and community participation.[5,6] The VA prescribes more than 2,000 wheelchairs annually to Veterans with AL and more than 3,600 to those with SCI.[7] Wheelchair quality is an important aspect of wheeled mobility devices for both manual and power wheelchair users. High quality, customizable wheelchairs are more durable and cost-effective than non-customizable wheelchairs and can help prevent deleterious conditions while improving QOL.[8–18] Conversely, wheelchair failures can lead to injuries,[19] death,[13] and/or upper-limb and neck pain.[20]

VA policy on wheelchair eligibility promotes access to high quality wheelchairs by (a) providing wheelchairs regardless of cost or extent of service-connected injuries; (b) providing quality backup wheelchairs; and, (c) standardizing quality across VA through national contracts.[21] Nevertheless, evidence suggests that Veterans from racial minority groups and of lower socioeconomic status (SES) may be prescribed lower quality wheelchairs[7,22] similar to patterns in the general public.[23] Thus, we hypothesized that white (WH) and/or higher SES Veterans would be prescribed with higher quality wheelchairs.

Previous investigations did not assess whether cultural or psychosocial patient characteristics are associated with wheelchair quality, and therefore, were unable to determine potential reasons for such inequities. Research demonstrates that cultural and psychosocial characteristics[24–30] are associated with race disparities in other healthcare processes and outcomes. For example, African Americans (AAs) are more likely to miss medical appointments, delay obtaining necessary medical care/prescriptions, and are less likely to seek certain services (e.g., tests, surgeries) or adhere to physician instructions, because they distrust the healthcare system and/or believe that it is discriminatory.[29,31–36] While other factors such as health literacy, self-image, and emotional distress have been examined in a number of healthcare populations,[37–42] no studies examined these characteristics in patients

with SCI or AL other than our own work with non-Veterans.[43] We hypothesized that AA Veterans would score higher on perceived discrimination, racism, distrust, and emotional distress, but lower on communication, health literacy, and self-image.

Our previous work demonstrated that cultural and psychosocial factors (e.g., perceived discrimination and racism, medical mistrust) were positively associated with patient occupational functioning, mobility, and perceived health in non-Veterans with SCI.[43] Understanding whether these factors play a role in the quality of wheelchairs prescribed in the VA will help prescribing clinicians identify unique factors faced by Veteran wheelchair users and will help researchers responsible for designing interventions to improve the equity of wheelchair provision. We hypothesized that differences in cultural and psychosocial factors would account for the advantages for WH and/or higher SES Veterans in wheelchair quality.

METHODS

Participants

Data were collected from Veterans with SCI or an AL from three urban, academicaffiliated VA Medical Centers with an SCI specialty clinic, whose wheelchair was prescribed and paid for by the VA. Sites obtained local Institutional Review Board approval prior to study initiation. Eligible participants were age ≥18 years, had non-progressive SCI or an AL, used a power or manual wheelchair >1 year as their primary means of mobility, and were nonambulatory except for exercise purposes. We excluded Veterans who were non-English speakers, unable to communicate due to neurological impairment, or had diseases other than SCI or AL that required wheelchair use.

Procedures

Participants completed a structured questionnaire face-to-face (~60 minutes) or by mail, and were compensated $40.00.

Patient Characteristics

Demographic Characteristics and Medical Factors—*Demographic characteristics* and *medical factors* were assessed with standardized selfreport measures used in our previous work.[43] Demographic characteristics included race (WH, AA, Asian, American Indian/Alaskan Native, Native Hawaiian/Other Pacific Islander, other), ethnicity (Hispanic, non-Hispanic), gender, age, employment status, education, income, and insurance. Medical factors included self-reported co-morbid medical and psychiatric conditions from a checklist of possible conditions, and time since injury. Using chart review, one research assistant reviewed participants' VA medical record under "Problem List" to assess level of injury (tetraplegia, paraplegia, or AL) and whether the wheelchair was prescribed at a VA with an SCI specialty clinic whose staff had advanced training in SCI treatment and wheelchair service delivery (yes, no). Not all wheelchairs were prescribed at the recruiting sites.

Culturally-Related Factors—We assessed all culturally-related factors using validated measures (all alphas presented are for the current sample, rather than previously published

studies). For *experience with discrimination*, participants indicated the extent to which they had experienced each of 7 discriminatory practices in the healthcare setting (Cronbach's α=0.92).[24,33,36] For *perceived racism*, participants indicated the extent to which they believed that 4 instances of racism occurs within the healthcare system (Cronbach's α =0.83).[32,35,43] We assessed *medical mistrust* with the 9-item Healthcare System Distrust Scale[44] (Cronbach's α =0.86). We used a 4-item subset of the Components of Primary Care Index[45] to assess *communication with providers* involved in participants' SCI care (Cronbach's α =0.70). We used the 8-item Rapid Estimate of Adult Literacy in Medicine (REALM-R)[46] to assess *health literacy*.

Psychosocial Characteristics—We assessed *emotional distress* with the anxiety and depression subscales of the Brief Symptom Inventory (BSI),[47] (Cronbach's α =0.86 for anxiety and 0.89 for depression). We used two measures to assess *self-image*: the 10-item Rosenberg Self-Esteem Scale[48] and the 7-item Sense of Mastery scale[49] (Cronbach's α =0.88 for self-esteem and 0.82 for mastery).

Wheelchair Quality

To assess wheelchair quality, a research assistant observed and recorded the make and model of each participant's wheelchair, which was later verified through chart review. We then used the Medicare Healthcare Common Procedure Coding System (HCPCS) K-codes and Groups[50] to determine wheelchair quality according to chair characteristics.[7,22] For manual wheelchairs, we coded weight, power seat functions, specialized push rims, and casters. For power wheelchairs, we coded speed, range, and customizable options (e.g., power tilt and power recline).

Chairs were assigned to one of eight quality categories (M1-M4 for manual wheelchairs; P1-P4 for power wheelchairs; Table 1). For manual wheelchairs, M4 was the highest quality category, indicating greater customizability and lighter weight. For power wheelchairs, including scooters, P4 was the highest quality category (e.g., most programmable, customizable, obtained the highest speeds).

Analyses

We calculated scale means for continuous and Likert-type items and assessed all data for violation of statistical assumptions (e.g., normality, kurtosis).[51] Due to non-normal distributions, we dichotomized education, employment status, income, insurance status, comorbid conditions, communication with provider, health literacy, self-esteem, anxiety, and depression; we also categorized experiences of discrimination as "ever/never." Given their distinct qualities and features, we analyzed manual and power wheelchairs separately.

We calculated descriptive statistics for all study variables. We compared racial groups using two sample t-tests for continuous variables and chi-square or Fisher exact tests for categorical variables.[51] To determine the variables to include in our final analyses, we first ran separate regression models to examine associations of each predictor with wheelchair quality. We started with a model including race only, then added other predictors that were associated with wheelchair quality at $p \leq 0.10$ when tested individually.[51] We transformed age

by centering it around the sample mean and scaling by 10. We determined that no variables needed to be excluded due to collinearity (r>0.50).[51] We treated study site as a fixed effect.

For the final set of analyses on both types of wheelchairs, we combined the two lowest quality categories (M1 and M2 for manual, P1 and P2 for power) due to small cell sizes, and compared them to each of the two higher quality categories (M3, M4 for manual, and P3, P4 for power). After checking the proportional odds assumptions, we applied ordinal logistic multivariable regression models to assess the independent association of patient characteristics with wheelchair quality.[51] In the final multivariable models, we retained race and any patient characteristics that were associated with quality at p<0.05. Finally, we tested interactions between race and the variables retained in the final model. For any significant interactions, we conducted analyses stratified by race.[51]

RESULTS

Of the 516 patients who were eligible to participate, 498 consented and 482 completed the interview. Because data from 11 (2%) participants who identified as 'other' race and 8 (1.6%) who had missing race were significantly different from the AA sample, we restricted analyses to the WH (n=281, 60.7%) and AA participants (n=182, 39.3%). Eleven (2.4%) of the 463 participants completed the questionnaire by mail. Because of systematic differences in the distribution of wheelchair quality between AL patients and SCI patients (e.g., no AL patients had M4 manual chairs or P1 power chairs (see Table 2)), and insufficient data to analyze wheelchair quality among AL patients (n=42), separately, we excluded them from those analyses.

Race comparisons for wheelchair quality and patient characteristics

We compared wheelchair quality between AA and WH participants (Table 2). Although the estimated odds of getting higher quality wheelchairs were lower for AA compared to WH, those racial differences were not statistically significant (OR=0.58; 95% CI: 0.29, 1.15 for manual; OR=0.81; 95% CI: 0.50, 1.32 for power; both NS).

Table 3 presents descriptive data for the study sample and racial comparisons on demographic, medical, cultural, and psychosocial factors. The distribution of race in our study sample was statistically similar to the racial makeup of the general SCI population at Sites A and C, but not Site B, where AAs were over-represented in the study sample (see Note 3 in Table 3). Across all sites smaller proportions of AAs than WHs were female, Hispanic, or married. AAs also had significantly less education and total family income; they were also less likely to be employed or have private insurance, and had fewer years since their SCI injury than WHs (all *p*s<.05). There were no racial differences in the proportion of patients who were prescribed their wheelchair from a VA with an SCI specialty clinic, number of co-morbid conditions, or level of injury.

AAs reported more experiences of discrimination in healthcare, greater perceived racism, and lower health literacy than did WHs (Table 3). There were no race differences in healthcare system distrust or communication with provider. AAs reported less anxiety than did WHs, but there were no differences in self-esteem, mastery, or depression.

Independent associations of patient characteristics and wheelchair quality

Multivariable analyses for manual wheelchair users (Table 4) indicated that the odds of getting a higher quality wheelchair were lower with each 10 year increase in age (OR=0.64; 95% CI: 0.46–0.90), but higher with greater income (OR=3.64; 95% CI: 1.47–9.03). Further, those with manual wheelchairs prescribed from an SCI specialty clinic were more likely to get a higher quality wheelchair than those prescribed from a VA without an SCI specialty clinic (OR=4.66; 95% CI: 1.74–12.48). We observed no significant interactions with race among manual wheelchair users.

Multivariable analyses for power wheelchair users indicated significant interactions of race with study site and injury level. Therefore, we fit an ordinal logistic regression model separately for AA and WH participants (Table 4). For WHs, patients with family incomes > $25,000 (OR=3.15; 95% CI: 1.31–7.56) and those with tetraplegia (vs. paraplegia; OR=3.49; 95% CI: 1.52–8.03) were more likely to get higher quality power wheelchairs. For AAs, participants in study site A and study site B (versus study site C) were less likely to get higher quality power wheelchairs (OR=0.10; 95% CI: 0.02–0.48 and OR=0.15; 95% CI: 0.04–0.53, respectively). Neither income nor injury level were associated with wheelchair quality in AA power wheelchair users, as was the case for WH.

Because cultural and psychosocial factors were not associated with wheelchair quality for either manual or power wheelchair users in our univariable analyses, we excluded them from the multivariable analyses.

DISCUSSION

Wheelchairs are integral to the lives of individuals with SCI and reintegration into society largely depends on access to adequate wheelchairs.[52–55] This project revealed important information about the equity of wheelchairs provided to Veterans with SCI, and identified patient factors associated with wheelchair quality.

Consistent with work in community-dwelling and other healthcare populations,[56–60] we found that AA Veterans with SCI were less likely to be married or have private insurance and had less education, lower levels of employment, and lower total family income compared to WHs. Similarly, as in other healthcare populations, AAs had more experiences of healthcare discrimination, greater perceived racism, lower health literacy, and greater anxiety than did WHs.[24–27,29,30,33,43,61–64]

Despite significant demographic and psychosocial differences, we found no significant difference in the quality of wheelchairs prescribed to AA and WH Veterans with SCI. However, we did find that other patient characteristics predicted wheelchair quality in manual and power wheelchair users. For manual wheelchair users, older age was significantly associated with lower wheelchair quality. This result may be due to generational differences in self-advocating for a better quality wheelchair; or, it may reflect system-level “inertia,”[65–67] such that those who received a poor chair initially may continue to receive poorer quality chairs. However, the lack of association of years since injury with manual wheelchair quality does not support the latter explanation.

Our study also found income disparities in wheelchair quality that have been documented for more than 10 years.[7,22] Thus, despite the VA's emphasis on giving all Veterans equal access to care, the fact that poorer Veterans who use manual chairs and poorer WH Veterans who use power wheelchairs continue to get poorer quality wheelchairs may speak to the pervasive influence of income inequality throughout the US. Given the complex nature of the wheelchair prescription process,[68] poorer Veterans may still have more difficulty navigating the VA system than other Veterans, and thus are not able to get the level of quality of wheelchair that they need.

Finally, we found that patients who were prescribed manual wheelchairs in a VA medical center with a dedicated SCI specialty clinic were more likely to be prescribed higher quality manual wheelchairs. However, this significant result did not extend to power wheelchair users. This finding speaks to the need to strengthen connections from VA centers with SCI specialty clinics to those that don't have them, at least for manual wheelchair users.

The relationship between patient characteristics and wheelchair quality was more complex for power wheelchair users. For WH Veterans, the quality of power wheelchairs varied by income and level of injury. In contrast, for AA Veterans, power wheelchair quality varied only by study site. Local procedures and variations in the interpretation and implementation of national policies may contribute to differences in prescribing practices across VA facilities.[69, 70]

The relationship between level of injury and quality of wheelchair for WH power wheelchair users was expected given that those who have more disability as a result of more severe injury often require customized parts that are found in higher quality power wheelchairs.

However, the relationship between quality and level of injury was only significant in WH, but not AA, Veterans with SCI. Due to limited sample size, we were unable to explore this relationship further, but it would be important to do so in future work.

Finally, it is noteworthy that no cultural factors or psychosocial characteristics were associated with wheelchair quality for manual or power wheelchair users in our study. This finding was surprising in light of previous work finding positive associations of cultural and psychosocial factors with patient occupational functioning, mobility, and perceived health in nonVeterans with SCI.[43] The key difference between the current study and previous studies was that our outcome was wheelchair quality as opposed to QOL. Cultural and psychosocial factors may be more predictive of perceptions of self-reported quality of life outcomes, rather than wheelchair quality.

Study Limitations

Our study had some limitations. Data were collected cross-sectionally; as such, causal conclusions cannot be drawn. Future work should test the robustness of our findings with a prospective design. Second, although we attempted to collect data from a diverse sample at multiple sites, the study was limited to comparisons between AA and WH participants because of few other racial/ethnic group members in our sample. Similarly, we were unable to include AL patients in all analyses because there was not enough variability in their

prescribed wheelchairs. Further, we limited our sample to participants who obtained their wheelchair through the VA. Although we assessed whether patients also had private insurance (Table 3), we speculate that bigger differences may have been found outside the VA where cost may be more of a concern. Thus, this information may not be generalizable beyond the Veteran population with SCI. Finally, we found that the distribution of race for the SCI population at each study site compared to our sample was similar for Sites A and C, but not Site B. We speculate that this difference had to do with the Site B's effort to over recruit African American participants for the study.

Conclusions

Despite efforts to deliver equitable healthcare to all Veterans, our study demonstrated a significant association of older age and lower income with poorer wheelchair quality. We believe that the significant association of some demographic characteristics with wheelchair quality has important implications for prescribing practices within the VA. Efforts are needed to raise awareness of such disparities among providers and to take steps to eliminate them in prescription practice across VA medical centers.

Abbreviations

AA	African American
AL	amputated limb
HCPCS	Medicare Healthcare Common Procedure Coding System
QOL	quality of life
SCI	spinal cord injury
SES	socioeconomic status
VA	Veterans Affairs
VAMC	Veterans Affairs Medical Center
WH	white

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Table 1.

Classification of wheelchair types based on wheelchair characteristics

Category	Assigned Type	HCPCS Code/Group	Description
Manual	M1	K0001	>36 lbs, nonadjustable, standard wheelchair
		K0002	>36 lbs; nonadjustable, lower seat only; standard wheelchair, hemiplegia
		K0006	Heavy-duty bariatric wheelchair
	M2	K0003	≤ 36 lbs, nonadjustable, lightweight, standard wheelchair
		K0004	<34 lbs; adjustable seat/back height, some adjustment in axle; high strength; lightweight; rehabilitation wheelchair
	M3	K0005	<30 lbs; adjustable seat/back height/axle/wheel camber; ultralightweight wheelchair
	M4	K0009	<30 lbs; custom ultralightweight titanium wheelchair
Power	P1	Group 1	Nonadjustable, seat height only; standard weight; nonprogrammable controls
	P2	Group 2	Miscellaneous limited programmable controls power wheelchair
	P3	Group 3	Custom power wheelchair; top speed 4.5 mph; range – 12 miles
	P4	Group 4	Custom power wheelchair; top speed 6.0 mph; range – 16 miles

Note: lbs - pounds

Table 2.

Comparison of wheelchair quality by race

Factor	SCI Patients			AL or Other Patients		
	Total (N=422)	African American (N=171)	White (N=251)	Total (N=41)	African American (N=11)	White (N=30)
Wheelchair Quality - %(N)						
Manual Wheelchair (SCI n=143; AL n = 16)[1]	OR[2] (95% CI) = 0.58 (0.29, 1.15)					
M1	3.5 (5)	5.8 (3)	2.2 (2)	37.5 (6)	28.6 (2)	44.4 (4)
M2	1.4 (2)	3.9 (2)	0.0 (0)	25.0 (4)	14.3(1)	33.3 (3)
M3	55.9 (80)	57.7 (30)	55.0 (50)	31.3 (5)	57.1 (4)	11.1 (1)
M4	38.5 (55)	32.7 (17)	41.8 (38)	0.0 (0)	0.0 (0)	0.0 (0)
Power Wheelchair (SCI n=262; AL n = 24)[3]	OR[4] (95% CI) = 0.81 (0.50, 1.32)					
P1	3.8 (10)	4.4 (5)	3.4 (5)	0.0 (0)	0.0 (0)	0.0 (0)
P2	1.5 (4)	0.9 (1)	2.0 (3)	25.0 (6)	0.0 (0)	30.0 (6)
P3	46.2 (121)	50.4 (58)	42.9 (63)	58.3 (14)	50.0 (2)	60.0 (12)
P4	44.3 (116)	41.7 (48)	46.3 (68)	8.3 (2)	50.0 (2)	0.0 (0)

Note:

[1]Manual wheelchair: SCI total n=143; AA n=52; WH n=91; AL total n=16; AA=7; WH=9; the types of manual wheelchairs are listed in ascending order with worst (M1) to best quality (M4). Some groups do not add up to the total due to missing data on wheelchair quality.

[2]For purpose of analyses, M1 and M2 were grouped together; the ordinal OR denotes the odds of higher quality for AA relative to WH patients at each possible cut point of the quality scale.

[3]Power wheelchair: SCI total n=262; AA n=115; WH n=147; AL total n=24; AA=4; WH=20; the types of power wheelchairs are listed in ascending order with worst (P1) to best quality (P4). Some groups do not add up to the total due to missing data on wheelchair quality.

[4]For purpose of analyses, P1 and P2 were grouped together; the ordinal OR denotes the odds of higher quality for AA relative to WH patients at each possible cut point of the quality scale.

Table 3.

Comparison of demographics, medical factors, culturally-related factors, psychosocial characteristics by race

Factor	Total (N=463)	African American (N=182)	White (N=281)	p-value[1,2]
Study site[3] – % (N)				**< 0.001**
VAMC A	**24.8 (115)**	**42.6 (49)**	**57.4 (66)**	
VAMC B	**35.2 (163)**	**25.8 (42)**	**74.2 (121)**	
VAMC C	**40.0 (185)**	**49.2 (91)**	**50.8 (94)**	
Demographic - N (%)				
Gender (female)	4.1 (19)	1.7 (3)	5.7 (16)	0.05
Age - M(SD)	58.1 (12.4)	58.0 (10.1)	58.1 (13.7)	0.99
Ethnicity (Hispanic)	**6.5 (30)**	**3.3 (6)**	**8.5 (24)**	**0.03**
Married (Yes)	**41.0 (190)**	**33.0 (60)**	**46.3 (130)**	**< 0.01**
Educational level (≥ Some College)	**60.0 (278)**	**52.2 (95)**	**65.1 (183)**	**< 0.01**
Employment Status (Employed)	**9.9 (46)**	**4.4 (8)**	**13.5 (38)**	**< 0.01**
Family Income (≥ $25,000)	**42.8 (198)**	**37.4 (68)**	**46.3 (130)**	**0.04**
Insurance (Any Private - yes)	**13.0 (60)**	**8.2 (15)**	**16.0 (45)**	**0.02**
Wheelchair from SCI specialty clinic (yes)	71.1 (329)	72.5 (132)	70.1 (197)	0.73
Medical – N (%)				
Co-Morbid Conditions (> 1)	53.6 (248)	50.6 (92)	55.5 (156)	0.30
Years since injury - M(SD)	**18.0 (14.9)**	**15.3 (12.7)**	**19.7 (15.9)**	< 0.01
Level of Injury				**0.05**
Tetraplegia	**41.7 (193)**	**47.8 (87)**	**37.7 (106)**	
Paraplegia	**49.5 (229)**	**46.2 (84)**	**51.6 (145)**	
AL or other	**8.9 (41)**	**6.0 (11)**	**10.7 (30)**	
Culturally- Related Factors - % (N) [4]				
Experience of Discrimination (ever)	**34.8 (161)**	**48.9 (89)**	**25.6 (72)**	**<.0001**
Perceived Racism - M(SD)	**2.4 (0.8)**	**2.6 (0.8)**	**2.3 (0.7)**	**< .0001**
Healthcare System Distrust - M(SD)	2.5 (0.6)	2.5 (0.7)	2.5 (0.6)	0.60
Communication with provider (> 4)	32.8 (152)	29.1 (53)	35.2 (99)	0.17
Health Literacy (> 10)	**57.5 (266)**	**47.8 (87)**	**63.7 (179)**	**<0.001**
Psychosocial Characteristics - % (N)[5]				
Self-esteem (> 3)	49.0 (227)	51.1 (93)	47.7 (134)	0.47
Mastery - M(SD)	2.9 (0.5)	2.9 (0.5)	2.9 (0.5)	0.18
Anxiety (> 1)	**56.2 (260)**	**48.4 (88)**	**61.2 (172)**	**<0.01**
Depression (> 1)	68.3 (316)	63.2 (115)	71.5 (201)	0.05

Note:

[1] Independent two samples t-test was performed for continuous variables, chi-square or Fisher exact test for dichotomous variables and CMH for ordinal categorical variables.

[2] Bold items are significant at $p \leq 0.05$.

[3]The distribution of race for the SCI population at each site within the recruitment period was as follows: Site A: 95 AA (41.1%), 136 WH (58.9%); Site B: 108 AA (14.5%), 638 WH (85.5%); Site C: 252 AA (36.1%), 447 WH (63.9%).

[4]Experience of discrimination (range: 1–6); perceived racism (range: 1–5); healthcare system distrust (range: 1–5); communication with provider (range: 1–5); health literacy (range: 0–11).

[5]Self-esteem (range: 1–4); Mastery (range: 1–4); Anxiety (range: 1–5); Depression (range: 1–5)

Table 4.

Associations of wheelchair quality with patient factors (SCI patients only)

Factor	Manual[1]		Power[3]			
			African American		White	
	OR[2]	95% CI	OR[4]	95% CI	OR[4]	95% CI
Study Site						
A vs C			**0.10** **	**0.02, 0.45**	1.22	0.37, 4.06
B vs C			**0.15** **	**0.04, 0.53**	0.52	0.20, 1.34
Demographics						
Race (AA)	0.81	0.34, 1.94				
Age	**0.64** **	**0.46, 0.90**				
Married (Y)			0.38	0.14, 1.07	0.44	0.18, 1.07
Family Income (≥$25,000)	**3.64** **	**1.47, 9.03**	1.46	0.54, 3.97	**3.15** *	**1.31, 7.56**
Wheelchair from SCI center (yes)	**4.66** **	**1.74, 12.48**	1.44	0.54, 3.86	2.05	0.86, 4.85
Medical						
Injury Level						
Tetraplegia vs. Paraplegia			0.99	0.40, 2.44	**3.49** **	**1.52, 8.03**

Note: Significant at

* $p<.05$

** $p<.01$

*** $p<.001$

[1] The quality of manual wheelchair was regressed on race, age, family income and whether wheelchairs were from SCI center.

[2] M1 and M2 were combined; the OR denotes the odds high versus low quality at each possible cut point for each factor (i.e., M3 and M4 vs. M1 and M2; M4 vs. M1, M2, and M3), estimated from ordinal logistic regression.

[3] The quality of power wheelchair was regressed separately for African American and White on study site, marital status, family income, whether wheelchairs were from SCI site and injury level.

[4] P1 and P2 were combined; the OR denotes the odds of high versus low quality at each possible cut point for each factor (i.e., P3 and P4 vs. P1 and P2; P4 vs. P1, P2, and P3), estimated from ordinal logistic regression.