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A cross-sectional study to investigate the effects of perceived discrimination in the healthcare setting on pain and depressive symptoms in wheelchair users with spinal cord injury.

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Title: A cross-sectional study to investigate the effects of perceived discrimination in the healthcare setting on pain and depressive symptoms in wheelchair users with spinal cord injury.

Running Head: Perceived discrimination in SCI

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- 2 healthcare setting on pain and depressive symptoms in wheelchair users with spinal cord injury.

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3 ABSTRACT

4 Objectives: In a sample of wheelchair users with spinal cord injury (SCI), the objectives were to
5 investigate which subject characteristics are associated with greater perceived discrimination in
6 the healthcare setting, and how such discrimination relates to health outcomes of pain and
7 depressive symptoms.

8 Design: Survey, cross-sectional.

9 Setting: Spinal Cord Injury Model Systems Centers (SCIMS).

10 Participants: 410 full-time wheelchair users with SCI from 9 SCIMS centers, with data collected
11 between 2011 and 2016.

12 Interventions: N/A.

13 Main Outcomes: 7-item questionnaire inquiring about perceived discrimination by hospital staff;
14 self-reported pain severity over the past month using a 0-10 Numerical Rating Scale; depressive
15 symptoms using the 2-question Patient Health Questionnaire screener.

16 Results: Participants who were Black or from the lowest income group were more likely to
17 report experiencing more discrimination than those who were White or from the highest income
18 group, respectively (IRR=2.2-2.6, $p<.01$). Those who reported more perceived discrimination
19 had greater risk of severe pain compared to no pain (RR=1.11, 95% CI=1.01-1.23, $p<.05$), mild
20 depressive symptoms (RR=1.09, 95% CI=1.02-1.17, $p<.05$), and severe depressive symptoms
21 (RR=1.12, 95% CI=1.04-1.21, $p<.05$) compared to no symptoms.

22 Conclusions: Wheelchair users with SCI who were from more disadvantaged groups (Black,
23 lower income levels) reported experiencing more discrimination in their healthcare setting.

24 Furthermore, those who reported more discrimination were more likely to report worse mental
25 and physical health outcomes. Attempts to reduce discrimination in healthcare settings may lead

26 to better outcomes for people with SCI. These observations were correlational and not causal; a
27 prospective analysis is necessary to prove causation. Future investigations should further explore
28 the impact of discrimination on the many facets of living with a SCI.

29

30 **KEYWORDS**

31 Spinal Cord Injuries; Wheelchairs; Pain, Depression; Social Discrimination

32

33 **ABBREVIATIONS**

34 IRR - Incidence Rate Ratio

35 PHQ – Patient Health Questionnaire

36 RR - Relative Risk

37 SCI – Spinal Cord Injury

38

39

40 Health disparities in people with disabilities are largely under-recognized.¹ In the United States,
41 a survey conducted in the early 2000s found that 77.2% of people with severe movement
42 disabilities reported fair or poor health compared with 3.4% of adults without disabilities. An
43 example of such a disability is spinal cord injury (SCI). Paralysis caused by SCI can result in
44 physical impairments and mobility limitations, which can negatively impact different health
45 domains. Indeed, one study found that people with SCI reported worse scores across most health
46 domains compared with the general population, including general health and social function.²

47

48 SCI can lead to many secondary mental and physical health complications despite prior health
49 status.³ These individuals rely more on the healthcare system than the general population⁴, yet
50 many report being unable to receive the care needed to manage their condition or prevent
51 complications from developing.^{5,6} Many also report a lack of satisfaction with their care.^{6,7}
52 Chronic pain and depression are among the most common secondary conditions reported by
53 people with SCI, with reported prevalence rates of 26-96% and 17-24%, respectively.^{8,9} Pain in
54 the SCI population is highly variable and may be caused by many known and unknown factors.¹⁰
55 Depressive symptoms can be exacerbated by pain and worsening health status, as well as other
56 psychosocial factors that originated before or developed as a consequence of the injury.^{11,12} Both
57 conditions are interrelated, with mood state affecting the experience of pain and vice versa.¹³

58

59 Pain and depression tend to be undertreated in this population despite their high prevalence.¹¹

60 Such disparities may reflect barriers to accessing the necessary rehabilitative and medical care.

61 Access to adequate healthcare is mediated by both physical (e.g. structural, equipment
62 accessibility) and social barriers (e.g. discriminatory attitudes, communication).¹⁴ For individuals
63 with SCI in primary care settings, several authors have identified a lack of physical accessibility
64 to the clinics or their equipment, as well as physician communication and knowledge gaps.^{5-7, 15.}

65 ¹⁶ However, the relationship between negative attitudes experienced in healthcare settings – such
66 as discrimination – and poor health outcomes has not been investigated. Eliminating
67 discriminatory attitudes and actions can lead to more successful health outcomes for these
68 individuals.¹⁷

69
70 Prior research has identified several demographic factors that are associated with perceived
71 discrimination in the able-bodied population, such as older age, minority race/ethnicity, female,
72 less education, and lower income levels.^{18, 19} Overall, the evidence suggests that perceived
73 discrimination in healthcare settings leads to poorer mental and physical health outcomes.²⁰
74 Studies in the SCI population have found that Blacks reported higher levels of perceived
75 discrimination than Whites^{21, 22}, and that implicit physician racial bias may lead to negative
76 mental health outcomes.²³ The impact of perceived discrimination on health status has generally
77 been understudied in SCI research and warrants further attention.

78
79 There were two primary objectives of this study. First, to identify differences in healthcare-
80 related perceived discrimination that may be related to age, gender, level of education, income,
81 race/ethnicity, or insurance coverage among wheelchair users with SCI. Second, to investigate
82 the association between discrimination and two key outcomes, pain and depressive symptoms,
83 after controlling for sociodemographic differences. Individuals who were Black or Hispanic,

84 lower income, and less educated were hypothesized to report more perceived discrimination.
85 Further, individuals who reported greater perceived discrimination would have higher risk of
86 pain and depressive symptoms after controlling for comorbidity and demographic factors.

87

88 METHODS

89

90 *Participants*

91

92 All participants were people with chronic spinal cord injury who completed an inpatient medical
93 rehabilitation program at a SCI Model Systems (SCIMS) Center. SCIMS Centers are designated
94 centers of excellence around the United States for the SCI clinical care and research. The data for
95 this analysis were collected between 2011 and 2016 as part of a multisite, modular survey
96 amongst SCIMS Centers to better understand equity in wheelchair provision and outcomes in
97 people with SCI.²²⁻²⁵ Participants were enrolled if they were older than 16 years, had chronic
98 neurologic impairment resulting from a traumatic SCI that occurred at least 1 year prior to the
99 study, were treated at a national SCIMS Center, and used a manual- or power-wheelchair
100 (including power assisted manual chairs) for at least 40 hours per week.

101

102 *Data Collection*

103

104 Nine centers collected data: Boston, Massachusetts (2 sites: Boston Medical Center and
105 Spaulding); Chicago, Illinois; Louisville, Kentucky; Philadelphia, Pennsylvania; Pittsburgh,
106 Pennsylvania; Washington, DC; West Orange, New Jersey; Seattle, Washington. Each site was

107 responsible for recruitment and enrollment at their center. Recruitment methods included
108 approaching participants in the National SCIMS Database, local registries, flyers, and
109 identification by clinical staff. Surveys were completed by in-person interviews, phone, or via
110 mail. All centers obtained ethical approval from their local institutional review boards and all
111 participants provided written informed consent.

112

113 *Measures*

114

115 Participants reported demographic information, comorbidities (e.g. diabetes; cancer; arthritis;
116 kidney disease; stroke; liver, respiratory, digestive, or heart problems; HIV/AIDS) and perceived
117 discrimination. Independent variables included self-reported age, race/ethnicity, gender, annual
118 household income, level of education, marital status, and insurance coverage type. Injury level
119 groups were divided into C1-4, C5-8, T1-S3.²⁶ Race/ethnicity was separated into White,
120 Hispanic-White, and Hispanic/Non-Hispanic Black. Other races (e.g. Native American, Asian
121 Indian, East Asian) were omitted and Black participants were not separated into Hispanic or non-
122 Hispanic due to small sample sizes. To optimize cell sizes, education and insurance were
123 dichotomized into post-secondary and no post-secondary education and private insurance or no
124 private insurance, respectfully. Appendix A contains a detailed list of demographic variables and
125 how they were recoded.

126

127 Perceived discrimination was examined by asking participants seven questions to describe how
128 often they felt they had been treated unfairly by doctors and nurses; specifically, how often they:
129 1) have been treated with less courtesy or 2) respect; 3) received poorer service than others; had

130 doctors or nurses act as if he or she thought they were 4) not smart, 5) afraid of them, 6) or better
131 than them; and 7) felt like a doctor or nurse was not listening to what they were saying. These
132 questions were developed by Bird, Bogart, and Delahanty²⁷, who adapted questions from the
133 original metric by Williams, et al.²⁸ and framed them within a healthcare context; for example,
134 instead of asking whether an individual felt people acted like they were not smart, the adapted
135 questionnaire asked whether they felt a healthcare provider acted like they were not smart.
136 Participants rated their response on a scale between 1 (Never) and 5 (Always). Higher scores
137 indicated that the individual experienced more discrimination. Reliability analysis showed this
138 scale had good internal consistency (Cronbach's $\alpha=.885$) within this dataset, comparable to the
139 original study.²⁷ Construct validity of the scale has been reported when measuring self-reported
140 racial discrimination²⁹ and quantifying discriminatory attitudes in healthcare in the general
141 population.^{18, 27, 30} Items were recoded on a scale from 0 to 4 and summed for a total score
142 between 0 and 28 to better fit the negative binomial statistical model.

143
144 Participants were asked about recent pain and depressive symptoms. Pain over the past month
145 was assessed using a 0 (no pain) to 10 (worst possible pain) numerical rating scale (NRS) – a
146 valid, reliable, and sensitive assessment of pain that has been recommended for use in the SCI
147 population.³¹ Pain scores were recoded into four categories: no pain (score of 0), minor pain
148 (score between 1 and 3), moderate pain (score between 4 and 6), or major pain (score of 7 or
149 greater).³² Depressive symptoms were evaluated by summing responses from the two-question
150 Patient Health Questionnaire screener (PHQ-2).³³ The PHQ-2 is derived from the PHQ-9 and
151 asks two questions about depressive moods and anhedonia over the past two weeks using a 0 (not
152 at all) to 3 (nearly every day) scale, for a total score of 6. A score of ≥ 3 for the two combined

153 items has a sensitivity of 83% and specificity of 92% for major depression, and thus used as a
154 cutpoint in this study.³³ The PHQ-2 was recoded into three categories: no depressive symptoms
155 (score of 0), minor symptoms (score of 1 or 2), or major symptoms (score of 3 or greater).³³ The
156 tool has been proven as a valid and reliable measure of depression in populations other than
157 SCI.³³⁻³⁵

158

159 *Statistical Analysis*

160

161 Relationships with $\alpha=.05$ were considered to be statistically significant. All statistical analyses
162 were performed using SPSS 21.0^a. Descriptive statistics included means and standard deviations
163 for continuous variables and frequencies for nominal variables. Several participants were missing
164 data for one or more variables. Differences among independent and dependent variables between
165 included and missing subjects were tested using chi-square (categorical) or independent t-tests
166 (continuous). Little's test ($X^2=8.51$, $p>.05$) was insignificant, which indicated data were missing
167 completely at random. Therefore, subjects with missing data were deleted casewise and no data
168 were imputed.³⁶

169

170 To test the first hypothesis, a negative binomial regression model was built to determine how
171 age, race/ethnicity, sex, level of education, income level, and insurance coverage were associated
172 with perceived healthcare discrimination.¹⁸ This model was chosen because of overdispersion
173 and the quantity of zeroes on the perceived discrimination scale (Figure 1).³⁷ The dependent
174 variable was the summated perceived discrimination score. Two multinomial logistic regression
175 models were built to test the influence of perceived discrimination on depressive symptoms and

176 pain while controlling for other potentially related variables found in the literature. Perceived
177 discrimination score, age, years since injury, gender, race/ethnicity, income level, education
178 level, insurance coverage, marital status, and physical comorbidity were included in the model
179 with depressive symptoms as the dependent variable.^{11, 12, 38, 39} Perceived discrimination score,
180 age, years since injury, gender, race/ethnicity, income level, education level, insurance coverage,
181 injury level, and physical comorbidity were included in the model with pain group as the
182 dependent variable.⁴⁰⁻⁴²

183

184 RESULTS

185

186 A sample of 410 cases with complete data were retained for analysis out of the 577 in the
187 dataset. Average scores on the discrimination scale were 2.31 (SD=3.87, range=0-18); the
188 distribution of scores is presented in Figure 1. A comparative analysis of the cases that were
189 included in the analysis versus excluded yielded no significant differences across the key
190 outcome variables (Table 1).

191

192 Results of the binomial regression model indicated Blacks were more than twice as likely to
193 report a one-point higher score in perceived discrimination compared with non-Hispanic Whites
194 (IRR=2.15, CI=1.35-3.42, $p<.01$), as were people in the lowest income group compared with
195 those in the highest income group (IRR=2.48, CI=1.37-4.49, $p<.01$). No other predictors were
196 significant. Full model statistics are presented in Table 2.

197

198 Both multinomial logistic regression models found greater risk of negative health outcomes with
199 higher levels of perceived discrimination. Every one-point increase in perceived discrimination
200 score increased risk of reporting severe pain (RR=1.09, 95% CI=1.02-1.17, $p<.05$). Having at
201 least one comorbidity was also associated with higher risk of reporting severe pain (RR=2.45,
202 95% CI=1.17-5.13, $p<.05$). A one-point increase in perceived discrimination score also increased
203 the risk of mild depressive symptoms by 9.0% (RR=1.09, 95% CI=1.02-1.17, $p<.05$), and severe
204 symptoms by 12.4% (RR=1.124, 95% CI=1.0-1.2, $p<.05$). Higher relative-risk of major
205 depressive symptoms were found among people with lower levels of education (RR=2.11, 95%
206 CI=1.07-4.16, $p<.05$) and income (RR=2.87, 95% CI=1.09-7.51, $p<.05$). Full model statistics
207 and significant covariates are listed in Tables 3 and 4. Perceived discrimination scores between
208 depressive symptom and pain groups are presented in Figure 2.

209

210 DISCUSSION

211

212 The objectives of this cross-sectional analysis were to identify demographic characteristics
213 correlated with perceived discrimination in this sample of wheelchair users with SCI, and to
214 investigate how this discrimination was associated with clinically-relevant outcomes of pain and
215 depressive symptoms. Results paralleled literature on the able-bodied population¹⁸ in that
216 individuals who were Black, had less education, or were from the lowest income level were more
217 likely to report more perceived discrimination. Furthermore, perceived discrimination was
218 associated with greater risks of reporting severe pain and both mild and major depressive
219 symptoms.

220

221 This study is one of the few to examine perceived discrimination in individuals with disabilities
222 and its relationship with health status. The observed relationship between race and perceived
223 discrimination has been mirrored by others in SCI, despite different sample characteristics and
224 geographic locations.^{21, 22} Previous studies, however, observed no relationship between perceived
225 discrimination and measures of psychosocial health status.^{21, 22} In these studies, pain was not
226 examined directly and depressive symptoms were treated as an independent variable instead of
227 an outcome. In the present investigation, pain and depressive symptoms were included as
228 dependent variables because they can be targeted with interventions to ultimately yield
229 improvements in quality of life. Future studies could include a more comprehensive model to
230 evaluate the influence of perceived discrimination on pain, depressive symptoms, and quality of
231 life; for example, structural equation modeling.

232
233 Individuals who were Hispanic White reported no significant differences in perceived
234 discrimination compared to those who were non-Hispanic White. Participants who were
235 Hispanic Black and non-Hispanic Black were combined into the same group, which
236 subsequently reported the highest levels of perceived discrimination. These findings suggest an
237 interaction effect may be present between race and ethnicity. According to the U.S. Census
238 Bureau, race and ethnicity are mutually independent concepts, with 53% of Hispanic/Latino
239 individuals self-identifying as White in the 2010 Census.⁴³ Thirty-six percent of these individuals
240 considered their race “other”⁴³, which is a category that is not reflected within the Model
241 Systems dataset. This category should be included in future datasets to more fully capture the
242 racial identities of people from different ethnicities. Unfortunately, the sample of Hispanic Black
243 participants was too small for a meaningful analysis. Future research could examine the

244 interaction between race and ethnicity on health outcomes in people with SCI and other
245 disabilities.

246

247 Causal relationships cannot be determined because of the cross-sectional and retrospective nature
248 of the data, yet there are potential mechanisms to explain these observations. Experiencing
249 discrimination may create an additional barrier that discourages people with SCI from seeking
250 the necessary care, or promote self-destructive behaviors.²⁰ These individuals may also lose trust
251 in their healthcare providers, making them less likely to follow their providers' advice.⁴⁴ Another
252 potential scenario is the reverse: the healthcare systems in place hold certain biases toward
253 people with physical impairments (particularly minority and lower income groups), which in turn
254 affects the healthcare they provide.^{45, 46} This observation was made by Hausmann, et al., who
255 found that pro-White/anti-Black race biases were present amongst all physicians in their study;
256 these biases were strongly associated with worse depression and life satisfaction among their
257 patients.²³ Ultimately, eliminating attitudinal barriers in healthcare may help ameliorate the
258 potential negative feedback loop of worsening health perpetuated by such biases; this remains to
259 be proven.

260

261

262 It should be noted that most participants reported little or no perceived discrimination, including
263 many from minority groups (Figure 1); this is overall a positive finding that should be
264 emphasized. Contrarily, the low frequency of people reporting perceived discrimination
265 compared to previous studies^{18, 27, 30} may indicate real instances of discriminatory attitudes were
266 underreported in this sample. It is not known whether potential underreporting occurred among

267 the entire sample or was different between social groupings; either would introduce bias that
268 would either diminish or amplify the actual relationships compared to those observed. The
269 present study also points to the need to collect additional data on barriers to healthcare access so
270 that effective interventions can be developed to address these issues. Other factors may
271 contribute to discrimination yet were not captured; for example, gender diversity and sexual
272 orientation. These variables should be included in future data collection so their relationship with
273 perceived discrimination can be investigated.

274

275 One potential solution to this problem is improving cultural-competency. Weech-Maldonado, et
276 al. surveyed patients from 66 different hospitals in the United States about their experiences with
277 healthcare.⁴⁷ The authors found that patients at hospitals with better cultural competency policies,
278 programs, practices, and cultures reported overall better experiences with their care. These
279 relationships were amplified in the patients who were Black.⁴⁷ Recently, this same group
280 implemented a cultural competency intervention within two hospital systems in the United
281 States. Although patient experiences were not assessed, the authors reported improvements in
282 organizational and individual attitudes toward other racial and ethnic groups.⁴⁸ It is reasonable to
283 assume that a similar approach with an emphasis on disability could be useful in practitioners
284 who treat individuals with SCI; such a program needs to be developed and tested.

285

286 *Limitations*

287

288 There were two potential sources of bias, the sampling methods and handling of missing data.
289 The current sample may differ from the National Database and the SCI population at large.

290 However, demographics did not differ greatly from those in the National Database; any
291 differences could be attributed to the fact that these data were collected at a subset of SCIMS
292 Centers. In addition, demographic differences were identified between participants with
293 complete and incomplete data. Listwise deletion of subjects with missing data may have
294 introduced bias. However, data were missing completely at random and no differences were
295 observed in the primary outcomes.

296

297 The analysis was cross-sectional and retrospective so causal relationships cannot be discerned. A
298 prospective analysis would be more powerful, and should include assessment of both clinician
299 and patient decision making when prescribing and adhering to treatment protocols, respectively.
300 Validity of the perceived discrimination scale used in this study has not been established in SCI,
301 which may bias results. Future studies should aim to establish validity of this scale in different
302 clinical subpopulations. Behavioral factors can heavily influence health status, yet were not
303 included in the models. The questions assessed frequency of perceived discrimination, as
304 opposed to actual discriminatory events, so it is difficult to accurately describe the rates of
305 discrimination. However, perceived discrimination can influence a variety of health-related
306 factors and thus should not be discounted.⁴⁹ Participants in the current sample were treated at a
307 subsample of United States SCI Model Centers, which have a high level of care and may not be
308 generalizable to the entire SCI population within the United States or globally. The small sample
309 size prevented a more thorough examination of groups other than Black or Hispanic (e.g. Asian,
310 Native American), different education levels, and insurance coverages. It also reduced cell sizes,
311 which yielded wide confidence intervals of a few variables.

312

313 CONCLUSIONS

314

315 In a sample of wheelchair users with SCI, people who were Black or of lower income levels
316 reported experiencing more perceived discrimination in the healthcare setting. Subjects who
317 reported more perceived discrimination also reported more pain and worse depressive symptoms.
318 While only a small portion of individuals felt they experienced discrimination, attempts should
319 be made to eliminate attitudinal barriers that would prevent someone from achieving better
320 health outcomes. This study was cross-sectional and thus causation cannot be proven. Further
321 research should seek to better understand the relationship between discrimination, behavioral
322 factors, and health outcomes using a prospective study design.

323

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Journal Pre-proof

466 Figure 1. A histogram which depicts the spread of summated perceived discrimination scores
467 across the sample, separated by race/ethnicity group (grey = White, black = Black, white =
468 Hispanic White). The minimum score is 0 and the maximum score is 28.

469

470 Figure 2. Perceived discrimination score separated between severity of pain (left) depressive
471 symptoms (right). Perceived discrimination scores were higher in those with minor and major
472 depressive symptoms and severe pain than with no symptoms. Error bars represent 95%
473 confidence intervals.

474 *significantly higher risk associated with higher perceived discrimination scores ($p < .05$).

Table 1. Sample characteristics, including complete and missing cases (n [%] or Means [SD]).

Variable	Complete (N=410)	Missing	Missing n
Age (average years, SD)*	45.4 (13.9)	40.7 (14.3)	2
Injury Duration (average years, SD) †	12.4 (10.6)	9.7 (8.3)	19
Perceived Discrimination (mean, SD)	2.3 (3.9)	2.5 (3.9)	2
Race/Ethnicity (n, %)			40
	Non-Hispanic White	80 (63.0)	
	Hispanic White	10 (7.9)	
	Black#	37 (29.1)	
Gender (n, %)			1
	Male	137 (82.5)	
	Female	29 (17.5)	
Marital Status (n, %)‡			0
	Married/LWP	46 (27.5)	
	Single	30 (18.0)	
	Other	91 (54.5)	
Education (n, %)§			1
	Post-Secondary	62 (37.3)	
	No Post-Secondary	104 (62.7)	
Injury Level (n, %)			13
	T1-S3	92 (59.7)	
	C5-8	38 (24.7)	
	C1-4	24 (15.6)	
Income Level (n, %)			108
	≥\$75,000	6 (10.2)	
	\$50,000-\$74,999	9 (15.3)	
	\$25,000-\$49,999	13 (22.0)	
	<\$25,000	31 (52.5)	
Insurance (n, %)□			8
	Private	43 (27.0)	
	Not Private	116 (73.0)	
Comorbidities (n, %)			3
	None	104 (63.4)	
	≥1	60 (36.6)	
Depression			9
	None	62 (39.2)	
	Mild	55 (34.8)	
	Severe	41 (25.9)	
Pain			3
	None	27 (16.5)	
	Minor	37 (22.6)	
	Moderate	48 (29.3)	
	Severe	52 (31.7)	

Notes. LWP = living with partner. Missing n refers to numbers of participants with missing data for that variable.

* $t(573) = 3.74, p < .01, d = .34$

† $t(328.8) = 3.12, p < .01, d = .28$

‡ $\chi^2(2, N = 577) = 11.8, p < .01, V = .14$

§ $\chi^2(1, N = 576) = 5.2, p < .05, V = .10$

|| $\chi^2(3, N = 469) = 8.1, p < .05, V = .13$

□ $\chi^2(1, N = 569) = 4.2, p < .05, V = .09$

7 individuals reported their race/ethnicity as Hispanic-Black

Table 2. Relationships between demographic variables and perceived discrimination.

		<i>B</i>	<i>B SE</i>	<i>95% CI B</i>		X^2	<i>p</i>	<i>IRR</i>	<i>95% CI IRR</i>	
				<i>Lower</i>	<i>Upper</i>				<i>Lower</i>	<i>Upper</i>
Intercept		0.13	0.40	-0.66	0.93	0.11	.745	1.14	0.52	2.52
Race†	Hispanic White	0.34	.36	-.36	1.0	0.90	.344	1.40	0.70	2.82
	Black*	0.77	.24	.30	1.2	10.5	.001	2.15	1.35	3.42
Sex‡	Female	-0.22	0.23	-0.68	0.24	0.90	.342	0.80	0.51	1.27
Education§	No Post-Secondary	-0.18	0.20	-0.56	0.23	0.67	.414	0.85	0.57	1.26
	<\$25,000*	0.91	0.30	0.31	1.50	8.96	.003	2.48	1.37	4.49
Income Level	\$25,000-\$49,999	0.52	0.31	-0.08	1.12	2.92	.088	1.69	0.93	3.08
	\$50,000-\$74,999	0.32	0.34	-0.36	0.99	0.85	.356	1.37	0.70	2.69
Insurance¶	Not Private	0.14	0.25	-0.35	0.67	0.33	.568	1.16	0.71	1.89
Age		0.00	0.01	-0.02	0.01	0.12	.732	1.00	0.98	1.01

Notes. Results are presented as incidence rate ratios (IRR) with model statistics. The dispersion coefficient suggests over-dispersion, $B = 2.93$, $B SE = 0.32$, $95\%CI B = 2.36 - 3.63$. The model is significant in predicting perceived discrimination using the above demographic variables, Likelihood Ratio $X^2(11) = 35.19$, $p < .001$.

* $p < .01$

† Omitted reference group is White.

‡ Omitted reference group is Male.

§ Omitted reference group is Post-secondary

|| Omitted reference group is $\geq \$75,000$.

¶ Omitted reference group is Private

Table 3. Relative risks of demographic variables and perceived discrimination for reporting minor, moderate, or severe pain.

		Minor	Moderate	Severe
Perceived Discrimination		1.08 (0.97 – 1.20)	1.10 (0.99 – 1.22)	1.11 (1.01 – 1.23)*
Injury Duration (years)		1.00 (0.97 – 1.03)	1.02 (0.98 – 1.05)	1.01 (0.98 – 1.05)
Age (years)		1.00 (0.98 – 1.02)	1.00 (0.98 – 1.02)	1.00 (0.98 – 1.02)
Income †	<\$25,000	0.56 (0.21 – 1.48)	0.40 (0.15 – 1.02)	1.00 (0.35 – 2.85)
	\$25,000-49,999	1.40 (0.55 – 3.59)	0.82 (0.32 – 2.09)	1.25 (0.42 – 3.66)
	\$50,000-74,999	0.83 (0.31 – 2.23)	0.29 (0.10 – 0.87)*	1.03 (0.33 – 3.26)
Race‡	Black	0.70 (0.27 – 1.82)	0.86 (0.37 – 2.00)	1.22 (0.52 – 2.86)
	Hispanic	0.40 (0.11 – 1.53)	1.14 (0.40 – 3.24)	0.75 (0.23 – 2.47)
Gender§	Female	1.07 (0.49 – 2.35)	1.21 (0.60 – 2.63)	1.50 (0.67 – 3.36)
Injury Level	C1 – C4	0.64 (0.24 – 1.66)	0.86 (0.36 – 2.08)	0.88 (0.35 – 2.21)
	C5 – C8	0.60 (0.30 – 1.20)	0.58 (0.30 – 1.14)	0.57 (0.28 – 1.19)
Education¶	No Post-Secondary	0.53 (0.26 – 1.08)	1.65 (0.82 – 3.32)	0.96 (0.46 – 2.00)
Insurance#	Not Private	0.72 (0.34 – 1.50)	1.28 (0.61 – 2.69)	2.16 (0.95 – 4.94)
Comorbidity**	One or more	1.83 (0.97 – 3.85)	2.03 (0.99 – 4.16)	2.45 (1.17 – 5.13)*

Notes. Results are presented as relative risk ratios with their 95% confidence intervals in parentheses.

Minor, moderate, and severe pain groups were compared to the no pain group. The full model significantly predicted pain severity group, $X^2(42, N = 410) = 85.6, p < .001, \text{Nagelkerke } R^2 = .202.$

* $p < .05$

† Omitted reference group is $\geq \$75,000.$

‡ Omitted reference group is White.

§ Omitted reference group is Male.

|| Omitted reference group is T1 – S3

¶ Omitted reference group is Post-secondary

Omitted reference group is Private

** Omitted reference group is None

Table 4. Relative risks of demographic variables and perceive discrimination for reporting minor or severe depressive symptoms.

		Minor	Severe
Perceived Discrimination		1.09 (1.02 – 1.17)*	1.12 (1.04 – 1.21)*
Injury Duration (years)		0.98 (0.96 – 1.00)	0.96 (0.93 – 0.99)†
Age (years)		1.01 (0.99 – 1.03)	1.03 (1.00 – 1.05)
Income ‡	<\$25,000	1.10 (0.53 – 2.28)	2.44 (0.86 – 6.91)
	\$25,000-49,999	1.29 (0.65 – 2.55)	2.87 (1.09 – 7.51)†
	\$50,000-74,999	1.15 (0.54 – 2.47)	1.50 (0.46 – 4.89)
Race§	Black	0.58 (0.31 – 1.10)	0.55 (0.25 – 1.21)
	Hispanic	0.80 (0.33 – 1.97)	1.12 (0.38 – 3.26)
Sex	Female	0.81 (0.47 – 1.39)	1.01 (0.49 – 2.10)
Marital Status¶	Single	1.66 (0.90 – 3.08)	1.19 (0.54 – 2.64)
	Divorced/widowed/separated	1.24 (0.64 – 2.41)	0.77 (0.32 – 1.83)
Education#	No Post-Secondary	1.00 (0.60 – 1.66)	2.11 (1.07 – 4.16)†
Insurance**	Not Private	1.08 (0.63 – 1.87)	0.97 (0.47 – 2.00)
Comorbidity††	One or more	1.59 (0.98 – 2.60)	1.60 (0.85 – 3.00)

Notes. Results are presented as relative risk ratios with their 95% confidence intervals in parentheses. Minor and severe depressive symptoms were compared with no symptoms. The full model significantly predicted pain severity group, $X^2(28, N = 410) = 52.8, p < .01$, Nagelkerke $R^2 = .138$.

* $p < .01$

† $p < .05$

‡ Omitted reference group is $\geq \$75,000$.

§ Omitted reference group is White.

|| Omitted reference group is Male.

¶ Omitted reference group is Married/Living with partner

Omitted reference group is Post-secondary

** Omitted reference group is Private

†† Omitted reference group is None



