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Research Article

Healthcare Access Barriers Among Minority Groups with Low Back Pain

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Abstract

Background: Research on healthcare access barriers among sexual and gender minority (SGM) individuals and racial/ethnic minorities with low back pain (LBP) in the United States remains limited. This study compared cost-related and non-cost–related barriers to care among SGM and non-SGM adults with LBP across racial/ethnic groups.

Methods: We conducted a cross-sectional analysis of deidentified healthcare access and utilization survey data from the All of Us Research Program (May 6, 2018–July 1, 2022). Adults aged ≥18 years with LBP were included. Exposures included SGM status and self-reported race/ethnicity (non-Hispanic Black [NHB], non-Hispanic White [NHW], Hispanic/Latino [HL]). Outcomes were cost-related and non-cost–related barriers to healthcare access. Multivariable logistic regression assessed associations between SGM status, race/ethnicity, and barriers to care.

Results: Among 25,597 adults with LBP (2,169 [8.5%] SGM), SGM patients had higher odds of delaying mental health visits (aOR 1.72; 95% CI 1.50–1.97), prescription filling (aOR 1.27; 95% CI 1.13–1.43), and specialist care (aOR 1.18; 95% CI 1.02–1.35) due to cost, as well as reporting inability to take time off work (aOR 1.18; 95% CI 1.03–1.36), transportation barriers (aOR 1.36; 95% CI 1.18–1.56), and perceived disrespect (aOR 1.40; 95% CI 1.27–1.54). Compared with NHW patients, NHB and HL patients more frequently delayed care due to cost and experienced transportation and work-leave barriers. HL SGM patients had over twice the odds of delaying care (aOR 2.41; 95% CI 1.61–3.62) compared with NHW non-SGM patients.LBP (2,169

Conclusion: SGM, HL, and NHB adults with LBP experience disproportionate barriers to healthcare access, underscoring the need for targeted strategies to promote equity in pain-related care

Keywords: Low Back Pain; Healthcare Access Barriers; Sexual and Gender Minority; Racial and Ethnic Disparities

Introduction

Low back pain (LBP) is the leading cause of disability worldwide, with approximately 75% of affected individuals reporting some form of limitation and nearly 60% experiencing mobility or work restrictions [1-3]. Early, coordinated interventions, including physical therapy, specialist consultations, and pharmacotherapy, are essential to prevent chronicity and reduce the economic and social burden of LBP.4,5 Yet, financial, logistical, and interpersonal barriers frequently impede timely care. Although disparities in access have been documented among sexual and gender minority (SGM)

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and different racial/ethnic populations in other chronic conditions, [6-8] little is known about these barriers to care amongst individuals with LBP. Furthermore, a recent systematic review found studies on the potential role of social determinants of health in low back pain are poorly defined, with most studies limited by narrow populations or settings [9]. In this study, we used survey data on healthcare access and utilization from the National Institutes of Health's All of Us Research Program to prevalence of cost and non-cost barriers among SGM, non-SGM, and different racial/ethnic groups of patients diagnosed with LBP.

Methods

The All of Us Research Program

All of Us is a longitudinal, nationwide cohort study designed to study the effects of environment, lifestyle, and genomics on health outcomes. Recruitment is facilitated through collaborating healthcare organizations and Federally Qualified Health Centers, with additional opportunities for individuals to join directly by visiting local enrollment facilities (https://joinallofus.org). After enrollment, participants are invited to undergo preliminary clinical evaluations and provide biological samples at partner healthcare sites. Participant data is maintained passively through integration of electronic health records (EHRs) and actively through periodic follow-up questionnaires. This study incorporates data from individuals who enrolled between May 6, 2018 and July 1, 2022 (release 7, N=413,537). This study was reported in accordance with the Consensus- Based Checklist for Reporting of Survey Studies [10]. All analyses were performed in accordance with the All of Us Code of Conduct and participants granted informed consent upon joining the program, which included authorization for All of Us to access their EHR data. This study has been deemed not human subjects research by the University of Texas Medical Branch Institutional Review Board and is exempt from IRB review.

Data extraction and variable coding

The All of Us program employs the Observational Medical Outcomes Partnership (OMOP) Common Data Model (CDM) to standardize EHR data from various sources [11,12]. Diagnoses for low back pain were defined based on the OMOP CDM Concept ID for low back pain (194133) within the All of Us Research Program Database [11,12]. Our analyses included measures for age, sex, gender identity, sexual orientation, race and ethnicity, educational attainment, insurance status, and US census region. Age was defined at the date of the data pull (July 23, 2024). SGM status was defined according to survey responses on sex assigned at birth, gender identity, and sexual orientation, where participants were categorized as SGM if they reported being intersex at birth, identifying as transgender or nonbinary, or identifying as lesbian, gay, bisexual, or other gender identities and sexual orientations. Non-SGM participants were defined as individuals who identified as either men or women whose sex assigned at birth aligned with their gender identity and who identified as heterosexual. Patients were categorized into the following groups based on self-reported race and ethnicity: Hispanic, Latino, or of Spanish origin (HL); non-Hispanic Asian (NHA); non-Hispanic Black (NHB); non-Hispanic Middle Eastern or North African (NHMENA); non-Hispanic Native Hawaiian or other Pacific Islander (NHNHPI); non-Hispanic White (NHW); non-Hispanic and multiple races; or another race and ethnicity not listed on the survey. Socioeconomic characteristics, including insurance coverage, educational attainment, household income, and census region were constructed by All of Us utilizing information from "The Basics Survey" which contains demographic information, coupled with zip code data. The outcome variables were responses to eight questions on The Healthcare Access and Utilization survey regarding broadly applicable healthcare barriers used in previous studies.3 Additional data on methods and questionnaires is available in Supplementary materials.

Statistical Analysis

Univariable and multiple logistic regression were used to study the association of race/ethnicity, SGM status, and gender with experiencing barriers to care. Due to limitations in the sample size, only patients identifying as NHW, HL, and NHB were included. Regression models excluded participants with missing data. Analyses were conducted in the All of Us Researcher workbench using Juptyer Notebook software, version 6.4.8 using Python language (Python Software Foundation), version 3.10.12. A two sided P < .05 was considered statistically significant for all analyses.

Results

Study Population

Our analysis included 25,597 patients with LBP, of whom 2,169 were identified as SGM and 23,428 as non-SGM (Table 1). The SGM group had a median age of 54.0 years [interquartile range (IQR), 41.0-66.0], with 1,389 (64.0%) assigned female sex, 779 (35.9%) male sex, and <20 (0.1%) intersex at birth. The racial/ethnic composition of the SGM group was: 228 (10.5%) HL, 38 (1.8%) NHA, 214 (9.9%) NHB, 1,525 (70.3%) NHW, 84 (3.9%) non-Hispanic and multiple races, and <20 (0.1%) NHNHPI.

The non-SGM group had a median age of 65.0 years (IQR, 53.0-74.0), with 16,037 (68.5%) assigned female sex and 7,391 (31.5%) male sex at birth. The racial/ethnic composition was: 2,532 (10.8%) HL, 374 (1.6%) NHA, 2,955 (12.6%) NHB, 16,618 (70.9%) NHW, 340 (1.5%) non-Hispanic and multiple races, and <20 (0.1%) NHNHPI.

Table 1: Characteristics of the study population with low back pain grouped by SGM status.

Characteristics[a]	SGM (n=2,169)	Non-SGM (n=23,428)	p Value[b]
Age, median (IQR), years	54 (41-66)	65 (53-74)	<0.001
Sex Assigned at Birth			
Female	1389 (64.0)	16037 (68.5)	<0.001
Male	779 (35.9)	7391 (31.5)	
Intersex	NA	0 (0)	
Gender Identity[c]			
Man	755 (34.8)	7400 (31.6)	<0.001
Nonbinary	103 (4.7)	0 (0)	
Transgender	55 (2.5)	0 (0)	
Woman	1299 (59.9)	16028 (68.4)	
Sexual Orientation			
Bisexual	868 (40)	0 (0)	<0.001
Gay	560 (25.8)	0 (0)	
Heterosexual	33 (1.5)	23428 (100)	
Lesbian	421 (19.4)	0 (0)	
Race and Ethnicity			
Hispanic, Latino, or of Spanish origin	228 (10.5)	2532 (10.8)	<0.001
Non-Hispanic Asian	38 (1.8)	374 (1.6)	
Non-Hispanic Black	214 (9.9)	2955 (12.6)	
Non-Hispanic MENA	NA	92 (0.4)	
Non-Hispanic NHPI	NA	NA	
Non-Hispanic White	1525 (70.3)	16618 (70.9)	
Non-Hispanic and multiple races	84 (3.9)	340 (1.5)	
Another race/ethnicity	35 (1.6)	235 (1.0)	
US Census Region			
Mid-South Atlantic	613 (28.3)	6466 (27.6)	<0.001
Midwest	616 (28.4)	7569 (32.3)	
New England	378 (17.4)	3672 (15.7)	
Pacific	236 (10.9)	2393 (10.2)	
South	149 (6.9)	1774 (7.6)	
West	164 (7.6)	1445 (6.2)	
Insurance Status			
Employer or Union	747 (34.4)	6954 (29.7)	<0.001
Medicaid	359 (16.6)	2465 (10.5)	
Medicare	199 (9.2)	3369 (14.4)	
Purchased	61 (2.8)	696 (3.0)	
Mixed	360 (16.6)	5154 (22.0)	
Other	103 (4.7)	940 (4.0)	

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Annual Income ($, thousands)			
< 25	626 (28.9)	4312 (18.4)	<0.001
25 - 50	423 (19.5)	3738 (16.0)	
50 - 100	465 (21.4)	5949 (25.4)	
100 - 150	262 (12.1)	3249 (13.9)	
> 150	243 (11.2)	3319 (14.2)	
Educational Level			
College	1181 (54.4)	12481 (53.3)	0.07
Vocational	617 (28.4)	6515 (27.8)	
High school	264 (12.2)	3088 (13.2)	
Less than high school	81 (3.7)	1118 (4.8)	

[a] Because all patients did not complete all demographic questions, percentages may not sum to 100. In compliance with the All of Us Data and Statistics Dissemination Policy, cells with participant counts of 1 to 20 have been marked with NA.

[b] The welch t test was used to compare the mean age between groups. All other characteristics were compared using Pearson χ2 tests.

[c] Patients may have identified with more than one gender and sexual orientation. Additional data are available in eTable 4.

(SGM, sexual gender minority; IQR, interquartile range; MENA, Middle Eastern or North African; NHPI, Native Hawaiian or Pacific Islander).

Regarding gender identity among SGM patients, 755 (34.8%) identified as men, 103 (4.7%) as nonbinary, 55 (2.5%) as transgender, and 1,299 (59.9%) as women. In terms of sexual orientation, 868 (40.0%) identified as bisexual, 560 (25.8%) as gay, 421 (19.4%) as lesbian, and 33 (1.5%) as heterosexual. Among non-SGM patients, 7,400 (31.6%) identified as men and 16,028 (68.4%) as women. SGM patients were generally younger and more likely to be assigned female at birth compared to non-SGM patients (p < 0.001). Detailed information on responses to questions about sex assigned at birth, gender identity, and sexual orientation are available in eTable 5.

Insurance coverage patterns varied significantly, with a higher proportion of SGM patients enrolled in Medicaid (16.6% vs. 10.5% for non-SGM) and a lower enrollment in Medicare (9.2% vs. 14.4%). Income levels were also significantly different; SGM patients were more likely to report incomes below $25,000 (28.9% vs. 18.4%) and between $25,000 and $50,000 (19.5% vs. 16.0%), while non-SGM patients more frequently reported incomes between $50,000 and $100,000 (25.4% vs. 21.4% for SGM).

When grouped by race/ethnicity, the LBP cohorts included 3,169 (12.4%) NHB, 18,143 (70.9%) NHW, and 2,760 (10.8%) HL patients (Table 2). Age distributions varied, with median ages of 55 years (IQR 44-66) for HL, 60 years (IQR 51-68) for NHB, and 67 years (IQR 54-75) for NHW patients. A higher proportion of NHB (76.5%) and HL (76.3%) patients were assigned female at birth compared to NHW patients (65.5%). Regarding insurance status, HL patients had the highest rates of Medicaid coverage (28.5%), while NHW patients more commonly had employer-based (32.1%) or Medicare (15.3%) insurance. NHB and HL patients reported lower income levels, with 42.0% and 34.9% respectively having annual incomes below $25,000, compared to 13.0% of NHW patients. Educational attainment also varied, with NHW patients having substantially higher rates of college education (60.5%) than NHB (30.1%) and HL (28.2%) patients.

Cost and Non-cost Barriers Stratified by SGM Status

After adjusting for demographic and socioeconomic factors, SGM patients faced significantly more healthcare-related delays compared to non-SGM patients (Table 2). While the difference in delaying general doctor visits was not significant [adjusted odds ratio (aOR) 1.07, p-value (p) 0.340, 95% confidence interval (CI) 0.90-1.28], SGM patients had significantly increased odds of delaying mental health care (aOR 1.72, p<0.001, 95% CI 1.50-1.97), prescription filling (aOR 1.27, p<0.001, 95% CI 1.13-1.43), and specialist visits (aOR 1.18, p<0.021, 95% CI 1.02-1.35). Additionally, SGM patients were significantly more likely to report non-cost barriers, including inability to take time off work (aOR 1.18, p<0.020, 95% CI 1.03-1.36), lack of transportation (aOR 1.36, p<0.001, 95% CI 1.18-1.56), perceived disrespect by healthcare providers (aOR 1.40, p<0.001, 95% CI 1.27-1.54), and delayed care due to differences in provider background (aOR 1.42, p<0.001, 95% CI 1.26-1.60).

Cost and Non-cost Barriers Stratified by Race and Ethnicity

Analysis across racial and ethnic groups revealed significant disparities in healthcare access among NHB and HL patients compared to NHW patients (Table 3). NHB patients exhibited higher odds of delaying general doctor visits due to cost (aOR 1.38, 95% CI 1.19-1.61) and delaying prescription filling due to cost (aOR 1.25, 95% CI 1.13-1.39). They also faced increased transportation issues (aOR 1.33,

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Table 2. Characteristics of the study population with low back pain grouped by race and ethnicity.

Characteristics[a]	Non-Hispanic Black (n=3169)	Non-Hispanic White (n=18143)	Hispanic/Latino (n=2760)	p value[b]
Age, median (IQR), years	60 (51-68)	67 (54-75)	55 (44-66)	<0.001
Sex Assigned at Birth				
Female	2424 (76.5)	11879 (65.5)	2105 (76.3)	<0.001
Male	745 (23.5)	6263 (34.5)	655 (23.7)	
US Census Region				
Mid-South Atlantic	1026 (32.4)	6412 (35.3)	346 (12.5)	<0.001
Midwest	315 (9.9)	2954 (16.3)	499 (18.1)	
New England	120 (3.8)	1582 (8.7)	663 (24.0)	
Pacific	713 (22.5)	1054 (5.8)	78 (2.8)	
South	62 (2.0)	1116 (6.2)	329 (11.9)	
West	1026 (32.4)	6412 (35.3)	346 (12.5)	
Insurance				
Employer or Union	708 (22.3)	5819 (32.1)	675 (24.5)	<0.001
Medicaid	704 (22.2)	1163 (6.4)	787 (28.5)	
Medicare	397 (12.5)	2780 (15.3)	197 (7.1)	
Purchased	73 (2.3)	568 (3.1)	68 (2.5)	
Mixed	497 (15.7)	4420 (24.4)	326 (11.8)	
Other	122 (3.8)	708 (3.9)	147 (5.3)	
Annual Income ($, thousands)				
<25	1331 (42.0)	2358 (13.0)	962 (34.9)	<0.001
25 - 50	588 (18.6)	2874 (15.8)	456 (16.5)	
50 - 100	499 (15.7)	5162 (28.5)	395 (14.3)	
100 - 150	162 (5.1)	3013 (16.6)	160 (5.8)	
> 150	97 (3.1)	3094 (17.1)	123 (4.5)	
Educational Level				
College	953 (30.1)	10985 (60.5)	779 (28.2)	<0.001
Vocational	1098 (34.6)	4868 (26.8)	793 (28.7)	
High school	765 (24.1)	1925 (10.6)	515 (18.7)	
Less than high school	295 (9.3)	242 (1.3)	630 (22.8)	

[a] These odds ratios and p-values are for univariate analysis comparing SGM individuals versus non-SGM individuals and the prevalence of barriers.

[b] These odds ratios and p-values are comparing SGM individuals vs Non-SGM individuals and prevalence of barriers, adjusting for age, census region, race, income, insurance, and education level.

[c] Patients who skipped the question or responded “don’t know” were excluded from the calculations for that barrier.

(SGM, sexual gender minority; OR, odds ratio; aOR, adjusted odds ratio).

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Table 3: Odds Ratios and p values for experiencing barriers to care in univariate and multivariate analysis by SGM status.

	SGM, No. (%)	Non-SGM, No. (%)	OR (95% CI)[a]	p Value[a]	aOR (95% CI)[b]	p Value[b]
Cost Barriers[c]						
(1) Delayed general doctor visit because unable to afford cost	172 (7.9)	1260 (5.4)	1.52 (1.28-1.79)	<0.001	1.07 (0.90 - 1.28)	0.43
(2) Delayed mental health visit because unable to afford cost	363 (16.7)	1582 (6.8)	2.78 (2.45-3.14)	<0.001	1.72 (1.50 - 1.97)	<0.001
(3) Delayed filling prescription because unable to afford cost	461 (21.3)	3175 (13.6)	1.72 (1.54-1.92)	<0.001	1.27 (1.13 - 1.43)	<0.001
(4) Delayed specialist visit because unable to afford cost	311 (14.3)	2145 (9.2)	1.66 (1.46-1.89)	<0.001	1.18 (1.02 - 1.35)	0.021
Non-cost Barriers[c]						
(5) Delayed care because could not take time off work	317 (14.6)	1912 (8.2)	1.93 (1.69-2.19)	<0.001	1.18 (1.03 - 1.36)	0.02
(6) Delayed care because did not have transportation	333 (15.4)	1966 (8.4)	1.98 (1.75-2.24)	<0.001	1.36 (1.18 - 1.56)	<0.001
(7) Health care practitioners did not always treat me with respect	784 (36.1)	5451 (23.3)	1.87 (1.7-2.05)	<0.001	1.4 (1.27 - 1.54)	<0.001
(8) Delayed care because my healthcare practitioner was different than me	445 (20.5)	2621 (11.2)	2.05 (1.83-2.29)	<0.001	1.42 (1.26 - 1.60)	<0.001

[a] These odds ratios and p-values are for univariate analysis comparing SGM individuals versus non-SGM individuals and the prevalence of barriers.

[b] These odds ratios and p-values are comparing SGM individuals vs Non-SGM individuals and prevalence of barriers, adjusting for age, census region, race, income, insurance, and education level.

[c] Patients who skipped the question or responded “don’t know” were excluded from the calculations for that barrier.

(SGM, sexual gender minority; OR, odds ratio; aOR, adjusted odds ratio).

95% CI 1.17-1.50) and were more likely to delay care due to differences with their healthcare practitioner (aOR 1.28, 95% CI 1.14-1.43). However, they reported lower odds of perceiving disrespect from healthcare providers (aOR 0.71, 95% CI 0.64-0.78).

HL patients similarly showed higher odds of delaying general doctor visits due to cost (aOR 1.39, 95% CI 1.18-1.65), delaying specialist visits due to cost (aOR 1.24, 95% CI 1.09-1.42), delaying care due to an inability to take time off work (aOR 1.51, 95% CI 1.32-1.73), and were more likely to delay care due to differences with healthcare practitioners (aOR 1.29, 95% CI 1.14-1.45). Similar to NHB patients, HL patients reported lower odds of perceiving disrespect from healthcare providers (aOR 0.77, 95% CI 0.69-0.86).

Cost and Non-cost Barriers Stratified by Both SGM Status and Race and Ethnicity

HL SGM patients, compared to NHW non-SGM patients, were significantly more likely to delay care for general doctor

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visits (aOR 2.41, 95% CI 1.61-3.62), mental health (aOR 2.50, 95% CI 1.76-3.56), prescription filling (aOR 1.49, 95% CI 1.07-2.07), and specialist visits (aOR 1.76, 95% CI 1.22-2.52). They also faced greater challenges in taking time off work (aOR 2.36, 95% CI 1.65-3.37) and with transportation (aOR 1.70, 95% CI 1.18-2.45).

NHB SGM patients showed increased delays in mental health visits (aOR 1.61, 95% CI 1.08-2.40) and prescription filling (aOR 1.92, 95% CI 1.41-2.61). They also experienced more difficulties with transportation (aOR 1.86, 95% CI 1.31-2.64) and healthcare provider differences (aOR 2.39, 95% CI 1.74-3.29). Notably, NHW SGM patients were more likely to face all eight healthcare barriers compared to their NHW non-SGM counterparts.

A post hoc sensitivity analysis compared the prevalence of barriers to care between patients with and without LBP. Patients with LBP were more likely to delay filling a prescription (aOR 1.23, 95% CI 1.17-1.28), delay specialist visits (aOR 1.07, 95% CI 1.02-1.12), and experience transportation-related delays (aOR 1.10, 95% CI 1.05-1.16). No significant differences were observed in the prevalence of the remaining barriers between patients with and without LBP (eTable 6).

Table 4. Odds ratios and p values for experiencing barriers to care in multivariate analysis by race and ethnicity.

	NHW, No. (%)	NHB, No. (%)	HL, No. (%)	NHB aOR (95% CI)[a]	p value[a]	HL aOR (95% CI)a	p value[a]	NHW aOR (95% CI)[a]
Cost Barriers[b]								
(1) Delayed general doctor visit because unable to afford cost	797 (4.3)	311 (9.8)	243 (8.8)	1.38 (1.19-1.61)	<0.001	1.39 (1.18-1.65)	<0.001	*Reference*
(2) Delayed mental health visit because unable to afford cost	1298 (7.0)	271 (8.6)	255 (9.2)	0.81 (0.7-0.94)	0.005	1.01 (0.87-1.18)	0.866	*Reference*
(3) Delayed filling prescription because unable to afford cost	2201 (11.9)	724 (22.8)	510 (18.5)	1.25 (1.13-1.39)	<0.001	1.09 (0.97-1.23)	0.141	*Reference*
(4) Delayed specialist visit because unable to afford cost	1518 (8.2)	415 (13.1)	376 (13.6)	1.04 (0.92-1.18)	0.493	1.24 (1.09-1.42)	0.001	*Reference*
Non-cost Barriers[b]								
(5) Delayed care because could not take time off work	1412 (7.7)	285 (9.0)	366 (13.3)	0.99 (0.86-1.14)	0.88	1.51 (1.32-1.73)	<0.001	*Reference*
(6) Delayed care because did not have transportation	1237 (6.7)	536 (16.9)	401 (14.5)	1.33 (1.17-1.5)	<0.001	1.05 (0.91-1.20)	0.524	*Reference*
(7) Health care practitioners did not always treat me with respect	4526 (24.5)	675 (21.3)	636 (23.0)	0.71 (0.64-0.78)	<0.001	0.77 (0.69-0.86)	<0.001	*Reference*
(8) Delayed care because my healthcare practitioner was different than me	1756 (9.5)	551 (17.4)	517 (18.7)	1.28 (1.14-1.43)	<0.001	1.29 (1.14-1.45)	<0.001	*Reference*

[a] These odds ratios and p-values are comparing NHW, NHB, and HL groups and the prevalence of cost barriers, adjusting for age, census region, income, insurance, and education level.

[b] Patients who skipped the question or responded "don't know" were excluded from the calculations for that barrier.

(SGM, sexual gender minority; OR, odds ratio; aOR, adjusted odds ratio; NHW, non-Hispanic White; HL, Hispanic/Latino; NHB, non-Hispanic Black).

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Discussion

In this cross-sectional analysis of survey data on healthcare access and utilization of US adults with LBP, we observed that SGM individual disproportionately reported a broad range of cost-related and non-cost barriers to care compared with their non-SGM counterparts. The prevalence of barriers was particularly high among SGM patients who also identified with racially or ethnically minoritized groups, highlighting the potential for compounded disparities at the intersection of SGM status and race/ethnicity. These findings extend prior evidence of racial and socioeconomic inequities in LBP management by highlight disparities associated with sexual orientation and gender identity. [13] Of note, sexual minority adults were found to have a higher prevalence of chronic pain than their heterosexual counterparts, suggesting that the greater burden of LBP in SGM populations may be exacerbated by these care barriers. [14] Some of the disparities observed may also be partially explained by underlying socioeconomic disadvantages. For example, lower-income and less-educated patients are more likely to receive non-guideline-concordant LBP treatments, which can delay appropriate care. [13]

Our results also suggest that identity concordance between patient and provider plays an important role in LBP care. Many SGM patients – especially women of color in our cohort – reported discomfort or even delaying care when their clinician did not share their background with regard to race, ethnicity, or SGM identity. This identity-based mistrust is perhaps unsurprising given the persistent lack of diversity in the healthcare workforce. [15] Only 7.8% of family-medicine residents are Black and 9.1% are Hispanic, compared with 13.4% and 18.5% of the U.S. population, respectively. [16] Representation gaps are still wider in procedure-oriented spine disciplines; in the most recent AAOS census, practicing orthopedic surgeons were 1.9% Black, 2.2% Hispanic, and 7.6% women – versus 14%, 19%, and 50% of the population respectively. [17] Neurosurgery shows a similar mismatch, with 4% Black, 5% Hispanic, and 8% female neurosurgeons.18 Observational orthopedic data indicate that patients have better outcomes when they share racial or gender backgrounds with their surgeon, although these studies cannot fully disentangle concordance from unmeasured system-level variables. [19-21] Our finding that NHB-SGM women more frequently delayed care because clinicians did not share their background may be a possible explanation for poor LBP care outcomes, [22] but should be interpreted cautiously, as residual confounding of socioeconomic factors (e.g., insurance tiers, regional supply of specialists) remains a competing explanation.

Reports of disrespect and clinical alienation point toward deficits in culturally responsive spine-care training. In a recent national survey, only 34% of U.S. primary-care practices – and fewer in resource-limited regions—provided any LGBTQ+-specific training for clinicians;1 comparable estimates for surgical spine specialties are unavailable. While the impact of such training on measurable LBP outcomes has yet to be prospectively tested, the gap itself may perpetuate minority stress, reinforce mistrust, and compound existing access barriers. Developing, validating, and disseminating SGM-affirming curricula tailored to musculoskeletal and interventional pain settings is an actionable research priority.

The conducted intersectional analyses underscore that racial/ethnic minority status and SGM identity may be multiplicative in their association with delayed or forgone LBP care. Registry data show that, after three years of follow-up, Black patients with chronic LBP had 40% higher odds of long-term opioid therapy yet 55% lower odds of lumbar-spine surgery than White patients, alongside worse pain and function trajectories. [22] Additionally, non-white patients have been found to experience higher rates of nonhome discharge, readmissions, and ED visits after posterior lumbar fusion. [23] Coupled with the elevated pain prevalence in SGM communities, [14] these findings raise the possibility that structural factors underlie observed disparities in LBP care outcomes.

Limitations

The findings of this study should be viewed with consideration of several limitations. First, survey responses were not exclusively related to LBP care, and the results may not be specific to individuals with this condition. Our post hoc sensitivity analysis indicated that most barriers were equally prevalent among adults with and without LBP, suggesting that these obstacles may affect patients overall. One notable exception was that individuals with LBP were significantly more likely to delay filling prescriptions due to cost. This may be tied to the increasing expense of medications frequently prescribed for chronic pain. [24] Additionally, although the All of Us Research Program offers a large and diverse sample, the patients in this study may not be fully representative of the broader US population. Furthermore, the survey design did not provide details on how often these barriers were encountered or the extent to which they delayed care. Future studies should work to examine these barriers in greater depth, disaggregating data by specific gender identity, racial and ethnic backgrounds, and specific clinical diagnoses.

Conclusion

This study reveals significant healthcare barriers faced by SGM and racial/ethnic minority groups diagnosed with LBP. SGM patients experienced heightened challenges in accessing care, including both cost-related delays and non-cost obstacles. These challenges were further exacerbated by intersecting identities such as race and ethnicity. Our findings highlight structural barriers that impact minority groups from achieving parity in healthcare access and outcomes.

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Author Contributions:

Conceptualization, VA, MK, SA; Methodology, VA; Software, VA; Formal Analysis, VA; Data Curation, VA; Writing – Original Draft Preparation, SA, VA, AP; Writing – Review & Editing, KM, MK, SA, VA, AP; Visualization, VA, SA; Supervision, KM; Project Administration, MK and KM

Access to Data and Data Analysis:

Vedant Agrawal had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Data Availability Statement:

Restrictions apply to the availability of these data. Data were obtained from the All of Us Research Program and are available at (https://www.researchallofus.org) for qualified researchers associated with affiliated institutions.

Conflicts of Interest: The authors declare no conflict of interest.

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Supplement 1. Consensus-Based Checklist for Reporting of Survey Studies.

Section/topic	Item	Item description	Reported on page #
Title and abstract			
Title and abstract	1a	State the word “survey” along with a commonly used term in title or abstract to introduce the study’s design.	2
	1b	Provide an informative summary in the abstract, covering background, objectives, methods, findings/results, interpretation/discussion, and conclusions.	2
Introduction			
Background	2	Provide a background about the rationale of study, what has been previously done, and why this survey is needed.	3
Purpose/aim	3	Identify specific purposes, aims, goals, or objectives of the study.	3
Methods			
Study design	4	Specify the study design in the methods section with a commonly used term (e.g., cross-sectional or longitudinal).	3-4
	5a	Describe the questionnaire (e.g., number of sections, number of questions, number and names of instruments used).	4, Supplement
Data collection methods	5b	Describe all questionnaire instruments that were used in the survey to measure particular concepts. Report target population, reported validity and reliability information, scoring/ classification procedure, and reference links (if any).	4, Supplement
	5c	Provide information on pretesting of the questionnaire, if performed (in the article or in an online supplement). Report the method of pretesting, number of times questionnaire was pre-tested, number and demographics of participants used for pretesting, and the level of similarity of demographics between pre-testing participants and sample population.	4, Supplement
	5d	Questionnaire if possible, should be fully provided (in the article, or as appendices or as an online supplement).	Supplement
Sample characteristics	6a	Describe the study population (i.e., background, locations, eligibility criteria for participant inclusion in survey, exclusion criteria).	4
	6b	Describe the sampling techniques used (e.g., single stage or multistage sampling, simple random sampling, stratified sampling, cluster sampling, convenience sampling). Specify the locations of sample participants whenever clustered sampling was applied.	4
	6c	Provide information on sample size, along with details of sample size calculation.	5
	6d	Describe how representative the sample is of the study population (or target population if possible), particularly for population-based surveys.	5
Survey administration	7a	Provide information on modes of questionnaire administration, including the type and number of contacts, the location where the survey was conducted (e.g., outpatient room or by use of online tools, such as SurveyMonkey).	4
	7b	Provide information of survey’s time frame, such as periods of recruitment, exposure, and follow-up days.	4
	7c	Provide information on the entry process: –>For non-web-based surveys, provide approaches to minimize human error in data entry. –>For web-based surveys, provide approaches to prevent “multiple participation” of participants.	4
Study preparation	8	Describe any preparation process before conducting the survey (e.g., interviewers’ training process, advertising the survey).	4
Ethical considerations	9a	Provide information on ethical approval for the survey if obtained, including informed consent, institutional review board [IRB] approval, Helsinki declaration, and good clinical practice [GCP] declaration (as appropriate).	4
	9b	Provide information about survey anonymity and confidentiality and describe what mechanisms were used to protect unauthorized access.	4

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Statistical analysis	10a	Describe statistical methods and analytical approach. Report the statistical software that was used for data analysis.	4
	10b	Report any modification of variables used in the analysis, along with reference (if available).	4
	10c	Report details about how missing data was handled. Include rate of missing items, missing data mechanism (i.e., missing completely at random [MCAR], missing at random [MAR] or missing not at random [MNAR]) and methods used to deal with missing data (e.g., multiple imputation).	4
	10d	State how non-response error was addressed.	4
	10e	For longitudinal surveys, state how loss to follow-up was addressed.	
	10f	Indicate whether any methods such as weighting of items or propensity scores have been used to adjust for non-representativeness of the sample.	
	10g	Describe any sensitivity analysis conducted.	4
Results			
Respondent characteristics	11a	Report numbers of individuals at each stage of the study. Consider using a flow diagram, if possible.	5
	11b	Provide reasons for non-participation at each stage, if possible.	
	11c	Report response rate, present the definition of response rate or the formula used to calculate response rate.	
	11d	Provide information to define how unique visitors are determined. Report number of unique visitors along with relevant proportions (e.g., view proportion, participation proportion, completion proportion).	
Descriptive results	12	Provide characteristics of study participants, as well as information on potential confounders and assessed outcomes.	5
Main findings	13a	Give unadjusted estimates and, if applicable, confounder-adjusted estimates along with 95% confidence intervals and p-values.	5
	13b	For multivariable analysis, provide information on the model building process, model fit statistics, and model assumptions (as appropriate).	5
	13c	Provide details about any sensitivity analysis performed. If there are considerable amount of missing data, report sensitivity analyses comparing the results of complete cases with that of the imputed dataset (if possible).	7, Supplment
Discussion			
Limitations	14	Discuss the limitations of the study, considering sources of potential biases and imprecisions, such as non-representativeness of sample, study design, important uncontrolled confounders.	9
Interpretations	15	Give a cautious overall interpretation of results, based on potential biases and imprecisions and suggest areas for future research.	8-9
Generalizability	16	Discuss the external validity of the results.	
Other sections			
Role of funding source	17	State whether any funding organization has had any roles in the survey's design, implementation, and analysis.	14
Conflict of interest	18	Declare any potential conflict of interest.	14
Acknowledgements	19	Provide names of organizations/persons that are acknowledged along with their contribution to the research.	14

eMethods

These supplemental methods will focus on the inclusion criteria for sexual and gender minority (SGM) individuals.

Patients with Low Back Pain (LBP) were selected from the All of Us Controlled Tier V7 cohort containing individuals enrolled between May 31, 2017 and July 1, 2022. The codes used to select for individuals with generalized anxiety disorders is displayed in eTable 1. Individuals must also have completed the "Basics" survey, containing basic demographic information, and the "Health Care and Access Utilization" survey, which contains survey questions relating to the cost and non-cost barriers assessed in this study.

Patients with LBP were then categorized as a SGM individual if they identified with one or more than one of the following identities (additional data on sexual and gender identity responses available in eTable 3):

- Sex assigned at birth: Assigned intersex at birth
- Gender identity: transgender (including transgender men and transgender women), non-binary, genderqueer, genderfluid, gender variant, or two spirit
- Sexual orientation: gay, lesbian, bisexual, queer, polysexual, omnisexual, sapiosexual, pansexual, asexual, two spirit, not figured out, mostly straight, no sexuality, or no labels

Patients with LBP were categorized as non-SGM if they match one of the following criteria and do not meet any of the criteria listed above.

- Assigned male at birth, identify as a man, and are heterosexual
- Assigned female at birth, identify as a female, and are heterosexual

Participants were also classified into the following groups based on self-reported race and ethnicity:

- Hispanic, Latino, or of Spanish Origin
- Non-Hispanic Asian
- Non-Hispanic Black
- Non-Hispanic Middle Eastern or North African
- Non-Hispanic Native Hawaiian or other Pacific Islander
- Non-Hispanic White
- Non-Hispanic and multiple races
- Another race and ethnicity not listed on the survey

For coding purposes when running analysis, individuals identifying as Non-Hispanic Asian, Non-Hispanic Middle Eastern or North African, Non-Hispanic Native Hawaiian or other Pacific Islander, Non-Hispanic and multiple races, and Another race and ethnicity not listed on the survey were categorized as "non-Hispanic Other".

eTable 1: SNOMED Code and OMOP Id utilized for cohort identification.

Condition	SNOMED Code	OMOP Concept Id
Low Back Pain	279039007	194133

SNOMED Code and OMOP Id utilized to collect cohorts from the All of Us researcher workbench are detailed below. From left to right, the columns include the prospective cohort, followed by utilized SNOMED Code, and lastly followed by OMOP Concept Id.

eTable 2: Data Sources within All of Us Researcher Workbench.

Source	Access	Data Utilized
Healthcare Access & Utilization Surveys	Concept Sets, Healthcare Access & Utilization	Cost and Non-Cost Barriers to care
The Basics Surveys	Concept Sets, The Basics Surveys	Biological Sex, Race, Ethnicity, Income, Education Status, Age, Insurance Status
Zipcode Socioeconomic Status Data	Concept Sets, Zipcode Socioeconomic Status Data	Census Division

The first column indicates the data source within All of Us researcher workbench, the second indicates how the data was accessed, and the third lists information taken from each source to conduct our study.

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eTable 3: Details on terminology used for sex assigned at birth, gender identity, and sexual orientation.[a]

Term	Definition
Sex Assigned at Birth	The category of female, male, or intersex that a person is assigned by medical professionals at birth based on physical characteristics such as genitalia and chromosomes.[1]
Female	A sex assigned at birth category typically characterized by the presence of XX chromosomes and female genitalia.
Male	A sex assigned at birth category typically characterized by the presence of XY chromosomes and male genitalia.
Intersex	A sex assigned at birth category for individuals whose physical characteristics do not fit typical definitions of male or female. This can include variations in chromosomes, gonads, or genitalia.
Gender Identity	As defined by the APA, "A person's deeply-felt, inherent sense of being a boy, a man, or a male; a girl, a woman, or a female, or an alternative gender (e.g., genderqueer, gender nonconforming, gender neutral) that may or may not correspond to a person's sex assigned at birth or to a person's primary or secondary sex characteristics".[2] It is important to note that gender *identity* is not the same as gender *role*, gender *expression*, or sexual orientation.
Woman	A cisgender woman is an individual who was assigned female at birth and identifies as a woman. A transgender woman is someone whose sex assigned at birth was male and identifies as a woman. This term is distinct from the term 'assigned male at birth', detailed above.[3]
Man	A cisgender man is an individual who was assigned male at birth and identifies as a man. A transgender man is someone whose sex assigned at birth was female and identifies as a man. This term is distinct from the term 'assigned male at birth', detailed above.[3]
Transgender	As defined by NLHEC, the term transgender "describes a person whose gender identity and sex assigned at birth do not correspond based on traditional expectations; for example, a person assigned female sex at birth who identifies as a man; or a person assigned male sex at birth who identifies as a woman. Transgender can also include people with gender identities outside the girl/woman and boy/man gender binary structure; for example, people who are gender fluid or non-binary. Sometimes abbreviated as 'trans'."[3]
Non-Binary	As defined by NLHEC, non-binary "describes a person whose gender identity falls outside of the traditional gender binary structure of girl/woman boy/man."[3]
Genderqueer	As defined by NLHEC, genderqueer is "an umbrella term that describes a person whose gender identity falls outside the traditional gender binary of male and female. Some people use the term 'gender expansive.'"[3]
Sexual Orientation	Sexual orientation is an inherent or immutable enduring emotional, romantic or sexual attraction to other people which is independent of an individual's sexual orientation is independent of their gender identity.[4]
Lesbian	As defined by NLHEC, lesbian is "a sexual orientation that describes a woman who is primarily emotionally and physically attracted to other women."[3]
Gay	As defined by NLHEC, gay is "a sexual orientation describing people who are primarily emotionally and physically attracted to people of the same sex and/or gender as themselves. It is commonly used to described men who are primarily attracted to men, but can also described women attracted to women."[3]
Bisexual	As defined by NLHEC, bisexual is "a sexual orientation that describes a person who is emotionally and physically attracted to women/females and men/males. Some people define bisexuality as attraction to all genders."[3]
Heterosexual	As defined by NLHEC, heterosexual is "a sexual orientation that describes women who are primarily emotionally and physically attracted to men, and men who are primarily emotionally and physically attracted to women. Also referred to as straight."[3]
Asexual	As defined by NLHEC, the term asexual "describes a person who experiences little or no sexual attraction to others. Asexual people may still engage in sexual activity."[3]
Mostly Straight	From Professors of Psychology Dr. Vrangalova and Dr. Savin-Williams, mostly straight individuals are "more same-sex oriented than exclusive heterosexuals, but less so than substantial bisexuals, in their sexual/romantic attraction, fantasy, physiological arousal, and recent and lifetime sexual behavior."[5]
No Labels	This term has been used to describe individuals who are uncertain about relationships that they will have in the future and who choose not to have a label regarding their sexual identity.[6]
No Sexuality	This term may refer to an individual who does not have any sexual orientation.
Not Figured Out	This term refers to an individual who is still exploring their sexual orientation.

Polysexual	The term polysexual “refers to individuals who are, or who have the potential to be, attracted to more than one gender.”[7]
Omnisexual	This term may refer to “a person who is emotionally and sexually attracted to individuals without regard to their gender identity or sexual orientation.”[8]
Sapiosexual	This term may refer to “a person who is emotionally, romantically, sexually, affectionately, or relationally attracted to intelligence and its use.”[8]
Pansexual	According to NLHEC, pansexual is “a sexual orientation that describes a person who is emotionally and physically attracted to people of all gender identities, or whose attracted are not related to other people’s gender.”[3]
Queer	According to NLHEC, queer is “an umbrella term describing people who think of their sexual orientation or gender identity as outside of societal norms. Some people view the term queer as more fluid and inclusive than traditional categories for sexual orientation and gender identity. Although queer was historically used as a slur, it has been reclaimed by many as a term of empowerment. Nonetheless, some still find the term offensive.”[3]
Two Spirit	According to NLHEC, two-spirit “describes a person who embodies both a masculine and a feminine spirit. This is a culture-specific term used among some Native American, American Indian, and First Nations people.”[3]

[a]This table is not inclusive of all possible terms related to sexual and gender identity, and includes only those terms that are used in the All of Us survey questions. Here, we have provided definitions from leading organizations and other researchers. These definitions are fluid and may be defined differently by different people and organizations. Here, we have provided definitions from leading organizations and other researchers.

eTable 4: Survey items used as outcome measures for analysis.

Question Stem	Question	Possible Responses
DURING THE PAST 12 MONTHS, was there any time when you needed any of the following, but didn’t get it because you couldn’t afford it?	To see a regular doctor or general health provider (in primary care, general practice, internal medicine, family medicine)	Yes, No, Don’t Know
DURING THE PAST 12 MONTHS, was there any time when you needed any of the following, but didn’t get it because you couldn’t afford it?	Mental health care or counseling	Yes, No, Don’t Know
DURING THE PAST 12 MONTHS, was there any time when you needed any of the following, but didn’t get it because you couldn’t afford it?	Prescription medicines	Yes, No, Don’t Know
DURING THE PAST 12 MONTHS, was there any time when you needed any of the following, but didn’t get it because you couldn’t afford it?	To see a specialist	Yes, No, Don’t Know
There are many reasons people delay getting medical care. Have you delayed getting care for any of the following reasons in the PAST 12 MONTHS?	Couldn’t get time off work	Yes, No, Don’t Know
There are many reasons people delay getting medical care. Have you delayed getting care for any of the following reasons in the PAST 12 MONTHS?	Didn’t have transportation	Yes, No, Don’t Know
How often were you treated with respect by your doctors or health care providers? Would you say….	N/A	Always, Most of the time, Some of the time, None of the time, Don’t know
The following questions are about your experiences with doctors and other health care providers in the past year. Some people think it is helpful if their providers are from the same background that they are – like in terms of race or religion or native language – because they think their doctors will better understand what they’re experiencing or going through.	How often have you either delayed or not gone to see doctors or health care providers because they were different from you in any of these ways?	Always, Most of the time, Some of the time, None of the time, Don’t know

The first column indicates the question stem within All of Us researcher workbench, the second indicates how the data was accessed, and the third lists information taken from each source to conduct our study.

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eTable 5: Full sexual orientation and gender identity breakdown of the study population.[a,b]

	SGM[a] (n = 2169), n (%)	Non-SGM[a] (n = 23428), n (%)
Sex Assigned at Birth		
Female	1389 (64)	16037 (68.5)
Male	779 (35.9)	7391 (31.5)
Intersex	NA	0 (0)
Gender Identity[b]		
Woman	1299 (59.9)	16028 (68.4)
Man	755 (34.8)	7400 (31.6)
Transgender	55 (2.5)	0 (0)
Non-Binary	103 (4.7)	0 (0)
Genderqueer	NA	0 (0)
Sexual Orientation[b]		
Lesbian	421 (19.4)	0 (0)
Gay	560 (25.8)	0 (0)
Bisexual	868 (40)	0 (0)
Straight	33 (1.5)	23428 (100)
Asexual	315 (14.5)	0 (0)
Mostly Straight	36 (1.7)	0 (0)
No Labels	50 (2.3)	0 (0)
No Sexuality	NA	0 (0)
Not Figured Out	50 (2.3)	0 (0)
Polysexual, Omnisexual, Sapiosexual, or Pansexual	0 (0)	0 (0)
Queer	68 (3.1)	0 (0)
Two Spirit	NA	0 (0)

[a] In accordance with *All of Us* data dissemination policies, categories with less than 20 participants are marked as NA

[b] Participants can identify with more than one gender identity or sexual orientation

eTable 6: Prevalence of barriers based on low back pain diagnosis.

	Low Back Pain (n=26401)		No Low Back Pain (n=114296)	
	No. (%)	aOR[a] (95% CI)	No. (%)	aOR[a] (95% CI)
Cost Barriers[b]				
(1) Delayed general doctor visit because unable to afford cost	1432 (5.6)	1.02 (0.96 - 1.09)	6342 (5.5)	*Reference*
(2) Delayed mental health visit because unable to afford cost	1945 (7.6)	0.88 (0.84 - 0.93)	9933 (8.7)	*Reference*
(3) Delayed filling prescription because unable to afford cost	3636 (14.2)	1.23 (1.17 - 1.28)	12846 (11.2)	*Reference*
(4) Delayed specialist visit because unable to afford cost	2456 (9.6)	1.07 (1.02 - 1.12)	10490 (9.2)	*Reference*
Non-cost Barriers[b]				
(5) Delayed care because could not take time off work	2229 (8.7)	0.74 (0.70 - 0.78)	13457 (11.8)	*Reference*
(6) Delayed care because did not have transportation	2299 (9.0)	1.1 (1.05 - 1.16)	7691 (6.7)	*Reference*
(7) Health care practitioners did not always treat me with respect	6235 (24.4)	0.94 (0.91 - 0.97)	29758 (26.0)	*Reference*
(8) Delayed care because my healthcare practitioner was different than me	3066 (12.0)	0.92 (0.88 - 0.96)	14242 (12.5)	*Reference*

[a] Odds ratios adjusted for age, region, race, income, insurance, and education level

[b] Patients who skipped the question or responded "don't know" were excluded from the calculations for that barrier.

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