Published in final edited form as:
Arch Phys Med Rehabil. 2012 June ; 93(6): 972–977. doi:10.1016/j.apmr.2012.02.004.

Association of Race, Socioeconomic Status, and Health Care Access with Pressure Ulcers after Spinal Cord Injury

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Abstract

Objective—To assess the associations of race and socioeconomic status (SES) with pressure ulcers (PU) after accounting for health care access (HCA) among persons with spinal cord injury (SCI).

Design—Cross-sectional.

Setting—Large specialty hospital in the southeastern United States.

Participant—Persons with traumatic SCI who 1) had residual effects from their injury, 2) were 18 years or older at survey, and 3) were a year or more post-injury at survey (n=2,549).

Intervention—None.

Main Outcome Measures—Outcomes were measured by mail-in survey: having a current PU (yes vs. no), having a PU in the past year with or without reduced sitting time (no PU, no reduced sitting time, month or less, 5+ weeks), and having at least 1 PU surgery since SCI onset (yes vs. no).

Results—Of participants, 39.3% reported a PU in the past year, 19.9% had a current PU, and 21.9% reported having had surgery for a PU since their SCI onset. While race was preliminarily associated with each PU outcome, it became non-significant after controlling for SES and HCA. In each analysis, household income was significantly associated with PU outcomes after controlling for demographic and injury factors and remained significant after accounting for the HCA factors. Persons with lower income had higher odds of each PU outcome. HCA was not consistently related to PU outcomes.

Conclusions—Even after accounting for HCA, household income, a measure of SES, remained significantly associated with PU outcomes after SCI; however, race became non-significant.

Keywords

spinal cord injury; pressure ulcer; race; socioeconomic factors; health services accessibility

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Pressure ulcers (PU) are one of the most common secondary conditions after spinal cord injury (SCI)[1] and not only are associated with significant costs[2] but can have serious consequences, as they are linked with early mortality.[3] However, PUs are a preventable condition, and, therefore, the identification of risk factors and areas for prevention is essential.

Previous research has linked race[4,5] and socioeconomic status (SES)[6] with PUs after SCI. One previous study assessed the mediating relationship of SES, as measured by income and education, on the relationship between race and PUs.[6] Results showed race was significantly associated with having a current PU and with having surgery to repair a PU since injury onset. After controlling for SES, race was still significantly associated with having surgery to repair a PU since injury onset. Additionally, SES was significantly associated with PU outcomes. However, that study only included white and black participants and did not assess the impact indicators of health care access (HCA) on the relationships of race and SES with PU outcomes.

Measures of HCA have been linked with various outcomes after SCI. Even immediately after injury, HCA, as measured by insurance type, has been linked with re-hospitalization after rehabilitation and length of stay during rehabilitation.[7] Type of insurance has also been linked with psychological distress and participation, where persons with private insurance had less distress[8] and were more likely to be participating in work and school.[9] Saladin, Krause, and Adkins[4] looked at barriers to being able to see a physician to heal a PU. They found not having enough money or insurance and not having transportation to be significant barriers. However, they did not assess how important these barriers were after controlling for important confounding variables. Kroll, Neri, and Ho[10] found access to primary health care at baseline was associated with lower odds of PU at follow-up 1 year later. While there has been some research on HCA and outcomes after SCI, it has been mainly focused on insurance type, and the research specifically on PU outcomes has been limited. We will expand the measure of HCA to include not only insurance status, but also having a person thought of as a personal doctor, and not being able to afford care because of cost.

Purpose

The purpose of this study is to assess the association of race, SES, and HCA with PU outcomes after SCI, while controlling for demographic and injury factors. We hypothesize that 1) HCA will be significantly related to PU outcomes, and 2) after the addition of HCA, SES will still be significantly associated with PU outcomes.

Methods

Participants

After receiving approval from the Institutional Review Board, participants were identified through 3 different sources of records at a large specialty hospital in the southeastern United States: 1) SCI Model Systems patient database, 2) Model Systems registry, and 3) outpatient directory. Although participants were identified through one of the SCI Model Systems, our data was specifically collected for this study, and we do not utilize any of the data routinely collected by the SCI Model Systems. There were 3 inclusion criteria: 1) traumatic SCI with residual effects, 2) 18 or older at assessment, and 3) minimum of 1 year post-injury. Out of 3,669 potential participants meeting these criteria, 2,614 responded (71.2% response rate). After participation, 65 persons were determined ineligible for participation due to full recovery (16), non-traumatic injury (46), or less than 1 year post-injury at survey (3), leaving 2,549.

Procedures

All data were collected by mail-in survey. Participants were sent cover letters describing the study and alerting them of materials to be sent 4-6 weeks later. After the initial materials were sent, a second set of materials was sent to all non-respondents. Phone calls were initiated for non-respondents, and additional mailings were implemented for those who had misplaced or discarded materials but consented by phone to participate and requested an additional set of materials (no survey information was collected by phone). Extensive efforts were made to identify current addresses of all potential participants, including the use of multiple search engines. Participants were offered $50 remuneration for participation.

Measures

Measurements were taken by a mail-in survey tool. We used a subset of measures from a larger study of protective and risk factors associated with adverse health outcomes and secondary conditions after SCI.[11] Specifically for this study, HCA, income, education, race, and PUs were examined.

Our outcome in this study was PUs, and 3 items were used to assess this outcome; 1) having 1 or more open PUs at present, 2) number of days in the past year where sitting time was adversely affected by a PU, and 3) history of at least 1 surgery to repair a PU since SCI onset. Both current PU and PU related surgery were treated dichotomously (i.e., none, 1 or more), whereas sitting time was grouped into 4 categories: 1) no PU in the past year, 2) had a PU but no reduced sitting time, 3) had a PU and a month or less of reduced sitting time, and 4) had a PU and more than a month of reduced sitting time. We only asked participants to report open PUs as it might be difficult for some participants to recognize a less severe PU, especially persons with pigmented skin.[12] Therefore, all results in this study are referring to open PUs. This measurement has been used in previous studies of persons with SCI.[6,13] Additionally, these PU measures have been found to measure similar constructs through confirmatory factor analysis.[11]

Demographic (race, sex, age, years post-injury, age at injury) and injury characteristics were assessed. Injury severity was categorized as 1) C1-C4, non-ambulatory; 2) C5-C8, non-ambulatory; 3) non-cervical, non-ambulatory; and 4) ambulatory regardless of level.[6] Race was categorized as white, black, and other. There were 2 indicators of SES, education and income. Participants were asked the exact number of years of education they had completed, and the years were anchored with educational milestones (i.e., 12=High School certificate, 16=4 year college degree). Annual household income was asked consistent with the Behavioral Risk Factor Surveillance System (BRFSS),[14] which was recoded into 3 categories: 1) <$25,000, 2) $25,000-74,999, and 3) >$75,000. Lastly, we included 3 measures of HCA from the BRFSS. Participants were asked 1) if they had any kind of health care coverage, 2) if they have someone they thought of as their personal doctor, and 3) if there was a time in the past 12 months they needed to see a doctor but could not because of cost.

Analysis

Preliminary descriptive analyses were used to summarize the participant sample in terms of PUs, demographic, injury, educational, SES, and HCA characteristics. The χ^2 statistic was used to evaluate the statistical significance of categorical variables, whereas the t-test was used for continuous variables.

For the model building, we used multivariable logistic regression with 2 of the outcomes: current PU (yes vs. no), and ever had surgery for a PU (yes vs. no). Since the third outcome had 4 levels, we used a multinomial logistic regression model. We tested the proportional

odds assumption, and this assumption was rejected, thus we used a generalized logits model. For each model, we used a 2 stage model building strategy. In the first stage of each model (Model 1), variables from Saunders et al.[6] were entered (race, gender, injury severity, years post-injury, age at injury, education, household income). We wanted to see the effect of HCA on SES and race from the Saunders et al.[6] article, so in the second stage (Model 2), HCA variables (insurance, personal doctor, could not see doctor b/c of cost) were added to Model 1. We used $p<.05$ as the cutoff for statistical significance in the final model. Hosmer-Lemeshow[15] and global χ^2 tests were used to assess goodness-of-fit of the binary logistic regression models, and Pearson chi-square was used for the multinomial logistic regression model. The C-statistic, measuring area under the Receiver Operating Characteristic curve, was used to assess discriminatory ability.[15] Odds ratios (ORs) with 95% confidence intervals (CIs) are reported.

Results

Of 2,549 participants, 75.2% were male and 72.3% were white. Average age at survey was 45.6 (SD=14.3), and participants were, on average, 12.5 (SD=9.7) years post-injury. Of participants, 30.9% were ambulatory. Of those non-ambulatory, 10.8% had a C1-C4 level injury, 25.1% C5-C8, and 33.3% non-cervical. Having less than a high school degree was reported by 15.3% of participants, while 27.3% had at least a bachelor's degree. Twenty-two percent of participants reported average household income of $75,000 or more and 39.2% less than $25,000.

Current PU

Twenty percent of participants had a PU at the time of survey. Through the preliminary descriptive analyses (not shown), with the exception of age at injury (p=0.4728), all demographic and injury variables were initially associated with having a current PU. Additionally, education and income were significantly related with having a current PU, but none of the HCA variables were significant.

In Model 1 (table 1), only injury severity and years post-injury were significant out of the demographic and injury variables. Both education and household income were significantly related to having a current PU. After the addition of HCA predictors in Model 2, education just missed significance (p=0.0600). Persons having an income of less than $25,000 had 2.03 the odds of having a current PU than those with an income of $75,000 or more (95% CI=1.42-2.91). There was no difference between the middle and high income categories. Also, persons who could not see a doctor because of cost had higher odds of a current PU than those who could (OR=1.46; 95% CI=1.02-2.01). Both Models 1 and 2 had acceptable goodness-of-fit as measured by the Hosmer-Lemeshow goodness-of fit-test and discriminatory ability above 0.70 (Table 1).

Reduced Sitting Time due to a PU in the Past Year

Sixty-one percent of participants reported having no PUs in the past year. There were 10.4% who reported having their sitting time reduced by more than a month due to a PU in the past year, 12.2% had sitting time reduced by a month or less, and 16.6% had a PU in the past year but no reduced sitting time. As in the analysis of current PU, reduced sitting time was not significantly related to any of the HCA variables in preliminary descriptive analyses but was related to all demographic and SES variables.

In Model 1, sex, injury severity, years post-injury, and income were significantly related to reduced sitting time in the past year (table 2). The odds that those with less than $25,000 in household income had more than a month of reduced sitting time rather than not have a PU

in the past year were about 3.45 times the odds for those with $75,000 or more in household income (95% CI=2.12-5.62). In Model 2, household income remained significant. Additionally, not being able to see a doctor because of cost was associated with reduced sitting time due to a PU in the past year. The odds of someone who could not see a doctor because of cost having reduced sitting time of a month or less rather than not have a PU in the past year was 1.88 times the odds for those who could see a doctor (95% CI=1.24-2.87). Both Models 1 and 2 had acceptable goodness-of-fit as measured by the Pearson chi-square statistic (Table 2).

Had a PU Surgery since SCI Onset

Of participants, 21.9% reported having had a surgery to repair a PU since their SCI onset. In preliminary descriptive analyses, all demographic and injury characteristics were significantly related to PU surgery. Additionally, education, income, and having someone as a personal doctor were also related to PU surgery.

In Model 1, race and age at injury became non-significant (table 3). As with the other 2 analyses, lower income was associated with increased odds of PU surgery compared with higher income ($75,000+). In Model 2, household income remained significant. Of the HCA variables, not having a personal doctor was associated with lower odds of PU surgery (OR=0.53; 95% CI=0.29, 0.97) than with those who had a personal doctor. Both Models 1 and 2 had acceptable goodness-of-fit as measured by the Hosmer-Lemeshow goodness-of-fit test and discriminatory ability above 0.70 (Table 3).

Discussion

In our cohort, 39.3% of participants reported a PU in the past year, 19.9% had a current PU, and 21.9% reported having had surgery for a PU since their SCI onset. We investigated the relationships of SES and HCA with these PU outcomes and found, while income was consistently associated with PU outcomes, HCA was not. This study is the first to examine HCA with PU outcomes among an SCI population while also controlling for SES.

We found SES, specifically income, was significantly related to PU outcomes even after controlling for HCA. Previous research has found PUs were more common among persons with lower education and among those unemployed.[5] We did not find a relationship between education and PU outcomes *after* controlling for income. One possible explanation for the differences in PU outcomes by income level is the lack of availability of certain resources that may help prevent PUs. Hunt et al.[16] found those with low SES (low income, Medicaid/Medicare, less education) were more likely to have a standard wheelchair (either manual or power) rather than a customizable wheelchair, while persons with higher SES are more likely to have access to things like customizable wheelchairs, which are shown to reduce sitting pressure.[17]

HCA was related to PU outcomes in 2 different ways. First, in terms of *historical* PUs (i.e., having had surgery for a PU since SCI *onset*), HCA, specifically having a personal doctor, was associated with increased odds of PU surgery. This could be because someone with PUs in the past may have had more of a need to consult a physician than someone who has not had PUs as they will have needed treatment for their PU. Frequent doctor visits might enable someone to have a doctor they think of as their personal doctor. Findings of increased health care utilization have been reported in the SCI population, and persons who use the health care system more frequently may be more likely to have a person they think of as their personal doctor. Increased severity of PU has been associated with increased number of clinic or home visits.[18] On the other hand, in terms of *current* PU outcomes, not being able to see a doctor because of costs is associated with increased odds of PU outcomes (i.e.,

having a current PU or reduced sitting time due to a PU in the past year). These results demonstrate that, similar to having reduced household income, those who are not able to seek care due to lack of resources were at increased risk of PU outcomes. Contrary to our hypothesis, we did not find insurance to be predictive of PU outcomes. A previous study of nursing home residents partially supports our results as they did not find Medicaid status to be predictive of PU incidence.[19]

After controlling for SES and HCA variables, race was not significantly associated with any of the PU outcomes. Previous research has shown blacks have a higher occurrence of PUs than whites,[5,19] possibly due to increased difficulty in early detection of PUs due to skin pigmentation.[20] However, previous studies did not control for the potential confounding effects of SES and HCA. Saunders et al.[6] found that after controlling for SES (income, education), race was still significantly related to having a current PU; however, race became not significantly related to having a PU in the past year and having had surgery for a PU since SCI onset. We have shown that, while initially race was significantly associated with all 3 PU outcomes studied; these differences disappeared after the inclusion of both SES and HCA. Other results showed males had increased odds of having a PU in the past year and of having had surgery to repair a PU since SCI onset. Additionally, in each of our 3 analyses, increased injury severity was associated with higher odds of PU outcomes. Both of these results have also been seen in previous studies.[5,21]

Limitations

While this study shows the importance of SES in relation to PU outcomes after SCI, several limitations should be noted. First, we used self-report data from a mail-in survey for all measures included in this study. While it would be ideal to have clinical data on PU occurrence, we asked questions in a general manner and used a restricted time frame as to limit the recall bias in reporting PU outcomes. While we asked participants only about open PUs, some participants could have included all of their PUs in their responses. Second, we were not able to assess the severity or grade of PUs reported by participants, we were only able to ask that they report on open PUs. Third, these data were cross-sectional, so we were not able to establish the sequence of events or look at PU outcomes over time. Fourth, our participants were identified through a clinical setting in a large rehabilitation hospital, and thus our results may not be generalizable to all persons with SCI, especially those who were not seen in a rehabilitation hospital. Lastly, we were limited in our measures of HCA factors, and the inclusion of a broader scope of factors in this area would provide a better assessment of the relation of HCA with PU outcomes. Future measures could include the need for specialized equipment and access to health care providers who specialize in the treatment of persons with SCI.

Conclusion

These results have shown the importance of SES, specifically annual household income, in relation to PU outcomes after SCI. While most of the HCA variables were not significantly associated with PU outcomes, we did find having a personal doctor was associated with increased odds of having a PU in the past year and having a current PU. Health care providers should be aware of the increased risk of PU outcomes in lower SES populations, even after accounting for basic HCA factors such as insurance. Future studies should include a broader assessment of HCA factors and should use longitudinal data to assess the recurrence of PU outcomes among individuals with SCI. While we used three basic measures of HCA as used by the BRFSS, future research would benefit from more specific HCA information such as access to rehabilitation, therapy, and proper equipment.

Acknowledgments

Sponsorship: The contents of this publication were developed under grants from the Department of Education, NIDRR grant numbers H133G050165, H133B090005, and H133A080064, and the National Institutes of Health, grant number 1R01 NS 48117. However, those contents do not necessarily represent the policy of the Department of Education or NIH, and you should not assume endorsement by the Federal Government.

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List of Abbreviations

BRFSS	Behavioral Risk Factor Surveillance System
CI	confidence interval
HCA	health care access
OR	odds ratio
PU	pressure ulcer
SCI	spinal cord injury
SES	socioeconomic status

Table 1

Logistic regression model results for having a current PU (yes vs. no)

	Model 1*		Model 2†	
Characteristic	**OR (95% CI)**	**p-value**	**OR (95% CI)**	**p-value**
Race (vs. white)		0.4401		0.3686
Black	1.19 (0.91-1.56)		1.22 (0.93-1.60)	
Other	1.07 (0.68-1.69)		1.06 (0.67-1.69)	
Gender (vs. female)		0.0881		0.1398
Male	1.27 (0.97-1.66)		1.23 (0.94-1.61)	
Injury severity (vs. Ambulatory)		<.0001		<.0001
C1-C4, Non-A	6.00 (3.85-9.33)		5.93 (3.76-9.36)	
C5-C8, Non-A	5.78 (3.95-8.47)		6.04 (4.08-8.95)	
Non-C, Non-A	6.10 (4.22-8.81)		6.05 (4.16-8.81)	
Years post-injury	1.02 (1.01-1.03)	0.0002	1.02 (1.01-1.03)	0.0002
Age at injury	1.01 (1.00-1.02)	0.0617	1.01 (1.00-1.02)	0.0717
Education (vs. Bachelor+)		0.0138		0.0600
<High School	1.85 (1.27-2.69)		1.66 (1.13-2.44)	
High School/GED	1.28 (0.91-1.80)		1.24 (0.88-1.75)	
<Bachelor	1.38 (1.01-1.89)		1.37 (1.00-1.88)	
Household income (vs. >$75K)		<.0001		0.0001
<$25K	2.10 (1.48-3.00)		2.03 (1.42-2.91)	
$25K-$74,999	1.36 (0.96-1.92)		1.34 (0.94-1.89)	
Insurance (vs. yes)				0.9018
No			0.97 (0.62-1.52)	
Personal Doctor (vs. Yes)				0.4665
No			0.81 (0.47-1.42)	
Could not see a doctor b/c of cost (vs. no)				0.0379
Yes			1.46 (1.02-2.01)	

*MODEL 1: Hosmer-Lemeshow chi-squre=7.55, DF=8, p=0.4789; C-Statistic=0.722 (variables: race, gender, injury severity, years post-injury, age at injury, education, household income)

†MODEL 2: Hosmer-Lemeshow chi-squre=6.93, DF=8, p=0.5446; C-Statistic=0.721(variables: race, gender, injury severity, years post-injury, age at injury, education, household income, insurance, personal doctor, could not see a doctor b/c of cost)

Table 2

Multinomial logistic regression model results for having reduced sitting time due to a PU in the past year P

	Model 1*				Model 2†			
	5+ WEEKS vs. No PU	Month or less vs. No PU	Never vs. No PU		5+ WEEKS vs. No PU	Month or less vs. No PU	Never vs. No PU	
		OR (95% CI)		p-value		OR (95% CI)		p-value
Race (vs. White)				**0.4541**				**0.3695**
Black	1.16 (0.81-1.65)	1.09 (0.78-1.52)	1.29 (0.96-1.73)		1.17 (0.82-1.68)	1.05 (0.74-1.48)	1.35 (1.00-1.82)	
Other	0.70 (0.36-1.35)	0.77 (0.43-1.39)	1.21 (0.76-1.92)		0.74 (0.38-1.43)	0.77 (0.43-1.41)	1.24 (0.77-1.99)	
Gender (vs. female)				**0.0002**				**0.0002**
Male	1.61 (1.11-2.33)	1.86 (1.31-2.64)	0.88 (0.67-1.14)		1.59 (1.10-2.30)	1.84 (1.30-2.63)	0.87 (0.67-1.14)	
Injury Severity (vs. Ambulatory)				**<.0001**				**<.0001**
C1-C4, Non-A	18.36 (8.32-38.16)	3.74 (2.23-6.29)	3.145 (2.09-4.74)		18.76 (8.93-39.39)	4.08 (2.39-6.97)	3.17 (2.08-4.83)	
C5-C8, Non-A	14.98 (7.57-29.63)	4.52 (3.00-6.82)	3.31 (2.41-4.57)		15.00 (7.51-29.96)	5.04 (3.31-7.35)	3.37 (2.42-4.70)	
Non-C, Non-A	17.87 (9.21-34.66)	4.68 (3.17-6.90)	2.21 (1.61-3.02)		17.94 (9.21-34.94)	4.93 (3.31-7.35)	2.19 (1.59-3.02)	
Years post-injury	1.03 (1.02-1.05)	1.01 (1.00-1.03)	1.01 (0.99-1.02)	**0.0007**	1.03 (1.02-1.05)	1.01 (1.00-1.03)	1.01 (0.99-1.03)	**0.0005**
Age at injury	1.01 (1.00-1.02)	1.01 (0.99-1.02)	1.00 (0.99-1.01)	**0.2053**	1.01 (1.00-1.02)	1.01 (1.00-1.02)	1.00 (0.99-1.01)	**0.1603**
Education (vs. Bachelor+)				**0.8558**				**0.8429**
< HS	1.27 (0.77-2.10)	1.08 (0.68-1.70)	1.13 (0.75-1.69)		1.26 (0.75-2.10)	1.01 (0.63-1.61)	1.05 (0.69-1.59)	
HS	1.11 (0.71-1.73)	0.86 (0.57-1.30)	0.98 (0.70-1.38)		1.11 (0.71-1.75)	0.84 (0.56-1.27)	1.01 (0.71-1.43)	
< Bachelor	1.31 (0.87-1.98)	1.08 (0.75-1.56)	0.93 (0.68-1.27)		1.32 (0.87-2.00)	1.11 (0.77-1.60)	0.94 (0.68-1.29)	
Income (vs. $75,000+)				**<.0001**				**<.0001**
<$25K	3.45 (2.12-5.62)	2.79 (1.82-4.27)	1.38 (0.97-1.97)		3.19 (1.94-5.24)	2.57 (1.67-3.69)	1.29 (0.90-1.85)	
$25-75K	1.89 (1.17-3.04)	1.60 (1.06-2.41)	1.26 (0.91-1.74)		1.81 (1.12-2.93)	1.51 (1.00-2.28)	1.22 (0.88-1.68)	
Insurance (vs. yes)								**0.7540**
No					0.72 (0.38-1.37)	0.89 (0.52-1.52)	1.03 (0.64-1.64)	
Personal doctor (vs. Yes)								**0.9770**
No					1.03 (0.50-2.12)	1.09 (0.59-2.00)	0.92 (0.52-1.62)	
Could not see a doctor b/c of cost (vs. no)								**0.0170**
Yes					1.59 (0.98-2.58)	1.88 (1.24-2.87)	1.37 (0.91-2.05)	

[*] MODEL 1: Pearson chi-square=6766.04, DF-6858, p=0.7832 (variables: race, gender, injury severity, years post-injury, age at injury, education, household income)

[†] MODEL 2: Pearson chi-square=6669.91, DF=6723, p=0.6748 (variables: race, gender, injury severity, years post-injury, age at injury, education, household income, insurance, personal doctor, could not see a doctor b/c of cost)

Table 3

Logistic regression model results for having had surgery for a PU since SCI onset (yes vs. no)

	Model 1*		Model 2†	
Characteristic	**OR (95% CI)**	**p-value**	**OR (95% CI)**	**p-value**
Race (vs. white)		0.0503		0.0720
Black	1.27 (0.97-1.66)		1.28 (0.97-1.68)	
Other	0.70 (0.43-1.15)		0.73 (0.45-1.21)	
Gender (vs. female)		0.0186		0.0260
Male	1.38 (1.06-1.80)		1.36 (1.04-1.78)	
Injury severity (vs. Ambulatory)		<.0001		<.0001
C1-C4, Non-A	6.87 (4.34-10.87)		6.31 (3.95-10.98)	
C5-C8, Non-A	6.43 (4.32-9.57)		6.05 (4.04-9.08)	
Non-C, Non-A	9.15 (6.24-13.40)		8.77 (5.97-12.89)	
Years post-injury	1.06 (1.04-1.07)	<.0001	1.06 (1.04-1.07)	<.0001
Age at injury	1.00 (0.99-1.01)	0.5451	1.00 (0.99-1.01)	0.6008
Education (vs. Bachelor+)		0.2223		0.1807
<High School	1.33 (0.90-1.95)		1.35 (0.91-1.99)	
High School/GED	1.37 (0.98-1.90)		1.40 (0.99-1.96)	
<Bachelor	1.34 (0.99-1.81)		1.37 (1.00-1.86)	
Household income (vs. >$75K)		<.0001		0.0001
<$25K	1.98 (1.41-2.78)		1.95 (1.37-2.76)	
$25K-$74,999	1.30 (0.94-1.81)		1.25 (0.90-1.75)	
Insurance (vs. yes)				0.2095
No			0.73 (0.45-1.19)	
Personal Doctor (vs. yes)				0.0378
No			0.53 (0.29-0.96)	
Could not see a doctor b/c of cost (vs. No)				0.0550
Yes			1.43 (0.99-2.07)	

*MODEL 1: Hosmer-Lemeshow chi-square=7.55, DF=8, p=0.4786; C-Statistic=0.767 (variables: race, gender, injury severity, years post-injury, age at injury, education, household income)

†MODEL 2: Hosmer-Lemeshow chi-square=7.11, DF=8, p=0.5244; C-Statistic=0.767 (variables: race, gender, injury severity, years post-injury, age at injury, education, household income, insurance, personal doctor, could not see a doctor b/c of cost)