JSES International 8 (2024) 1259–1267

Contents lists available at ScienceDirect

JSES International

journal homepage: www.jsesinternational.org

# Trends and predictors of reporting social determinants of health in shoulder surgery

Aditya Joshi, BS[a], Haley Tornberg, BS[a], Evan Derector, BS[a], Catherine J. Fedorka, MD[a,b,*]

[a]Cooper Medical School of Rowan University, Camden, NJ, USA
[b]Department of Orthopaedic Surgery, Cooper University Healthcare, Camden, NJ, USA

A R T I C L E  I N F O

*Keywords:*
Randomized control trials
RCT
Shoulder
Shoulder surgery
Disparities
Social determinants of health
Gender
Race

*Level of evidence:* Survey Study; Literature Review

**Background:** The role of social determinants of health (SDH) in patient outcomes, quality of life, and overall well-being has been well documented. However, the inclusion of these variables in randomized control trials (RCTs) remains limited; thus, the extent of generalizability from such trials is brought into question. The purpose of this study is to explore the rates of reporting SDH variables in RCTs focused on shoulder surgery from the past decade.

**Methods:** The PubMed database was searched for RCTs with a focus on shoulder surgery from 2013 to 2023. Duplicates, responses to the editor, biomechanical studies, and nonshoulder studies were excluded. Each article was reviewed and data pertaining to patient demographics and socioeconomic covariates. Journal of publication was recorded, and studies from the 5 most common journals were analyzed. These journals were the Journal of Shoulder and Elbow Surgery, the Journal of Bone and Joint Surgery, the American Journal of Sports Medicine (AJSM), the Bone and Joint Journal, and the Journal of the American Medical Association. Multivariate logistic regression was performed to determine the independent effect of study characteristics on the reporting rates of SDH.

**Results:** A total of 255 articles were reviewed. Of these, 93.3% and 90.2% of articles reviewed reported age and sex, respectively. Employment status was reported in 11.8% of articles. Less than 10% reported race, ethnicity, income, insurance, and housing, with even less performing formal analyses on these variables. Studies that were conducted in the United States, multicenter, had a sample size of 251+, and had a combination of public and private funding which were significantly more likely to report on race and ethnicity. Reporting employment status was significantly associated with being European-based, multicenter, sample size 251+, double-blinded, and published in AJSM. Newer studies were significantly less likely to report education. Only publication in AJSM was significant for reporting income. Study intervention and topic were not significant for any SDH reporting.

**Discussion:** These data reflect how small of a proportion of RCTs report and analyze on SDH variables. These findings reflect a need for future RCTs to accurately report SDH variables that influence outcomes, such as race, ethnicity, education, employment, income, housing status, and insurance. SDH are infrequently reported and analyzed in RCTs pertaining to shoulder surgery. Academic medical journals should incorporate guidelines to encourage studies to include such variables and enable the assessment of outcomes to apply to a broader population.

© 2024 The Author(s). Published by Elsevier Inc. on behalf of American Shoulder and Elbow Surgeons. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

Social determinants of health (SDH) have been a focal point of literature and medical advocacy in recent years.[9] SDH are defined by the World Health Organization as the environmental, economic, and demographic factors that influence a patient's overall health and quality of life.[9,33,41] These characteristics include but are not limited to gender, race, ethnicity, employment status, insurance status, income level, social capital, and living environment including proximity to food sources and access to education and healthcare institutions.[9,33,41] The influence that SDH variables have on overall healthcare outcomes has been well established in current literature.[7,9,19,22,25,28,31,33,35,41,40,48,49] Trends in literature reflect worse outcomes for patients of more socially deprived backgrounds and residencies, with members of marginalized populations, with lower income and overall lower

Institutional review board approval was not required for this literature review.

*Corresponding author: Catherine J. Fedorka, MD, Cooper Medical School at Rowan University, Cooper University Hospital, 3 Cooper Plaza, Suite 408, Camden, NJ 08103, USA.

*E-mail address:* Fedorka-catherine@cooperhealth.edu (C.J. Fedorka).

https://doi.org/10.1016/j.jseint.2024.07.001

2666-6383/© 2024 The Author(s). Published by Elsevier Inc. on behalf of American Shoulder and Elbow Surgeons. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

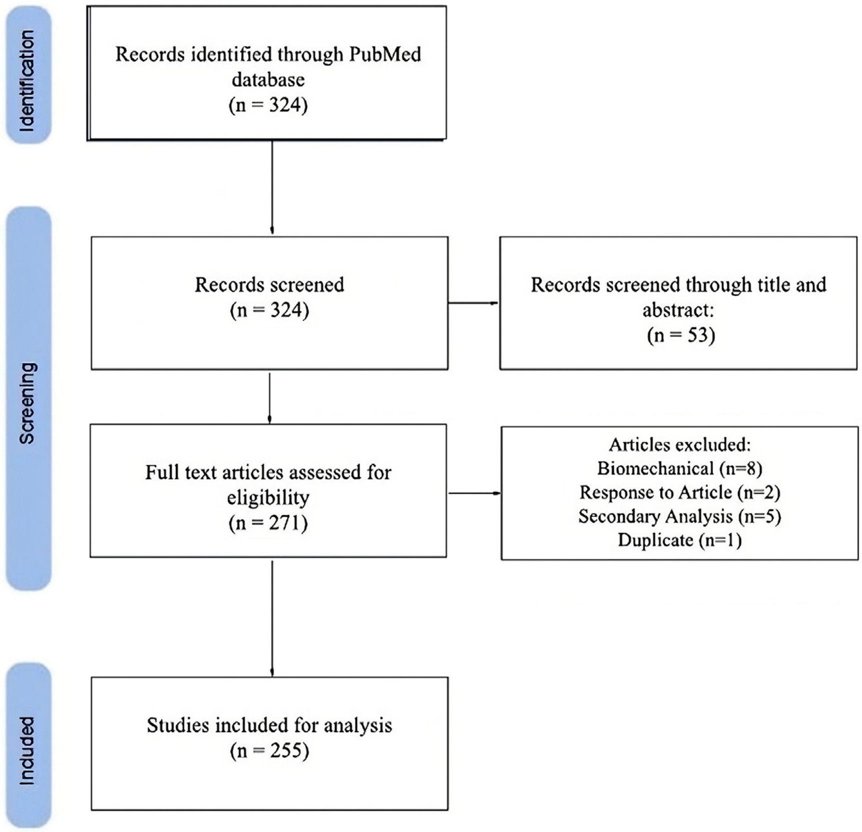


**Figure 1** Prisma diagram.

**Table I**
Demographics and breakdown of overall variable reporting.

| Social determinant of health | Percentage of studies that reported | Percentage of studies that analyzed |
|---|---|---|
| Race | 7.6% | 6.7% |
| Ethnicity | 3.9% | 3.1% |
| Education | 2.0% | 0.8% |
| Employment | 11.8% | 6.7% |
| Income | 5.5% | 2.0% |
| Housing | 0.4% | 0% |
| Insurance | 0.8% | 0.8% |

Percentages are a reflection of the total number of studies reviewed (n = 255).

socioeconomic status (SES) having worse outcomes.[1,7,9,19,22,25,31,33,35,40,41,48,49] This holds true for patients who are receiving surgical interventions for shoulder pathologies as well. SDH have been shown to be an independent predictor of worse outcomes following both arthroscopic rotator cuff repair[30] and total shoulder arthroplasty.[38] Additionally, those who face more barriers to care and are of lower SES status and minority backgrounds typically have less access to high-quality care.[2,9,41] Studies have reported disparities in the utilization of surgical interventions for shoulder pathology[17,27,44,45] along with a delayed time to treatment for shoulder injuries[30] in patients of lower SES status.

Given the important role that SDH has in orthopedic care, it seems logical that these factors would be at the forefront of most published research, particularly those that provide significant clinical impact, such as randomized control trials (RCTs). However, recent analysis has demonstrated that SDH-related variables are consistently under-reported in RCTs, with minorities and women typically under-represented in these trials.[4,29,34,37,46] SDH have been isolated as an independent predictor of worse outcomes in shoulder pathologies, the reporting of SDH in RCTs for shoulder pathology, and treatment has not yet been elucidated. Given this gap in the literature, this present study aims to explore the rates of reporting of SDH variables in global RCTs focused on shoulder surgery in the past decade to better understand the factors associated with the studies that do report and analyze SDH variables. We believe the results of this study will provide valuable insight into the representation of minority populations in shoulder-related RCTs and the subsequent generalizability of results to populations treated by orthopedic providers.

## Materials and methods

### *Search strategy and inclusion/exclusion criteria*

On December 12, 2023, the PubMed database was queried for RCTs pertaining to shoulder surgery from January 2013 to December 2023. Shoulder surgery trials were defined as articles in which the index event was a surgical procedure on the shoulder and an intervention was implemented in the preoperative, perioperative, and postoperative period of this procedure. Specific search terms are included in the supplementary material (Supplementary Table S1). In this analysis, selected articles were published in leading general medical journals, orthopedic journals, and shoulder-focused journals. The included journals are as follows: the Journal of Shoulder and Elbow Surgery, the Journal

**Table II**
Race reporting.

| Factors associated with reporting and analyzing race | Reporting odds ratio (95% CI) | *P* value | Analyzing odds ratio (95% CI) | *P* value |
|---|---|---|---|---|
| Year | 0.99 (0.85, 1.17) | .99 | 1.24 (0.94, 1.64) | .135 |
| Journal title (reference = JSES) | | | | |
| JBJS | 0.58 (0.1, 3.32) | .542 | 0.56 (0.11, 2.88) | .492 |
| AJSM | 0.33 (0.04, 2.95) | .319 | 0.24 (0.02, 2.48) | .231 |
| Bone and Joint | 0.62 (0.05, 8.27) | .718 | 0.84 (0.05, 13.03) | .898 |
| JAMA | 0 (0, Inf) | .99 | 0 (0, Inf) | .99 |
| Region (reference = N. America) | | | | |
| Europe | 0.26 (0.07, 0.94) | **.039** | 1.3 (0.11, 15.23) | .836 |
| Asia | 0.19 (0.02, 1.52) | .408 | 0 (0, Inf) | .995 |
| Other | 0 (0, Inf) | .994 | 13.8 (0.77, 248.71) | .075 |
| US only study | 5.96 (2.05, 17.33) | **< .001** | 4.06 (1.45, 11.4) | **.025** |
| Center (reference = single) | | | | |
| Multicenter | 5.2 (1.92, 14.06) | **< .001** | 1.66 (0.32, 8.65) | .548 |
| Size group (reference = 0-74) | | | | |
| 75-250 | 3.13 (0.75, 13.14) | .09 | 7.46 (0.52, 107.4) | .14 |
| 251+ | 20.33 (4.06, 101.74) | **< .001** | 14.97 (2.4, 93.2) | **.004** |
| Funding (reference = none) | | | | |
| Public | 5.22 (0.85, 31.98) | .074 | 4.61 (0.75, 28.13) | .098 |
| Private | 5.23 (0.93, 29.33) | .06 | 7.96 (1.34, 47.09) | **.022** |
| Institutional | 0 (0, Inf) | .995 | 0 (0, Inf) | .995 |
| Combination | 10.14 (2.75, 37.29) | **.015** | 3.19 (0.62, 16.42) | .166 |
| Masking (reference = none) | | | | |
| Single Blind | 0.38 (0.07, 1.99) | .251 | 2.35 (0.49, 11.29) | .286 |
| Double Blind | 0.67 (0.12, 3.59) | .637 | 1.84 (0.35, 9.74) | .473 |
| Intervention (reference = behavioral/therapy/rehabilitation) | | | | |
| Drug | 0 (0, Inf) | .991 | 2.53 (0.04, 145.98) | .654 |
| Mechanical Implant | 1.05 (0.09, 12.88) | .971 | 10.59 (0.06, 1921.87) | .374 |
| Nonmechanical Implant | 1.27 (0.14, 11.62) | .833 | 3.17 (0.03, 334.87) | .627 |
| Procedure/Protocol | 1.57 (0.16, 15.67) | .7 | 0 (0, Inf) | .997 |
| Other | 0.48 (0.05, 4.47) | .518 | 0 (0, Inf) | .996 |
| Subject (reference: degenerative) | | | | |
| Infectious | 0.94 (0.23, 3.76) | .927 | 0 (0, Inf) | .997 |
| Trauma | 1.55 (0.31, 7.75) | .596 | 0.5 (0.01, 44.32) | .762 |
| Pharmacology | 0.43 (0.12, 1.63) | .217 | 0.37 (0.01, 17.8) | .617 |
| Rehabilitation | 0 (0, Inf) | .993 | 0.36 (0, 80.94) | .711 |
| Procedure | 0 (0, Inf) | .991 | 0.16 (0, 7.62) | .348 |

*CI*, confidence interval; *JSES*, Journal of Shoulder and Elbow Surgery; *JBJS*, The Journal of Bone and Joint Surgery; *AJSM*, The American Journal of Sports Medicine; *JAMA*, The Journal of the American Medical Association; *N. America*, North America; *US*, United States of America; *Inf*, infinity.
All *P* values listed in bold indicate statistical significance ($P < .05$).

of Bone and Joint Surgery, the American Journal of Sports Medicine (AJSM), the Bone and Joint Journal, and the Journal of the American Medical Association. After retrieval of the data, the titles, abstracts, and full-text articles were screened by two independent reviewers of all searched studies by applying the previously mentioned criteria. Duplicates, responses to the editor, comments about an article, biomechanical studies, secondary/post-hoc analyses, and nonshoulder studies were excluded (Fig. 1).

## Data collection

Each article was reviewed and data pertaining to patient demographics, socioeconomic covariates, and study characteristics, including study intervention and topic of journal article, were recorded. The study variables collected included journal name, year of publication, location of conducted research, sample size, funding status, and whether the study was single center or multicenter. Study topic was classified as one of the following: degenerative, infectious, trauma, pharmacologic, rehabilitation, or procedure. Study intervention was categorized into one of the following: behavioral/therapy/rehabilitation, drug, mechanical implants, nonmechanical implants, procedure/protocol, and other. The SDH-specific variables collected included sex, age, race, ethnicity, insurance status, income level, employment status, and housing status. It was recorded whether these SDH variables were reported or a formal analysis was conducted. During data extraction, we distinguished between studies that ‘reported’ SDH by merely listing these variables in the demographic sections vs. studies that ‘analyzed’ these variables by incorporating these factors into formal analyses. This distinction was crucial for assessing the depth and impact of SDH reporting in the literature on shoulder surgery.

## Statistical analysis

We organized the studies included in our analysis to present the counts and the percentage of studies that included SDH covariates. Additionally, we tabulated study characteristics alongside these primary outcomes. Multivariate logistic regression was performed to determine the independent effect of study characteristics on the reporting rates of SDH. Given the small sample of studies that reported housing and insurance, logistic regression models could not converge for these variables. Gamma regression and Poisson regression were used for continuous and categorical variables, respectively. The calculated odds ratio (OR), 95% confidence interval, and respective *P* values for each analyzed variable were recorded. *P* values less than .05 were considered statistically significant. All statistical analyses were performed on RStudio v 4.3.1 Posit team (2023) (RStudio:

**Table III**
Ethnicity reporting.

| Factors associated with reporting and analyzing ethnicity | | | | |
|---|---|---|---|---|
| | Reporting odds ratio (95% CI) | *P* value | Analyzing odds ratio (95% CI) | *P* value |
| Year | 1.78 (1.05, 3.01) | **.031** | 1.85 (1.02, 3.36) | **.043** |
| Journal title (reference = JSES) | | | | |
| JBJS | 0.12 (0, 55.62) | .503 | 0.23 (0, 75.8) | .622 |
| AJSM | 0 (0, Inf) | .992 | 0 (0, Inf) | .998 |
| Bone and Joint | 1.07 (0.13, 9.11) | .997 | 1.45 (0.16, 12.78) | .997 |
| JAMA | 0 (0, Inf) | .998 | 0 (0, Inf) | 1 |
| Region (reference = N. America) | | | | |
| Europe | 0.14 (0.02, 1.11) | .063 | 0.18 (0.02, 1.5) | .999 |
| Asia | 0 (0, Inf) | .992 | 0 (0, Inf) | .99 |
| Other | 0 (0, Inf) | .994 | 0.07 (0, Inf) | 1 |
| US only study | 20.01 (2.49, 160.68) | **.005** | 15.17 (1.84, 125.32) | **.006** |
| Center (reference = single) | | | | |
| Multicenter | 24.44 (1.53, 391.21) | **.024** | 27.18 (1.36, 543.7) | **.031** |
| Size group (reference = 0-74) | | | | |
| 75-250 | 2.72 (0.52, 14.29) | .237 | 7.35 (0.64, 84.36) | .109 |
| 251+ | 160.5 (1.67, 15,406.77) | **.029** | 5.81 (0.31, 110.49) | .241 |
| Funding (reference = none) | | | | |
| Public | 159.31 (1.67, 15,183.44) | **.029** | 257.63 (1.63, 40,608.67) | **.032** |
| Private | 4.03 (0.55, 29.61) | .98 | 2.86 (0.08, 105.57) | .568 |
| Institutional | 0 (0, Inf) | .999 | 0 (0, Inf) | .999 |
| Public + Private | 10.44 (1.82, 59.9) | **.034** | 2.08 (0.08, 57.35) | .664 |
| Masking (reference = none) | | | | |
| Single Blind | 0.8 (0.15, 4.26) | .794 | 0.38 (0.03, 5.61) | .478 |
| Double Blind | 0.78 (0.18, 3.36) | .74 | 1.21 (0.13, 11.24) | .866 |
| Intervention (reference = behavioral/therapy/rehabilitation) | | | | |
| Drug | 0.48 (0.08, 3.05) | .438 | 4.28 (0.02, 810.82) | .587 |
| Mechanical Implant | 1.33 (0.2, 8.75) | .764 | 28.21 (0.05, 17,587.71) | .309 |
| Nonmechanical Implant | 0.29 (0.06, 1.51) | .141 | 1.74 (0.01, 459.9) | .845 |
| Procedure/Protocol | 0 (0, Inf) | .996 | 0 (0, Inf) | .998 |
| Other | 0 (0, Inf) | .995 | 0 (0, Inf) | .997 |
| Subject (reference: degenerative) | | | | |
| Infectious | 0 (0, Inf) | .991 | 0 (0, Inf) | .998 |
| Trauma | 0.5 (0.03, 8.77) | .635 | 211,170.21 (0, Inf) | .998 |
| Pharmacology | 0.39 (0.03, 4.72) | .461 | 0 (0, Inf) | .996 |
| Rehabilitation | 1.14 (0.11, 12.14) | .915 | 0 (0, Inf) | .996 |
| Procedure | 0.28 (0.03, 2.95) | .29 | 0 (0, Inf) | .996 |

*CI*, confidence interval; *JSES*, Journal of Shoulder and Elbow Surgery; *JBJS*, The Journal of Bone and Joint Surgery; *AJSM*, The American Journal of Sports Medicine; *JAMA*, The Journal of the American Medical Association; *N. America*, North America; *US*, United States of America; *Inf*, infinity.
All *P* values listed in bold indicate statistical significance ($P < .05$).

Integrated Development Environment for R; Posit Software, PBC, Boston, MA, USA).

## Results

### *Study characteristics*

Journal distribution of studies are as follows: the Journal of Shoulder and Elbow Surgery 154 (60.4%), 46 AJSM (18.0%), 35 Journal of Bone and Joint Surgery (13.7%), 18 Bone and Joint Journal (7.1%), and 2 Journal of the American Medical Association (0.8%). Regionally, 111 studies were conducted in North America, 83 in Europe, 37 in Asia, and 24 in Other. Of the 255 studies analyzed, 189 were single center and 66 were multicenter. Regarding funding, 143 studies did not receive funding. Thirty three received public funding, 37 received private, 11 received institutional, and 31 received a combination of public and private funding.

### *Demographics*

After application of exclusion criteria, a total of 255 articles were reviewed. Of these, 93.3% and 90.2% of articles reviewed reported age and sex, respectively. Regarding the other SDH-related variables, 19 (7.6%) articles reported on race, 10 (3.9%) reported on ethnicity, 5 (2.0%) reported on education, 30 (11.8%) reported on employment, 14 (5.5%) reported on income level, 1 (0.4%) reported on housing status, and 2 (0.8%) reported on insurance status (Table I). In terms of conducting a formal analysis on these variables, 17 (6.7%) analyzed race, 8 (3.1%) analyzed ethnicity, 2 (0.8%) analyzed education, 17 (6.7%) analyzed employment, 5 (2.0%) analyzed income level, 0 (0%) analyzed housing status, and 2 (0.8%) analyzed insurance (Table I).

### *Race reporting*

Study characteristics associated with reporting race included being based in the United States (OR: 5.96 [2.05, 17.33], $P < .001$), multicenter (OR: 5.2 [1.92, 14.06], $P < .001$), sample size 251+ (OR: 20.33 [4.06, 101.74], $P < .001$), and having a combination of public and private funding (OR: 10.14 [2.75, 37.29.4], $P = .015$). European studies were significantly less likely to report on race (OR: 0.26 [0.07, 0.94], $P = .039$). US-based studies (OR: 4.06 [1.45, 11.4], $P = .025$) and those with a sample size 251+ (OR: 14.97 [2.4, 93.2], $P = .004$) were also associated with formally analyzing race (Table II).

### *Ethnicity reporting*

Characteristics associated with reporting ethnicity include US-based studies (OR: 20.01 [2.49, 160.68], $P = .005$), multicenter (OR: 24.44 [1.53, 391.21], $P = .024$), sample size 251+ (OR: 160.5

**Table IV**
Education reporting.

| Factors associated with reporting and analyzing education | Reporting odds ratio (95% CI) | *P* value | Analyzing odds ratio (95% CI) | *P* value |
|---|---|---|---|---|
| Year | 0.26 (0.07, 0.94) | **.042** | 0.64 (0.28, 1.47) | .29 |
| Journal title (reference = JSES) | | | | |
| JBJS | 0.61 (0.1, 3.53) | .577 | 0 (0, Inf) | .999 |
| AJSM | 0.32 (0.04, 2.88) | .308 | 183.43 (0, Inf) | 1 |
| Bone and Joint | 0.68 (0.05, 9.3) | .772 | 0.43 (0.01, 16.35) | .652 |
| JAMA | 0 (0, Inf) | .999 | 9.56 (0.57, 160.31) | .75 |
| Region (reference = N. America) | | | | |
| Europe | 0.9 (0.08, 10.72) | .933 | 0.47 (0.01, 15.57) | .671 |
| Asia | 1.34 (0.06, 28.08) | .849 | 0 (0, Inf) | .999 |
| Other | 0 (0, Inf) | .996 | 0.08 (0, Inf) | .999 |
| US only study | 9.26 (0.93, 91.8) | .057 | 0 (0, Inf) | 1 |
| Center (reference = single) | | | | |
| Multicenter | 5.35 (0.47, 60.21) | .937 | 6.06 (0, Inf) | 1 |
| Size group (reference = 0-74) | | | | |
| 75-250 | 1.14 (0.11, 12.14) | .915 | 1.36 (0.08, 22.04) | .99 |
| 251+ | 11.12 (0.97, 127.32) | .998 | 0 (0, Inf) | 1 |
| Funding (reference = none) | | | | |
| Public | 2 (0.06, 63.84) | .696 | 2.6 (0.16, 42.39) | .88 |
| Private | 0.08 (0, Inf) | 1 | 0 (0, Inf) | 1 |
| Institutional | 6.98 (0, Inf) | 1 | 0.11 (0, Inf) | 1 |
| Public + Private | 0 (0, Inf) | .998 | 0 (0, Inf) | 1 |
| Masking (reference = none) | | | | |
| Single Blind | 0 (0, Inf) | .993 | 0 (0, Inf) | .998 |
| Double Blind | 0.5 (0.05, 4.54) | .534 | 0 (0, Inf) | .998 |
| Intervention (reference = behavioral/therapy/rehabilitation) | | | | |
| Drug | 0 (0, Inf) | .994 | 1.38 (0, Inf) | 1 |
| Mechanical Implant | 0 (0, Inf) | .997 | 2,561,250,830.64 (0, Inf) | .999 |
| Nonmechanical Implant | 0.3 (0.04, 2.18) | .233 | 31.12 (0, Inf) | 1 |
| Procedure/Protocol | 1.59 (0.13, 19.27) | .715 | 789.11 (0, Inf) | 1 |
| Other | 0 (0, Inf) | .997 | 622,410,825.28 (0, Inf) | .999 |
| Subject (reference: degenerative) | | | | |
| Infectious | 1 (0, Inf) | 1 | 671,075.27 (0, Inf) | 1 |
| Trauma | 38,842,517.32 (0, Inf) | .997 | 0.02 (0, Inf) | 1 |
| Pharmacology | 1 (0, Inf) | 1 | 4,430,918.18 (0, Inf) | .99 |
| Rehabilitation | 56,969,025.4 (0, Inf) | .997 | 88,965,240.84 (0, Inf) | .99 |
| Procedure | 14,483,650.53 (0, Inf) | .997 | 0.1 (0, Inf) | 1 |

*CI*, confidence interval; *JSES*, Journal of Shoulder and Elbow Surgery; *JBJS*, The Journal of Bone and Joint Surgery; *AJSM*, The American Journal of Sports Medicine; *JAMA*, The Journal of the American Medical Association; *N. America*, North America; *US*, United States of America; *Inf*, infinity.
All *P* values listed in bold indicate statistical significance ($P < .05$).

[1.67, 15,406.77], $P = .029$), having a combination of public and private funding (OR: 10.44 [1.82, 59.9], $P = .034$), and year of publication (OR: 1.78 [1.05, 3.01], $P = .031$), with studies published in more recent years more likely to report ethnicity. Factors associated with analyzing ethnicity included US-based studies (OR: 15.17 [1.84, 125.32], $P = .006$), multicenter (OR: 27.18 [1.36, 543.7], $P = .031$), and year of publication (OR: 1.85 [1.02, 3.36], $P = .043$), with studies published in more recent years more likely to analyze ethnicity (Table III).

*Education reporting*

Only year of publication was significant for studies that reported on education (OR: 0.26 [0.07, 0.94], $P = .042$), with studies published in more recent years significantly less likely to report this variable. No study characteristics were significantly associated with analyzing education (Table IV).

*Employment reporting*

Factors associated with reporting employment status included studies that were European-based (OR: 6.57 [1.05, 40.97], $P = .044$), multicenter (OR: 5.45 [1.55, 19.18], $P = .008$), sample size of 251+ (OR: 9.31 [1.02, 85.23], $P = .048$), being double-blinded (OR: 0.31 [0.11, 0.85], $P = .038$), and being published in AJSM (OR: 3.03 [1.12, 8.21], $P = .048$). Multicenter studies (OR: 10.35 [1.26, 19.46], $P = .022$) were also associated with formal analysis of employment (Table V).

*Income reporting*

Only studies published in the AJSM were significantly more likely to report income (OR: 20.32 [4.01, 102.81], $P < .001$). No study characteristics were predictive of analyzing income (Table VI).

The study intervention and topic of the publication were not significant for any SDH variable reporting.

## Discussion

This study found that, while the majority of studies reported on age and sex, less than 10% of articles reported on the additional SDH-related variables, including race, ethnicity, income, insurance, and housing, with even fewer studies performing a formal analysis on these variables. Disparities in race, ethnicity, and SDH and their impact on health outcomes have been extensively highlighted in the literature.[9,15] It has also been established that these variables play a significant role in outcomes following orthopedic surgery.[5,21,26] Specifically, Li et al demonstrated that income, race, ethnicity, education, and insurance status were predictors of patient health postoperatively regardless of outcome measure type.[26]

**Table V**
Employment reporting.

| Factors associated with reporting and analyzing employment | Reporting odds ratio (95% CI) | *P* value | Analyzing odds ratio (95% CI) | *P* value |
|---|---|---|---|---|
| Year | 0.87 (0.72, 1.06) | .164 | 0.89 (0.72, 1.09) | .264 |
| Journal title (reference = JSES) | | | | |
| JBJS | 0.97 (0.21, 4.51) | .965 | 0.42 (0.06, 3.05) | .394 |
| AJSM | 3.03 (1.12, 8.21) | **.048** | 2.71 (0.61, 12.11) | .192 |
| Bone and Joint | 4.87 (0.7, 33.91) | .11 | 1.01 (0.14, 7.26) | .989 |
| JAMA | 0 (0, Inf) | .998 | 0 (0, Inf) | .999 |
| Region (reference = N. America) | | | | |
| Europe | 6.57 (1.05, 40.97) | **.044** | 1.24 (0.19, 8.22) | .826 |
| Asia | 0 (0, Inf) | .992 | 0 (0, Inf) | .994 |
| Other | 1.74 (0.1, 31.33) | .707 | 2.59 (0.21, 31.41) | .454 |
| US only study | 1.22 (0.16, 9.05) | .848 | 4.19 (0.34, 52.33) | .266 |
| Center (reference = single) | | | | |
| Multicenter | 5.45 (1.55, 19.18) | **.008** | 4.95 (1.26, 19.46) | **.022** |
| Size group (reference = 0-74) | | | | |
| 75-250 | 2.03 (0.61, 6.67) | .246 | 2.5 (0.68, 9.24) | .17 |
| 251+ | 9.31 (1.02, 85.23) | **.048** | 0 (0, Inf) | .997 |
| Funding (reference = none) | | | | |
| Public | 1.68 (0.36, 7.77) | .508 | 3.23 (0.7, 14.99) | .134 |
| Private | 1.18 (0.24, 5.76) | .841 | 1.29 (0.24, 6.86) | .763 |
| Institutional | 0 (0, Inf) | .996 | 0 (0, Inf) | .996 |
| Public + Private | 0.79 (0.15, 4.1) | .782 | 1.15 (0.19, 7.09) | .878 |
| Masking (reference = none) | | | | |
| Single Blind | 0.59 (0.22, 1.58) | .096 | 0.48 (0.1, 2.42) | .373 |
| Double Blind | 0.31 (0.11, 0.85) | **.038** | 1.36 (0.3, 6.05) | .691 |
| Intervention (reference = behavioral/therapy/rehabilitation) | | | | |
| Drug | 0 (0, Inf) | .991 | 2.67 (0.06, 112.06) | .606 |
| Mechanical Implant | 2.91 (0.25, 33.92) | .394 | 1.33 (0.02, 115.42) | .9 |
| Nonmechanical Implant | 0.43 (0.01, 14.52) | .638 | 1.32 (0.03, 61.24) | .888 |
| Procedure/Protocol | 8.35 (0.18, 379.48) | .276 | 11.61 (0.1, 1410.94) | .317 |
| Other | 2.54 (0.25, 25.79) | .432 | 1.64 (0.02, 178.68) | .837 |
| Subject (reference: degenerative) | | | | |
| Infectious | 1.08 (0.04, 26.11) | .964 | 35.03 (0, Inf) | 1 |
| Trauma | 0.98 (0.03, 30.87) | .99 | 42,473,194.11 (0, Inf) | .996 |
| Pharmacology | 1.67 (0.07, 37.96) | .749 | 243,960,849.39 (0, Inf) | .996 |
| Rehabilitation | 1.62 (0.04, 71.92) | .803 | 2,238,693,843.7 (0, Inf) | .996 |
| Procedure | 3.03 (0.11, 84.66) | .514 | 2,401,748,291.13 (0, Inf) | .996 |

*CI*, confidence interval; *JSES*, Journal of Shoulder and Elbow Surgery; *JBJS*, The Journal of Bone and Joint Surgery; *AJSM*, The American Journal of Sports Medicine; *JAMA*, The Journal of the American Medical Association; *N. America*, North America; *US*, United States of America; *Inf*, infinity.
All *P* values listed in bold indicate statistical significance ($P < .05$).

This principle was also found to be true in recent studies investigating the effects of SDH on outcomes in orthopedic trauma and hemiarthroplasty patients, with these studies identifying increased complication and readmission rates in patients with educational deficiencies and lower SES.[5,21] Our study identifies that these same independent predictors of negative outcomes are under-reported and underanalyzed in shoulder-related RCTs.

With low inclusion rates of minorities and women, RCT findings are less generalizable to the broader population leaving significant gaps in healthcare knowledge surrounding treatments studied by individual trials.[13,23,42,47] Analysis of recent RCTs found lower rates of enrollment of diverse populations in USA-based clinical trials in comparison to their overall population percentages.[18,29,46] Within the studies enrolling minority populations, there is significant under-reporting of all 5 major race/ethnicity groups.[46] Although the disparity in enrollment of patients from minority backgrounds is slowly improving, many trials with adequate enrollment of socially disadvantaged and minority populations fail to report and analyze important demographic and statistical data relating to RCT outcomes across minority subgroups.[34]

This under-representation of SDH variable reporting is consistent with studies investigating RCTs in other orthopedic subspecialties.[12,14,20] Paul et al investigated RCTs related to orthopedics that assessed clinical outcomes and found that these RCTs infrequently report race and ethnicity.[32] While these findings are reiterated in studies investigating RCTs focused on clinical orthopedics, these prior studies placed an emphasis on simply describing the rates of reporting SDH, whereas we sought to determine factors associated with reporting by conducting multivariable analysis.[12,14,20] Increased education level has been recently associated with higher rates of patient recruitment to clinical trials.[6] Previous literature has identified increased rates of negative outcomes in orthopedic patients with lower education levels.[6,21] However, our analysis found that studies from more recent years were less likely to report on education, even with an increased awareness of the impact of educational deficiencies on orthopedic outcomes and RCT recruitment in this timeframe.[6,21]

Insurance status has been documented to determine a patient's preoperative and postoperative accessibility to orthopedic care and physical therapy services.[36] Strotman et al determined patients with private insurance had significantly better functional outcomes following shoulder arthroplasty than patients with Medicare or Medicaid.[43] Healthcare insurance plans are often determined by patient employment, income, and regional housing status. A corollary of this relationship is the influence of these variables on orthopedic outcomes. Studies have demonstrated employment status as an independent factor of postoperative prognosis.[3,11]

Our analysis determined several study characteristics that can potentially explain the low reporting rates of SDH. We found large sample size and multicenter studies were associated with increased

**Table VI**
Income reporting.

| Factors associated with reporting and analyzing income | Reporting odds ratio (95% CI) | *P* value | Analyzing odds ratio (95% CI) | *P* value |
|---|---|---|---|---|
| Year | 0.88 (0.7, 1.1) | .258 | 0.81 (0.59, 1.1) | .402 |
| Journal title (reference = JSES) | | | | |
| JBJS | 0.68 (0.06, 7.49) | .756 | 1.49 (0.09, 24.81) | .779 |
| AJSM | 20.32 (4.01, 102.81) | **< .001** | 1.74 (0.14, 21.19) | .665 |
| Bone and Joint | 0 (0, Inf) | .997 | 0 (0, Inf) | .999 |
| JAMA | 0 (0, Inf) | .999 | 0 (0, Inf) | 1 |
| Region (reference = N. America) | | | | |
| Europe | 0.47 (0.01, 18.19) | .682 | 30,595,436.26 (0, Inf) | .999 |
| Asia | 0 (0, Inf) | .994 | 1.11 (0, Inf) | 1 |
| Other | 22.54 (0.6, 846.73) | .092 | 1.57 (0.16, 15.73) | .256 |
| US only study | 4.85 (0.2, 120.51) | .335 | 4.56 (0.43, 48.35) | .753 |
| Center (reference = single) | | | | |
| Multicenter | 1.06 (0.14, 8.27) | .952 | 0.54 (0, 86.87) | .813 |
| Size group (reference = 0-74) | | | | |
| 75-250 | 1.37 (0.3, 6.26) | .688 | 0.4 (0.04, 4.45) | .46 |
| 251+ | 19.39 (0.75, 498.19) | .073 | 1.15 (0.02, 55.78) | .943 |
| Funding (reference = none) | | | | |
| Public | 1.06 (0.09, 12.5) | .962 | 0 (0, Inf) | .998 |
| Private | 0 (0, Inf) | .993 | 0 (0, Inf) | .998 |
| Institutional | 1.28 (0.08, 20.88) | .863 | 0 (0, Inf) | .998 |
| Public + Private | 0.45 (0.04, 5.01) | .519 | 1.75 (0.02, 138.05) | .802 |
| Masking (reference = none) | | | | |
| Single Blind | 0.48 (0.1, 2.42) | .373 | 0.4 (0.02, 6.39) | .515 |
| Double Blind | 1.36 (0.3, 6.05) | .691 | 0.58 (0.07, 5.14) | .629 |
| Intervention (reference = behavioral/therapy/rehabilitation) | | | | |
| Drug | 1.19 (0.03, 46.97) | .925 | 2.76 (0.02, 418.02) | .692 |
| Mechanical Implant | 0 (0, Inf) | .997 | 0 (0, Inf) | .998 |
| Nonmechanical Implant | 1.45 (0.03, 81.08) | .857 | 0 (0, Inf) | .995 |
| Procedure/Protocol | 0 (0, Inf) | .997 | 0 (0, Inf) | .998 |
| Other | 9.82 (0.14, 682.1) | .291 | 9.58 (0.02, 3789.6) | .459 |
| Subject (reference: degenerative) | | | | |
| Infectious | 2.05 (0, Inf) | 1 | 1.65 (0, Inf) | 1 |
| Trauma | 0.18 (0, Inf) | 1 | 0 (0, Inf) | .998 |
| Pharmacology | 1.9 (0.01, 551.43) | .824 | 0 (0, Inf) | .998 |
| Rehabilitation | 14.52 (0.04, 5222.1) | .373 | 0 (0, Inf) | .998 |
| Procedure | 3.04 (0.02, 443.11) | .662 | 0 (0, Inf) | .998 |

*CI*, confidence interval; *JSES*, Journal of Shoulder and Elbow Surgery; *JBJS*, The Journal of Bone and Joint Surgery; *AJSM*, The American Journal of Sports Medicine; *JAMA*, The Journal of the American Medical Association; *N. America*, North America; *US*, United States of America; *Inf*, infinity.
All *P* values listed in bold indicate statistical significance ($P < .05$).

rates of reporting race/ethnicity and employment status. Researchers may feel discouraged from commenting on diversity proportions of a study if the population is small and homogenous. By investigating a larger population, study results are more generalizable. This is an important step to ensure equitable access to healthcare advances and reduce economic healthcare costs that can aid in closing SDH-related disparities commonly identified in medical care.[8,16,24] It is possible that large sample size, multicenter studies are not a direct surrogate of SDH reporting and could be reflective of funding provided for such studies. Funding bodies most likely implement policies requiring researchers to outline the population to be studied possibly ensuring the trial in question has measures in place to be inclusive and accessible. As we determined in this study, studies which received a combination of private and public funding were more likely to report race and ethnicity.

In this study, US-based trials were significantly more likely to report race and ethnicity compared to other regions. Conversely, European studies were significantly more likely to report employment compared to those based in North America. We hypothesize this reflects the active policies in the United States mandating the reporting of race/ethnicity statistics. Beginning April 2017, ClinicalTrials.gov mandated the inclusion of race/ethnicity statistics, if collected.

In our findings, AJSM was the only journal associated with higher reporting rates SDH variables, specifically income and employment status. This observation raises questions about the potential influences driving this pattern. While our study did not directly analyze the editorial policies of the journals, it is important to consider whether AJSM's guidelines encourage the inclusion of SDH in submitted studies or if the nature of the studies typically published by AJSM inherently includes more comprehensive reporting of these variables. Further investigation into the editorial policies of AJSM and comparison with other leading journals could provide valuable insights into how journal standards may be shaping the reporting practices of authors. Such an analysis would contribute to understanding whether proactive editorial policies can effectively enhance SDH reporting in clinical research.

With the impact of SES and SDH on orthopedic care in mind, it is imperative to design trials investigating interventions with outcomes generalizable to the population treated by orthopedic surgeons. In doing so, orthopedic surgeons can identify patients at risk of experiencing worse outcomes due to SDH and socioeconomic risk factors and select interventions that have been studied in wider populations with generalizable results. However, this cannot be achieved without narrowing the disparity gap seen in RCT enrollment. Equitable enrollment in clinical trials has been recently encouraged through several initiatives.[10,39] However, such policies and reporting guidelines are yet to demonstrate a consistent effect in clinical trial reporting. Of note, only 1 of the 5 major journals studied was significantly more likely to report on some of the SDH variables. Major scientific journals may benefit from requiring some of these variables to be reported when articles are submitted for consideration for publication.

Limitations of this study included only sampling from 5 journals within the past decade. However, we believe this subset of shoulder studies still provides insight on the current state of reporting on SDH in clinical shoulder trials. The journals selected compose a substantial portion of the highest clinical-based evidence in shoulder surgery. Studies examined in this review also provided an appropriate distribution of international studies, multicenter studies, and studies of different funding bodies that we felt adequately captured clinical medicine in shoulder surgery. By choosing RCTs for the focus of our analysis, we were guided by the recognition of their role as the gold standard for generating reliable clinical evidence. Despite the infrequency of RCTs compared to other study types, their outcomes have a disproportionately large impact on clinical guidelines and health policy. Consequently, the standards of reporting in RCTs, particularly concerning SDH, are crucial; we hope future studies can explore SDH commentary in other levels of the clinical study hierarchy (meta-analyses, etc.) to provide a more robust interpretation of our current findings. The findings of this study reflect the need for increased awareness and initiatives to promote reporting and analysis of SDH-related variables in shoulder RCTs.

## Conclusion

SDH are infrequently reported and analyzed in RCTs pertaining to shoulder surgery. Academic medicine should incorporate guidelines to encourage studies to include such variables and enable the assessment of outcomes to apply to a broader population.

## Acknowledgment

The authors would like to acknowledge Sam Jin for his help with data collection for this project.

## Disclaimers:

Funding: No funding was disclosed by the authors.
Conflicts of interest: Dr. Fedorka is a Paid consultant for Stryker Corporation, Mahwah, NJ and a board member for the Philadelphia Orthopedic Society. The other authors, their immediate families, and any research foundation with which they are affiliated have not received any financial payments or other benefits from any commercial entity related to the subject of this article.

## Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jseint.2024.07.001.

## References

1. Abechain JJK, Godinho GG, Matsunaga FT, Netto NA, Daou JP, Tamaoki MJS. Functional outcomes of traumatic and non-traumatic rotator cuff tears after arthroscopic repair. World J Orthop 2017;8:631-7. https://doi.org/10.5312/wjo.v8.i8.631.
2. Abel MK, Schwartz H, Lin JA, Decker HC, Wu CL, Grant MC, et al. Surgical care of patients experiencing homelessness: a scoping review using a phases of care conceptual framework. J Am Coll Surg 2022;235:350-60. https://doi.org/10.1097/XCS.0000000000000214.
3. Adogwa O, Elsamadicy AA, Fialkoff J, Mehta AI, Vasquez RA, Cheng J, et al. Effect of employment status on length of hospital stay, 30-day readmission and patient reported outcomes after spine surgery. J Spine Surg 2017;3:44-9. https://doi.org/10.21037/jss.2017.03.08.
4. Alegria M, Sud S, Steinberg BE, Gai N, Siddiqui A. Reporting of participant race, sex, and socioeconomic status in randomized clinical trials in general medical journals, 2015 vs 2019. JAMA Netw Open 2021;4:e2111516. https://doi.org/10.1001/jamanetworkopen.2021.11516.
5. Baidya J, Gordon AM, Nian PP, Schwartz J, Golub IJ, Abdelgawad AA, et al. Social determinants of health in patients undergoing hemiarthroplasty: are they associated with medical complications, healthcare utilization, and payments for care? Arch Orthop Trauma Surg 2023;143:7073-80. https://doi.org/10.1007/s00402-023-05045-z.
6. Baquet CR, Commiskey P, Daniel Mullins C, Mishra SI. Recruitment and participation in clinical trials: socio-demographic, rural/urban, and health care access predictors. Cancer Detect Prev 2006;30:24-33. https://doi.org/10.1016/j.cdp.2005.12.001.
7. Best MJ, McFarland EG, Thakkar SC, Srikumaran U. Racial disparities in the use of surgical procedures in the US. JAMA Surg 2021;156:274-81. https://doi.org/10.1001/jamasurg.2020.6257.
8. Bibbins-Domingo K, Helman A, editors. Improving representation in clinical trials and research: Building research equity for women and underrepresented groups. Washington (DC): National Academic Press (US). May 17; 2022. 978-0-309-27820-1 0-309-27820-1.
9. Braveman P, Gottlieb L. The social determinants of health: it's time to consider the causes of the causes. Public Health Rep 2014;129(Suppl 2):19-31. https://doi.org/10.1177/00333549141291S206.
10. Clark LT, Watkins L, Pina IL, Elmer M, Akinboboye O, Gorham M, et al. Increasing diversity in clinical trials: overcoming critical barriers. Curr Probl Cardiol 2019;44:148-72. https://doi.org/10.1016/j.cpcardiol.2018.11.002.
11. Cook CE, Garcia AN, Shaffrey C, Gottfried O. The influence of unemployment and disability status on clinical outcomes in patients receiving surgery for low back-related disorders: an observational study. Spine Surg Relat Res 2021;5:182-8. https://doi.org/10.22603/ssrr.2020-0156.
12. Cwalina TB, Jella TK, Manyak GA, Kuo A, Kamath AF. Is our science representative? A systematic review of Racial and ethnic diversity in orthopaedic clinical trials from 2000 to 2020. Clin Orthop Relat Res 2022;480:848-58. https://doi.org/10.1097/CORR.0000000000002050.
13. Daitch V, Turjeman A, Poran I, Tau N, Ayalon-Dangur I, Nashashibi J, et al. Underrepresentation of women in randomized controlled trials: a systematic review and meta-analysis. Trials 2022;23:1038. https://doi.org/10.1186/s13063-022-07004-2.
14. Delma S, Langford K, Baylor JL, Ozdag Y, Hayes DS, Klena JC, et al. Race and ethnicity reporting in randomized controlled trials published in upper-extremity journals. J Hand Surg Am 2023;48:340-7. https://doi.org/10.1016/j.jhsa.2022.11.019.
15. Dickman SL, Himmelstein DU, Woolhandler S. Inequality and the health-care system in the USA. Lancet 2017;389:1431-41. https://doi.org/10.1016/S0140-6736(17)30398-7.
16. Fain KM, Nelson JT, Tse T, Williams RJ. Race and ethnicity reporting for clinical trials in ClinicalTrials.gov and publications. Contemp Clin Trials 2021;101:106237. https://doi.org/10.1016/j.cct.2020.106237.
17. Farley KX, Dawes AM, Wilson JM, Toston RJ, Hurt JT, Gottschalk MB, et al. Racial disparities in the utilization of shoulder arthroplasty in the United States: trends from 2011 to 2017. JB JS Open Access 2022;7. https://doi.org/10.2106/JBJS.OA.21.00144.
18. Hoel AW, Kayssi A, Brahmanandam S, Belkin M, Conte MS, Nguyen LL. Underrepresentation of women and ethnic minorities in vascular surgery randomized controlled trials. J Vasc Surg 2009;50:349-54. https://doi.org/10.1016/j.jvs.2009.01.012.
19. Hwang A, Zhang L, Ramirez G, Maloney M, Voloshin I, Thirukumaran C. Black race, hispanic ethnicity, and medicaid insurance are associated with lower rates of rotator cuff repair in New York state. Arthroscopy 2022;38:3001-3010.e2. https://doi.org/10.1016/j.arthro.2022.06.028.
20. Issa TZ, Lambrechts MJ, Canseco JA, Hilibrand AS, Kepler CK, Vaccaro AR, et al. Reporting demographics in randomized control trials in spine surgery - we must do better. Spine J 2023;23:642-50. https://doi.org/10.1016/j.spinee.2022.11.011.
21. Kamalapathy PN, Dunne PJ, Yarboro S. National evaluation of social determinants of health in orthopedic fracture care: decreased social determinants of health is associated with increased adverse complications after surgery. J Orthop Trauma 2022;36:e278-82. https://doi.org/10.1097/BOT.0000000000002331.
22. Khatib O, Onyekwelu I, Yu S, Zuckerman JD. Shoulder arthroplasty in New York State, 1991 to 2010: changing patterns of utilization. J Shoulder Elbow Surg 2015;24:e286-91. https://doi.org/10.1016/j.jse.2015.05.038.
23. Kirchner GJ, Kim AH, Smith NP, Martinazzi BJ, Hines SM, Weddle JB, et al. Few randomized controlled trials in spine surgery in the United States include sociodemographic patient data: a systematic review. J Am Acad Orthop Surg 2023;31:421-7. https://doi.org/10.5435/JAAOS-D-22-00838.
24. Lee LK, Narang C, Rees CA, Thiagarajan RR, Melvin P, Ward V, et al. Reporting and representation of Participant race and ethnicity in National Institutes of Health-funded pediatric clinical trials. JAMA Netw Open 2023;6:e2331316. https://doi.org/10.1001/jamanetworkopen.2023.31316.
25. Li L, Bokshan SL, Mehta SR, Owens BD. Disparities in cost and access by caseload for arthroscopic rotator cuff repair: an analysis of 18,616 cases. Orthop J Sports Med 2019;7:2325967119850503. https://doi.org/10.1177/2325967119850503.

26. Li X, Galvin JW, Li C, Agrawal R, Curry EJ. The impact of socioeconomic status on outcomes in orthopaedic surgery. J Bone Joint Surg Am 2020;102:428-44. https://doi.org/10.2106/JBJS.19.00504.
27. Linker JA, Eberlin CT, Naessig SA, Rudisill SS, Kucharik MP, Cherian NJ, et al. Racial disparities in arthroscopic rotator cuff repair: an analysis of utilization and perioperative outcomes. JSES Int 2023;7:44-9. https://doi.org/10.1016/j.jseint.2022.09.002.
28. Liu SH, Lapane KL. Scratching the Surface: Itching for evidence to reduce surgical health disparities in total shoulder arthroplasty. J Rheumatol 2020;47:490-2. https://doi.org/10.3899/jrheum.190796.
29. Loree JM, Anand S, Dasari A, Unger JM, Gothwal A, Ellis LM, et al. Disparity of race reporting and representation in clinical trials leading to cancer drug approvals from 2008 to 2018. JAMA Oncol 2019;5:e191870. https://doi.org/10.1001/jamaoncol.2019.1870.
30. Mandalia K, Ames A, Parzick JC, Ives K, Ross G, Shah S. Social determinants of health influence clinical outcomes of patients undergoing rotator cuff repair: a systematic review. J Shoulder Elbow Surg 2023;32:419-34. https://doi.org/10.1016/j.jse.2022.09.007.
31. Mehta B, Ho K, Bido J, Memtsoudis SG, Parks ML, Russell L, et al. Medicare/medicaid insurance status is associated with reduced lower bilateral knee arthroplasty utilization and higher complication rates. J Am Acad Orthop Surg Glob Res Rev 2022;6:e21.00016. https://doi.org/10.5435/JAAOSGlobal-D-21-00016.
32. Paul RW, Lee D, Brutico J, Tjoumakaris FP, Ciccotti MG, Freedman KB. Reporting and analyzing race and ethnicity in orthopaedic clinical trials: a systematic review. J Am Acad Orthop Surg Glob Res Rev 2021;5:e21.00027. https://doi.org/10.5435/JAAOSGlobal-D-21-00027.
33. Penman-Aguilar A, Talih M, Huang D, Moonesinghe R, Bouye K, Beckles G. Measurement of health disparities, health Inequities, and social determinants of health to support the advancement of health equity. J Public Health Manag Pract 2016;22(Suppl 1):S33-42. https://doi.org/10.1097/PHH.0000000000000373.
34. Petkovic J, Jull J, Yoganathan M, Dewidar O, Baird S, Grimshaw JM, et al. Reporting of health equity considerations in cluster and individually randomized trials. Trials 2020;21:308. https://doi.org/10.1186/s13063-020-4223-5.
35. Raso J, Kamalapathy PN, Sumpter A, Ramamurti P, Werner BC. Economic and educational disparities are associated with an increased risk of revision surgery following shoulder arthroplasty. J Shoulder Elbow Surg 2023;32:589-96. https://doi.org/10.1016/j.jse.2022.08.008.
36. Rogers MJ, Penvose I, Curry EJ, Galvin JW, Li X. Insurance status affects access to physical therapy following rotator cuff repair surgery: a comparison of privately insured and medicaid patients. Orthop Rev 2019;11:7989. https://doi.org/10.4081/or.2019.7989.
37. Romero CS, Maimeri N, Bonaccorso A, Baiardo-Redaelli M, Lombardi G, Iwuchukwu OF, et al. Gender-gap in randomized clinical trials reporting mortality in the perioperative setting and critical care: 20 years behind the scenes. Contemp Clin Trials Commun 2023;33:101117. https://doi.org/10.1016/j.conctc.2023.101117.
38. Sharma S, Miller AS, Pearson Z, Tran A, Bahoravitch TJ, Stadecker M, et al. Social determinants of health disparities impact postoperative complications in patients undergoing total shoulder arthroplasty. J Shoulder Elbow Surg 2024;33:640-7. https://doi.org/10.1016/j.jse.2023.07.006.
39. Shepherd V, Joyce K, Lewis A, Flynn S, Clout M, Nocivelli B, et al. Improving the inclusion of an under-served group in trials: development and implementation of the INCLUDE impaired capacity to consent framework. Trials 2024;25:83. https://doi.org/10.1186/s13063-024-07944-x.
40. Singh JA, Ramachandran R. Persisting Racial disparities in total shoulder arthroplasty utilization and outcomes. J Racial Ethn Health Disparities 2015;2015:1-8. https://doi.org/10.1007/s40615-015-0138-3.
41. Singh GK, Daus GP, Allender M, Ramey CT, Martin EK, Perry C, et al. Social determinants of health in the United States: addressing major health inequality trends for the nation, 1935-2016. Int J MCH AIDS 2017;6:139-64. https://doi.org/10.21106/ijma.236.
42. Somerson JS, Bhandari M, Vaughan CT, Smith CS, Zelle BA. Lack of diversity in orthopaedic trials conducted in the United States. J Bone Joint Surg Am 2014;96:e56. https://doi.org/10.2106/JBJS.M.00531.
43. Strotman P, Perry M, LeDuc R, Joyce C, Garbis N. Effect of insurance status on clinical outcomes after shoulder arthroplasty. Orthopedics 2020;43:e523-8. https://doi.org/10.3928/01477447-20200827-02.
44. Testa EJ, Brodeur PG, Li LT, Berglund-Brown IS, Modest JM, Gil JA, et al. Social and demographic factors impact shoulder stabilization surgery in anterior glenohumeral instability. Arthrosc Sports Med Rehabil 2022;4:e1497-504. https://doi.org/10.1016/j.asmr.2022.06.001.
45. Tornberg H, Kleinbart EP, Martin K, Hunter K, Gentile PM, Rivera-Pintado C, et al. Disparities in arthroplasty utilization for rotator cuff tear arthropathy. J Shoulder Elbow Surg 2023;32:1981-7. https://doi.org/10.1016/j.jse.2023.04.005.
46. Turner BE, Steinberg JR, Weeks BT, Rodriguez F, Cullen MR. Race/ethnicity reporting and representation in US clinical trials: a cohort study. Lancet Reg Health Am 2022;11:100252. https://doi.org/10.1016/j.lana.2022.100252.
47. Vitale C, Fini M, Spoletini I, Lainscak M, Seferovic P, Rosano GM. Under-representation of elderly and women in clinical trials. Int J Cardiol 2017;232:216-21. https://doi.org/10.1016/j.ijcard.2017.01.018.
48. Wang TF, Shi L, Nie X, Zhu J. Race/ethnicity, insurance, income and access to care: the influence of health status. Int J Equity Health 2013;12:29. https://doi.org/10.1186/1475-9276-12-29.
49. Wright MA, Murthi AM, Aleem A, Zmistowski B. Patient disparities and provider diversity in orthopaedic surgery: a complex relationship. J Am Acad Orthop Surg 2023;31:132-9. https://doi.org/10.5435/JAAOS-D-22-00410.