Obesity and the Receipt of Prescription Pain Medications in the US

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BACKGROUND: Little is known about disparities in pain treatment associated with weight status despite prior research on weight-based discrepancies in other realms of healthcare and stigma among clinicians.

OBJECTIVE: To investigate the association between weight status and the receipt of prescription analgesics in a nationally representative sample of adults with back pain, adjusting for the burden of pain.

DESIGN: Cross-sectional analyses using the Medical Expenditure Panel Survey (2010–2017).

PARTICIPANTS: Five thousand seven hundred ninety-one civilian adults age ≥ 18 with back pain.

MAIN MEASURES: We examine the odds of receiving prescription analgesics for back pain by weight status using logistic regression. We study the odds of receiving (1) any pain prescription, (2) three pain prescription categories (opioid only, non-opioid only, the combination of both), and (3) opioids conditional on having a pain prescription.

KEY RESULTS: The odds of receiving pain prescriptions increase monotonically across weight categories, when going from normal weight to obesity II/III, despite adjustments for the burden of pain. Relative to normal weight, higher odds of receiving any pain prescription is associated with obesity I (OR = 1.30 [95% CI = 1.04–1.63]) and obesity II/III (OR = 1.72 [95% CI = 1.36–2.18]). Obesity II/III is also associated with higher odds of receiving opioids only (OR = 1.53 [95% CI = 1.16–2.02]), non-opioids only (OR = 1.77 [95% CI = 1.21–2.60]), and a combination of both (OR = 2.48 [95% CI = 1.44–4.29]). Obesity I is associated with increased receipt of non-opioids only (OR = 1.55 [95% CI = 1.07–2.23]). Conditional on having a pain prescription, the odds of receiving opioids are comparable across weight categories.

CONCLUSIONS: This study suggests that, relative to those with normal weight, adults with obesity are more likely to receive prescription analgesics for back pain, despite adjustments of the burden of pain. Hence, the possibility of weight-based undertreatment is not supported. These findings are reassuring because individuals with obesity generally experience a higher prevalence of back pain. The possibility of over-treatment associated with obesity, however, may warrant further investigation.

KEY WORDS: obesity; pain; health disparities; pain medicine; opioids.

Supplementary Information *The online version contains supplementary material available at https://doi.org/10.1007/s11606-020-06581-9.*

Received July 28, 2020
Accepted December 29, 2020
Published online February 8, 2021

J Gen Intern Med 36(9):2631–8
DOI: 10.1007/s11606-020-06581-9

INTRODUCTION

Racial and gender disparities in access to prescription (Rx) pain medicine have been studied extensively.[1–11] Existing evidence indicates that racial minorities are less likely to receive Rx analgesics than whites despite having comparable need.[1–6] Evidence on gender disparities is mixed, with some finding no difference in analgesic prescribing between males and females.[6–11] Little is known, however, about disparities in pain treatment associated with obesity despite prior work documenting disparities in other realms of care and weight-related bias among providers.[12–18] For example, some research has shown that individuals with obesity are less likely to receive preventive care, such as influenza vaccination and screening for cervical and breast cancer.[19–23] Obesity is also associated with reduced hospice care at the end of life,[24] and patients with obesity are often denied arthroplasty that could alleviate pain.[25, 26] In terms of the patient encounter, obesity is associated with stereotypical beliefs held by healthcare providers (e.g., lack of motivation, poor self-control, low medication adherence),[13, 18] lower patient-clinician rapport,[27] and shorter appointments.[28] In a behavioral experiment where medical students were randomly assigned to provide care for a virtual patient who is either obese or non-obese with identical symptoms (e.g., shortness of breath), students assigned to treat the patient with obesity were more likely to provide lifestyle recommendations (e.g., weight loss), while their counterparts were more willing to prescribe a medication for symptom management.[29] These findings suggest that obesity-related stigma and bias may also affect the prescription of analgesics.

In this study, we examine the association between weight status and the receipt of prescription analgesics in a nationally representative sample of adults with back pain. We focus on back pain because it is a major cause of disability and reduced quality of life in the U.S.,[30, 31] especially among individuals who are obese.[32–37] Obesity is strongly associated with various back pain conditions (e.g., sciatica, lumbar disc degeneration), as well as the risk factors for back pain (e.g., increased loading of the spinal joints, reduced physical activity).[32–38]

Recent studies have shown a positive association between obesity and opioid use in the general population, presumably due to a higher prevalence of pain among those who are obese.[39, 40] The studies focus on overall use irrespective of need or conditions, which does not speak to disparities in *treatment*. To focus on potential *treatment disparities*, we restrict our sample to persons with a given source of pain (back pain) and examine whether they received a pain prescription as treatment. In addition, we adjust for the burden of pain by accounting for the degree to which pain interferes with work activities. Here, we follow prior work using such variables to gage the appropriateness of analgesic treatment.[1–10] We also extend the literature by examining the provision of both opioid and non-opioid analgesics. Prior work suggests that disparities in prescribing may be more pronounced for more potent medications.[41, 42]

Table 1 ICD codes for back pain

Version	Diagnosis/definition	Code
Ninth revision (2010–2015)	Ankylosing spondylitis and other inflammatory spondylopathies	720
	Spondylosis and allied disorders	721
	Intervertebral disc disorders	722
	Other disorders of cervical region	723
	Other and unspecified disorders of back	724
	Fracture of vertebral column without mention of spinal cord injury	805
	Fracture of vertebral column with spinal cord injury	806
	Other multiple and ill-defined dislocations	839
	Sprains and strains of sacroiliac region	846
	Sprains and strains of other and unspecified parts of back	847
	Spinal cord injury without evidence of spinal bone injury	952
	Injury to nerve roots and spinal plexus	953
	Injury to other nerve(s) of trunk excluding shoulder and pelvic girdles	954
Tenth revision (2016–2017)	Ankylosing spondylitis	M45
	Other inflammatory spondylopathies	M46
	Spondylosis	M47
	Other spondylopathies	M48
	Spondylopathies in diseases classified elsewhere	M49
	Cervical disc disorders	M50
	Thoracic, thoracolumbar, and lumbosacral intervertebral disc disorders	M51
	Other and unspecified dorsopathies, not elsewhere specified	M53
	Dorsalgia	M54
	Fracture of cervical vertebra and other parts of neck	S12
	Dislocation and sprain of joints and ligaments at neck level	S13
	Injury of nerves and spinal cord at neck level	S14
	Injury of nerves and spinal cord at thorax level	S24
	Fracture of lumbar spine and pelvis	S32
	Dislocation and sprain of joints and ligaments of lumbar spine and pelvis	S33
	Injury of lumbar and sacral spinal cord and nerves at abdomen, lower back, and pelvis level	S34

A full ICD (International Classification of Diseases) code is assigned to each complaint reported by participants during household interviews. Full codes are aggregated to first three digits by the MEPS
Since MEPS started using the 10th version of ICD in 2016, the compatibility of the 9th and 10th versions' codes for back pain were ensured by way of matching based on General Equivalence Mappings

METHODS

Data Source

We use the Medical Expenditure Panel Survey (MEPS), a nationwide survey on health, healthcare use, and medical expenditure, administered by the Agency of Healthcare Research and Quality.[43, 44] The MEPS is representative of the civilian noninstitutional population living in 50 US states and the District of Columbia.[43, 44] A new panel of households is sampled each year and asked to complete five rounds of interviews spaced evenly over two years.[43, 44] In each round, information on all eligible members of a household is collected from one knowledgeable member (a household proxy) via computer-assisted, in-person interviews.[45–47] Information obtained during interviews is supplemented and verified by administrative data provided by medical providers, e.g., pharmacies and hospitals.[45, 46] Also, each year, adult participants are asked to complete a mail-back Self-administered Adult Questionnaire (SAQ), which collects information on health and healthcare use, including pain interference.[48] For more information on sampling frame and methodology, see to Chowdhury et al.[44] Data from years 2010 to 2017 are pooled to increase sample size.

Participants

Our sample is civilian adults (age ≥ 18) who reported experiencing back pain. During each wave, respondents are asked to report on health problems, which are coded by MEPS using International Classification of Diseases (ICD) codes. Following prior work on back pain using the MEPS and other population-based surveys,[49–52] we use ICD codes to identify the sources of both upper and lower back pain (see Table 1 for codes). While data on health problems is collected in every round, data on pain interference is only available in rounds two and four. We examine those reporting back pain and their receipt of medications in round four, as weight status is not measured until round three, and we wish to maintain temporal ordering between the exposure and outcome. We exclude persons who were pregnant or had a diagnosis of cancer in rounds three or four, leaving a sample size of 5999 persons with back pain who completed the SAQ.

Measures

Our primary exposure of interest is weight status. Using height and weight data from round three, MEPS calculates body mass index (BMI), which we use to create categorical measures of weight status following standard guidelines:[53] underweight (BMI: <18.5), normal weight (18.5–24.9), overweight (25–29.9), class I obesity (30–34.9), and class II/III obesity (≥35).

Our outcome of interest is the receipt of Rx analgesics for back pain. The MEPS collects data on Rx medications in each round of the household interview, and supplements this information using administrative data from pharmacies. Respondents are asked to provide the names of all Rx medications that were purchased or obtained through other means (e.g., free samples) during the round and identify the pharmacy where the prescriptions had been filled. Respondents are also asked to report on the condition for which the medication was prescribed, and our outcome targets analgesics prescribed for back pain. To improve reporting accuracy, respondents are asked to show containers and boxes to the interviewer. Of note, the MEPS only includes prescriptions that were filled and does not discriminate between new prescriptions and refills. Each prescription represents the purchase of a single drug product.

We examine two basic categories of analgesics: (1) opioids and (2) non-opioid analgesics (henceforth referred to as "non-opioids"). The categories are defined using Multum Lexicon, a classification system for all approved drug products in the U.S. market.[54] Opioids include drugs categorized in Multum as "Opioid analgesics" or "Opioid analgesic combinations." Opioids with the following generic names are excluded because their primary use is not pain treatment: buprenorphine-naloxone, buprenorphine, and methadone. Non-opioids refer to drugs categorized in the following Multum classes: "Non-steroidal anti-inflammatory drugs (NSAIDs)," "Salicylates," "Analgesic combinations," "COX-2 inhibitors," or "Miscellaneous analgesics." It also includes doxepin, gabapentin, and pregabalin, which are frequently used for pain management.[55, 56]

As obesity is associated with an increased burden of pain, we adjust the models for pain interference. In the SAQ, respondents are asked, "During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?" and responses are "not at all," "a little bit," "moderately," "quite a bit," and "extremely." We code responses using an ordinal variable with a range of one to five. We also account for the frequency of healthcare visits for back pain, as it may be associated with both weight status and the likelihood of receiving pain medications.[34–36, 57, 58] During household interviews, MEPS collects information on visits to outpatient departments, office-based providers, emergency rooms, and inpatient stays, including the health conditions associated with each event. The frequency of healthcare visits equals the sum of all visits for back pain during the reference period for round four.

We also adjust for survey year and sociodemographic variables: sex, age, race-ethnicity, education, household income, marital status, insurance status, and region of residence.[50, 51] Age is modeled using both a continuous variable and a squared term to account for its non-linear relationship with the outcome. Other covariates are modeled using categorical indicators shown in Table 2.

Statistical Analysis

We use a series of multivariate regression models to examine the association of weight status with the receipt of analgesic prescriptions as the outcome, adjusting for covariates. First, we use logistic regression to examine the receipt of *any* pain prescription as a dichotomous outcome. Second, we use multinomial logistic regression to examine the following four-category outcome: opioid only, non-opioid only, a combination of opioid and non-opioid, and no prescription. Here, we

Table 2 Sample characteristics (*N* = 5791), MEPS, 2010–2017

Variable	Frequency (%)†
Weight status	
Underweight	1.19
Normal	27.36
Overweight	33.10
Class I obesity	21.70
Class II/III obesity	16.65
Received any pain prescription	29.67
Opioids only	15.36
Non-opioids only	9.83
Opioids and non-opioids	4.48
Age, mean (SE)‡	52.47 (0.29)
Female sex	54.77
Race-ethnicity	
Hispanic	10.38
Non-Hispanic white	74.56
Non-Hispanic black	8.64
Non-Hispanic Asian	3.50
Other	2.92
Education	
<High school	11.59
High school graduate	29.50
Some college	29.65
College graduate	29.25
Marital status	
Married	56.06
Never married	18.10
Other (separated, divorced, widowed)	25.84
Household income§	
Negative or poor (<100)	12.63
Near poor (100–125)	4.58
Low income (125–200)	12.71
Middle income (200–400)	28.92
High income (>400)	41.16
Insurance‖	
Uninsured	10.97
Only public insurance	27.44
Any private insurance with or without public insurance	61.59
Pain interference (range 1–5), mean (SE)	2.69 (0.02)
Healthcare visits, mean (SE)¶	3.03 (0.08)
Region	
Northeast	19.24
Midwest	24.25
West	24.62
South	31.88

All estimates reflect survey weight
†Unless indicated otherwise
‡Top-coded at 85
§Income categories are based on the federal poverty line (i.e., 100 = 100% of the poverty line)
‖Insurance status on the interview day
¶Top-coded at 15

again compare treatment to no treatment, but allow the treatment outcomes to vary in potency. Third, we use logistic regression to examine the receipt of an opioid prescription among those with any pain prescription. Hence, conditional on treatment, we ask whether obesity is associated with receipt of an opioid. We also check for interactions of weight status with sex and race/ethnicity and conduct the following sensitivity tests: limiting the sample to household proxies (for whom all information is self-reported), and excluding doxepin, gabapentin, and pregabalin from the definition of non-opioid analgesics. Unlike the other non-opioids, they are not classified as "Analgesics" under Multum.

Respondents with missing data are excluded from analyses. The overall rate of missing data is 3.5%, with a range of 2.1 to 5.2% by year. Our final sample includes 5791 adults. Analyses are conducted using STATA version 16.0 (StataCorp LP, College Station, TX). All analyses use the "svy" command to account for the complex multistage sample design.[44] The study is classified as exempt by the IRB office of New York University because we conduct secondary analyses of de-identified, existing data. Datasets generated/analyzed in this study are available from the corresponding author upon reasonable request.

RESULTS

Table 2 displays the sample characteristics. The prevalence of classes I and II/III obesity is 21.7% and 16.7%, respectively. In the overall sample, 29.7% received a prescription for any type of pain medication, 15.4% for opioids only, 9.8% for non-opioids only, and 4.5% for both opioids and non-opioids. The prevalence of pain medication use is comparable to prior estimates among individuals with back pain.[51, 59] Table 3 shows the unadjusted prevalence of the outcomes by weight status. For the first three outcomes (any medication, opioids only, and non-opioids only), there is a monotonic increase in the prevalence of prescriptions when going from normal weight to class II/III obesity, suggesting an unadjusted association between increased weight status and a higher probability of receiving Rx analgesics.

Table 4 displays logistic regression results for the odds of receiving any pain prescription for back pain. Adjusting for pain interference and other covariates, adults who are overweight or obese have significantly higher odds of receiving any pain prescription relative to persons with normal weight, and the odds ratios show a monotonic increase with weight status (overweight: 1.24 [95% CI = 1.03, 1.51]; obesity I: OR = 1.30 [95% CI = 1.04, 1.63]; obesity II/III: OR = 1.72 [95% CI = 1.36, 2.18]).

Table 5 displays multinomial regression results for the odds of an outcome in the following categories: (1) opioids only, (2) non-opioids only, and (3) both opioids and non-opioids. No prescription is the referent category. Individuals with grade II/III obesity have significantly higher odds of receiving opioids only relative to those with normal weight (OR = 1.53 [95% CI = 1.16–2.02]). For non-opioids only, being overweight or obese is associated with higher odds of receiving prescriptions relative to normal weight (overweight: OR = 1.42 [95% CI = 1.07–1.88]; obesity I: OR = 1.55 [95% CI = 1.07–2.23]; obesity II/III: OR = 1.77 [95% CI = 1.21–2.60]). Only class II/III obesity is significantly associated with higher odds of receiving prescriptions for both opioids and non-opioids relative to the normal weight category (OR = 2.48 [95% CI = 1.44–4.29]). The ORs for receiving opioids only and non-opioids only increase in a monotonic fashion from normal weight to obesity II/III.

Table 3 Unadjusted prevalence of pain prescriptions by weight status (*N* = 5791), MEPS, 2010–2017

Receipt of prescriptions	Full sample (*N* = 5791)	BMI category				
		Underweight (*N* = 72)	Normal weight (*N* = 1461)	Overweight (*N* = 1895)	Obesity I (*N* = 1285)	Obesity II/III (*N* = 1078)
Any pain medication						
%	29.67	26.98	21.78	28.50	32.64	41.30
(95% CI)	(28.03–31.37)	(16.03–41.70)	(19.16–24.64)	(25.83–31.32)	(29.64–35.80)	(37.75–44.94)
p value[†]	—	—		*<0.001*		
Opioids only						
%	15.36	15.66	11.58	14.52	17.40	20.58
(95% CI)	(14.17–16.63)	(8.42–27.26)	(9.77–13.68)	(12.55–16.74)	(15.04–20.04)	(17.81–23.65)
p value[†]	—	—		*<0.001*		
Non-opioids only						
%	9.83	9.24	7.27	9.74	11.28	12.36
(95% CI)	(8.97–10.76)	(3.49–22.28)	(5.77–9.12)	(8.32–11.38)	(9.54–13.29)	(9.99–15.18)
p value[†]	—	—		*0.003*		
Opioids and non-opioids						
%	4.48	2.08	2.93	4.23	3.97	8.36
(95% CI)	(3.90–5.14)	(0.72–5.85)	(2.14–4.00)	(3.27–5.47)	(2.85–5.50)	(6.32–10.97)
p value[†]	—	—		*<0.001*		

All estimates reflect survey weight

†Italicized numbers indicate statistical significance of differences in the proportion of outcomes across weight categories based on the Pearson chi-square statistic, which had been corrected to accommodate the survey design

Table 4 Adjusted relative odds of receiving any pain prescriptions (*N* = 5791), MEPS, 2010–2017

Receipt of any pain prescription	BMI category (kg/m^2)				
	Underweight (<18.5)	Normal weight (18.5–24.9)	Overweight (25–29.9)	Obesity I (30–34.9)	Obesity II/III (≤35)
OR (95% CI)	1.00 (0.50–2.03)	Ref	1.24 (1.03–1.51)	1.30 (1.04–1.63)	1.72 (1.36–2.18)
p value‡	0.99	—	*0.03*	*0.02*	*<0.001*

All estimates reflect survey weight
The model is adjusted for pain interference, visit frequency, age, squared age, sex, race-ethnicity, household income, education, marital status, insurance status, region, and survey year
‡Italicized numbers indicate statistical significance

Table 6 shows logistic regression results for the odds of receiving an opioid Rx among those who received any analgesic Rx for back pain (*N* = 1895). The estimates for all weight categories are statistically non-significant, suggesting that, adjusting for pain interference and other covariates, weight status is not associated with differential odds of receiving an opioid over other pain medications. Lastly, we did not find significant interactions between weight status and sex or race/ethnicity in our models, and sensitivity analyses that limited the sample to household proxies and excluded certain non-opioids that are not technically listed as "Analgesics" in Multum did not show meaningful differences in estimates for weight status (Appendices 1-4).

DISCUSSION

Although prior research on weight stigma and disparities in care raises the concern that individuals with obesity may be less likely to receive Rx medications for the treatment of pain, we did not find evidence of reduced access. On the contrary, in a nationally representative sample of adults with back pain, obesity was associated with higher odds of receiving opioids and non-opioids, despite adjustments for pain interference. Moreover, conditional on having a pain prescription for back pain, clinicians' propensity to provide more potent medications (i.e., opioids) did not differ by patients' weight status.

While some studies show that patients with obesity are less likely to receive certain types of medical care, the findings in this literature are actually mixed, with others finding no differences in the quality of care.[21, 22, 60, 61] Moreover, some studies find that patients with obesity are, in fact, more likely to receive preventive care for cardiovascular disease and diabetes (e.g., lipid and hemoglobin A1C testing).[21, 60]

Our work on pain treatment similarly suggests that individuals with obesity are not subject to reduced care, at least in the context of back pain, a major source of disability and reduced quality of life in the U.S. [30, 31] Obesity is associated with significantly higher odds of receiving both opioids and non-opioids, despite controlling for pain interference, healthcare visit frequency, insurance status, and a large number of sociodemographic factors. It is important to note, though, that our measure of pain interference may capture only one aspect of the burden of pain, and there can be residual variation by weight status in the need for pain relief, i.e., individuals with obesity may be more likely to experience and report pain outside the realm of pain interference. Increased physiologic sensitivity to pain among persons with obesity[32, 62, 63] is another source of residual variation in the burden of pain that may not have been fully captured by our measure. Although our data do not permit an in-depth assessment of the clinical appropriateness of any given pain prescription for back pain, interference with work activities is a major dimension of the experienced burden of pain,[64–66] and the strong positive

Table 5 Adjusted relative odds of receiving pain prescriptions by drug outcome category (*N* = 5791), MEPS, 2010–2017

Outcome	BMI Category (kg/m^2)				
	Underweight (<18.5)	Normal weight (18.5–24.9)	Overweight (25–29.9)	Obesity I (30–34.9)	Obesity II/III (≤35)
No pain prescription	Ref				
Opioids only					
OR (95% CI)	1.09 (0.51–2.31)	Ref	1.11 (0.85–1.44)	1.20 (0.90–1.59)	1.53 (1.16–2.02)
p value‡	0.83	—	0.45	0.21	*0.003*
Non-opioids only					
OR (95% CI)	1.11 (0.37–3.31)	Ref	1.42 (1.07–1.88)	1.55 (1.07–2.23)	1.77 (1.21–2.60)
p value‡	0.86	—	*0.01*	*0.02*	*0.004*
Opioids and non-opioids					
OR (95% CI)	0.55 (0.17–1.85)	Ref	1.39 (0.85–2.26)	1.15 (0.71–1.86)	2.48 (1.44–4.29)
p value‡	0.33	—	0.19	0.58	*0.001*

All estimates reflect survey weight
The model is adjusted for pain interference, visit frequency, age, squared age, sex, race-ethnicity, household income, education, marital status, insurance status, region, and survey year
‡Italicized numbers indicate statistical significance

Table 6 Adjusted relative odds of receiving an opioid prescription among individuals receiving any pain prescriptions (*N* = 1895), MEPS, 2010–2017

Receipt of opioids	BMI category (kg/m²)				
	Underweight (<18.5)	Normal weight (18.5–24.9)	Overweight (25–29.9)	Obesity I (30–34.9)	Obesity II/III (≤35)
OR (95% CI)	0.97 (0.36–2.60)	Ref	0.87 (0.61–1.25)	0.87 (0.58–1.30)	1.06 (0.69–1.63)
p value	0.95	—	0.44	0.49	0.78

All estimates reflect survey weight
The model is adjusted for pain interference, visit frequency, age, squared age, sex, race-ethnicity, household income, education, marital status, insurance status, region, and survey year

associations we find suggest that undertreatment is less likely. In fact, the positive association we find between obesity and the receipt of pain medications could even represent overtreatment.

A central mediator of racial-ethnic disparities in analgesic prescribing has been found to be the discounting of racial minority patients' burden of pain by providers.[1, 2] For instance, racial minorities were more likely to have their burden of pain underestimated by providers and less likely to have their level of pain documented on medical records.[1, 2] In the case of back pain patients with obesity, providers may be less likely to discount their burden of pain because obesity itself is viewed as a significant contributor to back pain.[32–37] This is in keeping with studies finding that patients who are obese are more likely to receive preventive and recommended care for cardiovascular disease and diabetes, conditions where obesity itself is a major risk factor.[21, 60] While our study suggests that individuals with obesity are unlikely to be under-treated for pain, over-treatment, if it is the case, would be concerning because, in contrast to recommended preventive care, increased receipt of opioids is a risk factor for undesirable health outcomes (e.g., overdose).[67]

While obesity has been implicated in increased prevalence of pain and pain medication use,[40, 68] our study focuses, instead, on whether there are disparities in the *treatment* of pain by restricting the sample to those with back pain and adjusting for pain interference. Future work should consider of other conditions that warrant treatment with Rx pain medication and whether patients with obesity could, in fact, be over-treated for pain. Research on the latter requires more detailed, clinical data. One could, for example, examine the incidence of side-effects or whether recommended doses have been exceeded. Future work could also consider whether obesity is associated with disparities in access to treatments for opioid abuse. Our work, however, did not find that obesity is associated with the receipt of opioids over other types of analgesics.

This study has limitations. First, as discussed above, our data do not allow for a detailed, clinical assessment of the need for any given pain prescription. For example, we do not know what the patient reported with respect to pain during a specific clinical encounter. This type of information is not typically available in large, population-based surveys. Our findings of a strong positive association do, however, suggest that undertreatment among those with obesity is less likely in a nationally representative sample of individuals with a common source of pain. Second, the MEPS collects information from household proxies. Estimates from sensitivity analyses limited to self-reporters, however, are comparable to those of the full sample. Third, we do not differentiate between acute and chronic pain when identifying persons with back pain. Fourth, the MEPS did not collect data on over-the-counter (OTC) medications, so our findings only pertain to the use of Rx medication. Future work could incorporate the use of OTC NSAIDs, which are frequently used to manage back pain symptoms.[69, 70]

CONCLUSIONS

Our findings collectively suggest that for back pain, patients with obesity are more likely to receive Rx pain medications than those in the normal weight category. Hence, the possibility of weight-based undertreatment is not supported. Conditional on having a pain prescription, individuals who are obese are neither more nor less likely to receive an opioid. As obesity is associated with multiple key risk factors for back pain, it is reassuring to find that those with the highest burden of back pain do not experience reduced access to Rx analgesics. The possibility of over-treatment, however, may warrant further research.

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Compliance with Ethical Standards:

Conflict of Interest: *Gawon Cho participated in all tasks involved in the production of the manuscript and had access to the data. She formulated the research question and conducted literature search, which provided the basis for the project. She also led the empirical analyses and organized the findings into the manuscript. Gawon Cho has nothing to disclose.*
Virginia Chang supervised Gawon Cho's work throughout the course of the project. She contributed to conceptualizing the research question, choosing the dataset, designing the empirical analyses, and interpreting the results. She also contributed substantially to writing the manuscript. Virginia Chang has nothing to disclose.

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