

# Prevalence of pain awareness, treatment, and associated health outcomes across different conditions in Brazil\*

*Prevalência da percepção e do tratamento da dor e de seus resultados de saúde em diferentes condições do Brasil*

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## SUMMARY

**BACKGROUND AND OBJECTIVES:** Pain is a prevalent clinical condition causing tremendous humanistic and economic burden worldwide. With limited research into the impact of pain on health related outcomes in Brazil, the current study examined prevalence of pain conditions, rate of diagnosis and treatment, and potential impact on health outcomes among Brazilian adults.

**METHOD:** Data were collected from the stratified random sample of adults (n = 12,000) in the cross-sectional 2011 National Health and Wellness Survey (NHWS) in Brazil. Respondents reported on sociodemographic information, health-related quality of life (SF-12v2), work productivity and activity impairment (WPAI), comorbid conditions, and healthcare resource use. Comparisons between those reporting pain and no pain (i.e., neuropathic pain, fibromyalgia, surgery/medical procedure-related pain, or back pain, versus controls without the respective condition; or arthritis, with vs. without experiencing pain) were conducted using Chi-square and t-tests for categorical and continuous variables, respectively.

**RESULTS:** Back pain was the most commonly reported

pain condition (12%), followed by fibromyalgia. Among those experiencing the condition neuropathic pain was the most, and back pain the least, commonly diagnosed and treated. Across conditions, to varying degrees, pain vs. no pain was associated with greater comorbid burden, higher resource utilization, and greater impairments in health status and work productivity, with few differences in sociodemographic factors.

**CONCLUSION:** Pain-related conditions were associated with varying awareness and treatment rates among Brazilian adults. Consistent with previous US and European studies, pain was associated with various negative health outcomes. These findings highlight the under-treatment and range of potential sources of pain burden in Brazil.

**Keywords:** Back pain, Brazil, Pain burden, Quality of life, Work productivity.

## RESUMO

**JUSTIFICATIVA E OBJETIVOS:** A dor é uma condição clínica prevalente que gera um fardo humanístico e econômico tremendo em todo o mundo. Tendo em vista os poucos estudos sobre o impacto da dor em resultados de saúde no Brasil, este estudo avaliou a prevalência de condições dolorosas, a taxa de diagnóstico e tratamento, e o possível impacto nos resultados de saúde entre adultos brasileiros.

**MÉTODO:** Os dados foram coletados de uma amostra estratificada e aleatória de adultos (n = 12.000) da pesquisa transversal *National Health and Wellness Survey* de 2011 feita no Brasil. Os entrevistados deram informações sociodemográficas, sobre qualidade de vida relacionada à saúde (SF-12v2), produtividade no trabalho e prejuízo de suas atividades (WPAI), condições comórbidas e uso de

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recursos de assistência à saúde. As comparações entre os indivíduos com e sem dor (isto é, dor neuropática, fibromialgia, dor relacionada a procedimentos cirúrgicos/médicos, ou lombalgia, *versus* os controles sem a respectiva condição; ou artrite, com *versus* sem dor) foram realizadas pelos testes Qui-quadrado e *t* para variáveis categóricas e contínuas, respectivamente.

**RESULTADOS:** Lombalgia foi a condição dolorosa mais comum (12%), seguida de fibromialgia. Entre os incluídos nessa condição, a dor neuropática foi a mais comumente diagnosticada e tratada, e a lombalgia foi a menos diagnosticada e tratada. Nas diferentes condições, em graus variáveis, dor *versus* sem dor foi associada a maior fardo comórbido, maior utilização de recursos, e maiores prejuízos ao estado de saúde e à produtividade no trabalho, com poucas diferenças nos fatores sociodemográficos.

**CONCLUSÃO:** As condições dolorosas foram associadas a diferentes percepções e taxas de tratamento entre adultos brasileiros. Corroborando estudos anteriores norte-americanos e europeus, a dor foi associada a vários resultados negativos para a saúde. Esses achados destacam o subtratamento e uma gama de fontes potenciais de fardo da dor no Brasil.

**Descritores:** Brasil, Fardo da dor, Lombalgia, Produtividade no trabalho, Qualidade de vida.

## INTRODUCTION

Pain is a highly prevalent, debilitating clinical condition responsible for tremendous humanistic and economic burden throughout the world<sup>1-3</sup>. Prevalence rates vary based on the type of pain and timeframe assessed, with chronic non-cancer pain reported by 5%-20% of survey samples<sup>4-7</sup>, lower back pain reported by nearly 30%<sup>8</sup>, and higher rates frequently reported among those diagnosed with conditions such as cancer<sup>9</sup>. Chronic pain affects more Americans than heart disease, cancer, and diabetes combined<sup>10,11</sup> and is the most frequent reason for individuals to seek care from a health care provider. In the U.S., a recent report by the Institute of Medicine estimated direct health care costs associated with chronic pain to be between \$261 and \$300 billion, with a further \$297 to \$336 billion associated with lost productivity and absenteeism. Importantly, pain conditions are often associated with comorbid illness, heightened psychological distress, and impaired quality of life across a number of domains<sup>12-15</sup>.

Pain can manifest from a variety of sources or

conditions and is most frequently classified as acute or chronic in nature, with chronic pain representing a condition that has persisted beyond normal healing time<sup>16</sup>. A variety of treatment modalities exist for the treatment of pain, including prescription and non-prescription medication, surgical procedures, and non-pharmacological approaches (psychologically-based interventions). Pain medications can be classified as opioid, nonopioid or adjuvant analgesics. Opioid analgesics (such as morphine) represent the gold standard in the management of moderate to severe pain, while nonopioid analgesics (such as aspirin, acetaminophen) can be used individually for mild to moderate pain, or in conjunction with opioid analgesics for more severe pain.

Given the prevalence of pain reported by individuals, a number of important issues have arisen in the pharmacological treatment of pain conditions. Opioid analgesics possess addictive qualities; therefore, extensive research examines their long-term use and effectiveness in the treatment of chronic pain conditions<sup>17</sup>. It has been argued that the widespread concern regarding the prescribing of opioid medications, particularly in the context of chronic pain, may have resulted in the under-treatment of severe pain in other clinical contexts, such as cancer<sup>18,19</sup>.

The majority of research in this domain has examined prevalence rates of pain in the U.S. and Europe, where treatment models exist within the context of their respective health care systems. A paucity of research has examined the prevalence and treatment of pain elsewhere in the world. This is of critical importance given the role that culture can play in the reporting of pain and provision of care<sup>20</sup> both within country, and especially across countries.

Broader assessments of pain are lacking, for example, in Brazil, where published reports have focused on specific populations<sup>1</sup> or comorbid conditions<sup>22</sup>. One reported survey of adult workers identified a 61.4% prevalence rate of chronic pain, with higher rates reported by women<sup>23</sup>.

The current study contributes to the extant literature by examining the potential impact of pain on work productivity and health-related quality of life across a range of disease states commonly associated with pain (neuropathic pain, arthritis pain, fibromyalgia, back pain, and surgery/medical procedure-related pain) in Brazil. This analysis provides important information regarding the current state of pain management in this understudied region, raising awareness of barriers to seeking and improving care, by further examining rates of diagnosis and treatment.

## METHOD

### Sample and procedure

Data were taken from the 2011 National Health and Wellness Survey (NHWS; Kantar Health, New York, NY, USA) in Brazil, an annual, cross-sectional survey using stratified random sampling based on age, sex, and socioeconomic status (SES) to be representative of the Brazil adult population ( $\geq 18$  years). Invitations to participate were sent to members of the Lightspeed Research Internet panel via email and the survey was administered online, while some respondents over the age of 50 years were recruited in person or on the phone and administered computer-assisted Web interviews (CAWI). Of the  $N=12,000$  respondents,  $n = 10,636$  were completed online and  $n = 1,346$  completed CAWIs. All participants gave explicit informed consent, and secondary consent forms were completed to allow for interviewer administration of CAWI. Institutional Review Board (IRB) approval was granted by Essex IRB (Lebanon, NJ), and the study is in compliance with the principles of the Declaration of Helsinki<sup>24</sup>. Results were weighted by gender, age, and SES (using the International Data Base of the U.S. Census Bureau and Organization for Economic Cooperation) so that projections matched the overall Brazilian population.

### Measures

#### Pain groups

All participants were initially asked if they were experiencing certain medical conditions, including arthritis, fibromyalgia, and pain. The self-reported pain questions in the NHWS survey and its associated outcomes have been accepted as valid measures in different regions, including the European Union<sup>1,25</sup>. Past investigations analyzing the NHWS data have found the experience of pain, in particular severe daily pain, to have a substantial negative association with labor force participation in five European countries. Langley et al.<sup>25</sup> have also found decreased health-related quality of life and increased provider visits, emergency room visits, and hospitalizations among those experiencing pain. Respondents choosing fibromyalgia or pain were asked to specify types of pain they experienced in the past month and severity for each type. In addition to these pain types, patients with diabetic

neuropathy were included with neuropathic pain patients. Arthritis (i.e., rheumatoid arthritis or osteoarthritis) patients indicated physician diagnosis of their arthritis type and separately indicated whether they experienced arthritis-related pain in the past year. Pain types were categorized into five dichotomous groups for analysis: (1) experiencing neuropathic pain or diabetic neuropathy (collectively referred to as neuropathic pain) versus not; (2) diagnosed with arthritis and experiencing arthritis pain versus diagnosed and not experiencing arthritis pain; (3) experiencing fibromyalgia versus not; (4) experiencing back pain versus not; and (5) experiencing pain from a surgical or medical procedure versus not. Of the 12,000 respondents,  $n = 1,642$  experienced at least one of the pain conditions of interest. The groups were not exclusive of each other; a respondent could have more than one pain type.

#### Demographics and health characteristics

Gender, age, marital status, employment status, income, educational attainment, and SES (A1-A2 [upper class], B1B2 [middle class], C1 [lower middle class], C2 [skilled working class], D [lower working class], and E [lowest income earners] were assessed<sup>26</sup>. Body mass index (BMI), smoking status, alcohol use, exercise in the past month, and Charlson comorbidity index (CCI) were also assessed<sup>27</sup>. The CCI calculates the comorbid burden by weighting several comorbidities by severity and summing the result.

#### Health-related quality of life

Health status was measured using the Brazilian Portuguese version of the Short-Form 12 (SF-12v2)<sup>28,29</sup>. The SF-12v2 translation was provided by Quality Metric's process of independent forward and back translations, and this version was validated against other pain measures<sup>30,31</sup>. Physical Component Summary (PCS) and Mental Component Summary (MCS) scores, as well as the SF-6D health utilities index, were generated from the SF-12v2, with higher scores representing better health status. The SF-6D index varies on a theoretical scale of 0 to 1, where 0 represents death and 1 represents perfect health.

#### Work impairment

Work impairment was captured via the Work Productivity and Activity Impairment (WPAI) questionnaire, a validated instrument containing four

subscales<sup>32</sup>. The translated Brazilian version of the WPAI<sup>33</sup> has been used in the past (i. e. for COPD patients)<sup>34</sup>. Absenteeism represents the percentage work time missed due to health in the past 7 days. Presenteeism represents impairment while at work due to health in the past 7 days Overall work impairment represents the total work time impaired or missed due to health in the past 7 days (derived from absenteeism and presenteeism). Absenteeism, presenteeism, and overall work impairment were assessed only for respondents employed full-time, part-time, or self-employed. Activity impairment represents the percentage impairment of daily activities outside work due to health in the past 7 days, and was assessed for all respondents.

### Healthcare resource utilization

Healthcare utilization was measured by the self-reported number of physician visits, ER visits, and hospitalizations in the preceding six months. These measures were also dichotomized into yes (used the healthcare resource) versus no ratings.

### Statistical analyses

Frequencies and percentages (for categorical variables) and means and standard deviations

(for continuous variables) were reported for each measure. All results were weighted and projected to the Brazilian adult population. Respondents who did not self-report experiencing each pain type were compared against those with pain using Chi-square and t-tests for categorical and continuous variables, respectively.

The NHWS and associated consent form were approved by Essex IRB (Lebanon, NJ). All respondents had to provide their informed consent to participate in the study.

## RESULTS

### Prevalence, diagnosis, and treatment

Of the total sample (n = 12,000; 137.9 M), n = 1,642 (projected 18.9 M) respondents reported experiencing pain: neuropathic pain (n = 41; 569 K), diagnosed rheumatoid or osteoarthritis with arthritis pain (n = 118; 1.3 M), fibromyalgia (n = 253; 2.8 M), back pain (n = 1,425; 16.8 M), or pain from surgery or medical procedure (n = 107; 1.2 M; (Table 1). Back pain was most common (12.16% of Brazilian adults), followed by fibromyalgia (2.01%), neuropathic pain (1.70%), rheumatoid or osteoarthritis pain (0.97%), and surgery or medical procedure pain (0.84%). Of

Table 1 – Prevalence of experiencing, diagnosis, and treatment of pain types.

	Neuropathic Pain	Arthritis & Arthritis Pain	Fibromyalgia	Back Pain	Surgery/Medical Procedure Pain
	569 K (n = 41)	1.3 M (n = 118)	2.8 M (n = 253)	16.8 M (n = 1,425)	1.2 M (n = 107)
Experiencing Pain					
sample size (n)	41	118	253	1425	107
projected	568,726	1,341,776	2,769,773	16,768,465	1,153,541
projected % (base: total Brazil population)	1.70	0.97	2.01	12.16	0.84
Diagnosed Pain					
sample size (n)	29	78	206	592	66
projected	456,969	896,655	2,085,716	6,356,350	704,132
projected % (base: experiencing pain)	80.35	66.83	75.30	37.91	61.04
Treated for Pain					
sample size (n)	22	46	115	254	33
projected	411,176	631,542	1,155,782	2,963,585	418,024
projected % (base: diagnosed with pain)	89.98	29.60	55.41	46.62	59.37

those experiencing self-reported disease-specific pain symptoms, the most commonly diagnosed condition was neuropathic pain (80.35%), with lower rates of diagnosis for fibromyalgia (75.30%), rheumatoid arthritis or osteoarthritis pain (66.83%), surgical or medical procedure pain (61.04%), and back pain (37.91%). Of those diagnosed with disease-specific pain conditions, the most commonly treated condition was neuropathic pain (89.98%, or 72.30% of those experiencing neuropathic pain), with lower rates of treatment for surgical or medical procedure pain (59.37%), fibromyalgia (55.41%), back pain (46.62%, or 17.67% of those experiencing back pain), and rheumatoid arthritis or osteoarthritis pain (29.60%).

### Pain comparisons

Except where noted otherwise, all comparisons described in this section were statistically significant, at two-tailed  $p < 0.05$ .

### Demographics

In looking at the demographic characteristics of adults reporting disease-specific pain in Brazil compared with the non-disease specific painreporting control group, patients experiencing fibromyalgia and back pain were more likely to be women (76.72% versus 50.74% and 58.15% versus 50.31%, respectively; see Table 2). Back pain patients were younger than those not experiencing back pain (37.46 vs. 41.37 years). Patients experiencing neuropathic pain and arthritis pain were more likely than those not experiencing those pain specific states to be divorced (36.97% versus 6.01% and 24.43% versus 5.03%, respectively). In terms of income, those not experiencing fibromyalgia pain were more likely to report a lower income (46.30% versus 33.46% at  $\leq$  R\$2,000). SES and employment were not statistically significantly different across groups.

### Health profiles

Fibromyalgia vs. no-fibromyalgia patients were more likely to report being overweight/obese (62.20% versus 48.47% at  $BMI \geq 25$ ) and to have a higher mean BMI (27.46 versus 25.79, respectively; Table 3). Arthritis patients experiencing vs. not experiencing arthritis pain, and those experiencing vs. not experiencing back pain, were more likely to drink alcohol (66.14% versus 46.44% and 58.58% versus 52.71%, respectively). Patients experiencing fibromyalgia and back pain

were more likely to smoke than those not reporting the respective pain (33.01% versus 19.99% and 24.19% versus 19.71%; respectively). Patients experiencing back pain were less likely to exercise than those not experiencing back pain (mean days exercised per month was 5.31 versus 6.70).

### Comorbidities

Comparing comorbidities across the respective groups, adults experiencing most types of pain were significantly more likely to report depression, sleep difficulties (including insomnia), anxiety, and a higher mean CCI, although arthritis patients did not report significantly more sleep difficulties compared with their reference group (Table 3).

### Health-related quality of life

With respect to health status (SF-12v2 scores), adults experiencing neuropathic pain, fibromyalgia, back problems, and surgical or medical procedure pain were significantly more likely to have experienced lower physical (PCS) and health utilities scores (Table 4). Patients with arthritis and experiencing arthritis pain had lower mental (MCS) scores (41.21) than controls (45.86), as did patients with fibromyalgia, back pain, and surgery or medical procedure pain. Neuropathic pain patients experienced substantially lower PCS scores (33.19) than non-neuropathic pain patients (49.76), a difference greater than five times the suggested minimally important difference (MID) of 3 points<sup>35</sup>. Arthritis patients with arthritis pain and neuropathic pain patients had significantly lower health utilities than controls (0.591 versus 0.671 and 0.555 versus 0.732, respectively), both exceeding twice the MID of 0.03 points<sup>36</sup>.

### Work impairment

Patients experiencing neuropathic pain, fibromyalgia, back pain, and surgical or medical procedure pain had significantly higher impairment on all work productivity and activity-related impairment compared with the control groups (Table 4). For example, neuropathic pain patients were more likely than the non-neuropathic pain group to report substantially higher presenteeism and activity impairment (59.65% versus 15.72% and 60.44% versus 20.97% respectively). Patients with arthritis and experiencing vs. not experiencing arthritis pain reported higher activity

Table 2 – Sociodemographics as a function of pain groups.

	Neuropathic Pain		Arthritis & Arthritis Pain		Fibromyalgia Pain		Back Problems		Surgical or Medical Procedure Pain	
	Experiencing NP	Not Experiencing NP	Arthritis & Experiencing Arthritis Pain	Arthritis & Not Experiencing Arthritis Pain	Experiencing Fibromyalgia Pain	Not Experiencing Fibromyalgia Pain	Experiencing Back Problems	Not Experiencing Back Problems	Experiencing Surgical or Medical Procedure Pain	Not Experiencing Surgical or Medical Procedure Pain
Demographics	569 K (n=41)	137.4 M (n=11,959)	1.3 M (n=118)	3.2 M (n=284)	2.8 M (n=253)	135.2 M (n=11,747)	16.8 M (n=1,425)	121.2 M (n=10,575)	1.2 M (n=107)	136.8 M (n=11,893)
% Males	39.48% (225 K)	48.78% (67001 K)	32.07% (430 K)	40.86% (1288 K)	23.28% (645 K)	49.26%* (66581 K)	41.85% (7018 K)	49.69%* (60208 K)	43.75% (505 K)	48.78% (66721 K)
% Females	60.52% (344 K)	51.22% (70356 K)	67.93% (911 K)	59.14% (1864 K)	76.72%* (2125 K)	50.74% (68575 K)	58.15%* (9751 K)	50.31% (60949 K)	56.25% (649 K)	51.22% (70051 K)
Age	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
	42.59 (14.17)	40.89 (15.55)	48.94 (12.00)	52.79 (14.42)	43.48 (10.88)	40.84 (15.62)	37.46 (12.82)	41.37* (15.83)	36.99 (10.66)	40.93 (15.58)
% Married	19.20% (109 K)	35.61% (48915 K)	32.67% (438 K)	49.21% (1551 K)	33.92% (939 K)	35.58% (48085 K)	32.82% (5504 K)	35.92% (43520 K)	40.21% (464 K)	35.50% (48561 K)
% Single, never married	38.24% (217 K)	36.40% (50001 K)	14.99% (201 K)	17.14% (540 K)	26.73% (740 K)	36.61% (49479 K)	36.67% (6149 K)	36.37% (44070 K)	32.18% (371 K)	36.45% (49848 K)
% Divorced	36.97%* (210 K)	6.01% (8262 K)	24.43%* (328 K)	5.03% (159 K)	11.09% (307 K)	6.04% (8165 K)	5.08% (852 K)	6.29% (7620 K)	2.91% (34 K)	6.17% (8438 K)
% Separated	0.79% (5 K)	5.76% (7907 K)	12.4%* (166 K)	3.05% (96 K)	6.20% (172 K)	5.73% (7739 K)	5.72% (958 K)	5.74% (6953 K)	10.34% (119 K)	5.70% (7792 K)
% Employed (Full-time, Part-time, Self-employed)	51.26% (292 K)	62.89% (86385 K)	50.37% (676 K)	48.31% (1523 K)	58.37% (1617 K)	62.93% (85060 K)	65.73% (11022 K)	62.44% (75655 K)	52.89% (610 K)	62.93% (86067 K)
% Income (≤ RS 2,000)	21.22% (121 K)	46.14% (63380 K)	36.20% (486 K)	41.92% (1321 K)	33.46% (927 K)	46.30%* (62574 K)	44.39% (7443 K)	46.27% (56057 K)	40.00% (461 K)	46.09% (63039 K)
% College educated	16.40% (93 K)	21.96% (30169 K)	22.91% (307 K)	25.04% (789 K)	30.42% (843 K)	21.77% (29420 K)	22.05% (3697 K)	21.93% (26565 K)	18.13% (209 K)	21.97% (30053 K)
Socioeconomic status										
Socio-Economic Group 1 (A1-A2)	8.54% (49 K)	4.99% (6848 K)	6.66% (89 K)	7.60% (240 K)	8.28% (229 K)	4.93% (6667 K)	4.87% (816 K)	5.02% (6080 K)	6.32% (73 K)	4.99% (6823 K)
Socio-Economic Group 2 (B1)	57 K)	9.00% (12356 K)	10.82% (145 K)	10.01% (315 K)	12.34% (342 K)	8.93% (12071 K)	9.93% (1665 K)	8.87% (10749 K)	10.16% (117 K)	8.99% (12296 K)
Socio-Economic Group 3 (B2)	12.17% (69 K)	15.01% (20620 K)	17.65% (237 K)	16.38% (516 K)	18.70% (518 K)	14.92% (20171 K)	16.51% (2769 K)	14.79% (17920 K)	21.91% (253 K)	14.94% (20436 K)
Socio-Economic Group 4 (C1)	5.74% (33 K)	21.06% (28932 K)	24.01% (322 K)	17.50% (552 K)	15.29% (424 K)	21.12% (28541 K)	18.81% (3153 K)	21.30% (25811 K)	18.54% (214 K)	21.02% (28750 K)
Socio-Economic Group 5 (C2,D,E)	63.53% (361 K)	49.94% (68602 K)	40.85% (548 K)	48.51% (1529 K)	45.38% (1257 K)	50.09% (67706 K)	49.89% (8365 K)	50.02% (60598 K)	43.07% (497 K)	50.06% (68466 K)

Note. Presented are weighted results projected to the population on the basis of age, gender, and socioeconomic status. NP=Neuropathic Pain. SD = Standard deviation.

\* p < 0.05 for differences across pain versus no-pain groups.

Table 3 – Health characteristics and comorbidities as a function of pain groups.

	Neuropathic Pain		Arthritis & Arthritis Pain		Fibromyalgia Pain		Back Problems		Surgical or Medical Procedure Pain	
	Experiencing NP	Not Experiencing NP	Arthritis & Experiencing Arthritis Pain	Arthritis & Not Experiencing Arthritis Pain	Experiencing Fibromyalgia Pain	Not Experiencing Fibromyalgia Pain	Experiencing Back Problems	Not Experiencing Back Problems	Experiencing Surgical or Medical Procedure Pain	Not Experiencing Surgical or Medical Procedure Pain
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Health characteristics										
Mean BMI <sup>^</sup>	24.17 (5.97)	25.83 (5.63)	28.20 (6.20)	26.26 (5.39)	27.46* (5.80)	25.79 (5.62)	26.33* (6.08)	25.76 (5.56)	27.11 (5.18)	25.81 (5.63)
% Overweight/obese (BMI ≥ 25) <sup>^</sup>	% (n)	% (n)	72.87% (970 K)	% (n)	62.20%* (1612 K)	% (n)	% (n)	% (n)	% (n)	% (n)
% smoke e-cigarettes	23.44% (133 K)	20.24% (27799 K)	31.40% (421 K)	21.12% (666 K)	33.01%* (914 K)	19.99% (27018 K)	24.19%* (4056 K)	19.71% (23877 K)	18.81% (217 K)	20.26% (27715 K)
% drink alcohol	43.63% (248 K)	53.46% (73436 K)	66.14%* (888 K)	46.44% (1464 K)	62.91% (1743 K)	53.23% (71942 K)	58.58%* (9823 K)	52.71% (63861 K)	62.51% (721 K)	53.35% (72963 K)
Mean days exercised in the past month	4.18 (8.08)	6.54 (9.05)	6.10 (7.95)	5.64 (8.16)	5.51 (8.31)	6.55 (9.06)	5.31 (8.27)	6.70* (9.14)	3.92 (6.38)	6.56 (9.07)
Mean CCI (Including Zero)	1.77* (2.25)	0.30 (0.82)	1.24* (1.56)	0.51 (0.90)	1.19* (1.98)	0.29 (0.79)	0.58* (1.29)	0.27 (0.74)	0.94* (1.52)	0.30 (0.83)
Comorbidities										
Depression	77.74%* (442 K)	16.04% (22035 K)	47.87%* (642 K)	14.66% (462 K)	64.11%* (1776 K)	15.32% (20701 K)	38.29%* (6420 K)	13.25% (16056 K)	32.42%* (374 K)	16.16% (22103 K)
Sleep Difficulties	65.98%* (375 K)	33.35% (45803 K)	46.73% (627 K)	39.57% (1247 K)	64.16%* (1777 K)	32.85% (44401 K)	60.71%* (10180 K)	29.71% (35999 K)	70.83%* (817 K)	33.17% (45361 K)
Anxiety	84.99%* (483 K)	35.14% (48264 K)	72.72%* (976 K)	42.21% (1331 K)	82.74%* (2292 K)	34.37% (46455 K)	62.69%* (10513 K)	31.56% (38234 K)	58.25%* (672 K)	35.15% (48075 K)

Note. Presented are weighted results projected to the population on the basis of age, gender, and socioeconomic status. BMI = Body Mass Index; NP = neuropathic pain; SD = standard deviation.

<sup>^</sup> BMI: data were only provided for a subset of respondents with valid height and weight information; 1.8% (2544 K; n = 160) had missing data.

\* p < 0.05 for differences across pain versus no-pain groups.

Table 4 – Health outcomes as a function of pain groups.

	Neuropathic Pain		Arthritis & Arthritis Pain		Fibromyalgia Pain		Back Problems		Surgical or Medical Procedure Pain	
	Experiencing NP	Not Experiencing NP	Experiencing Arthritis Pain	Arthritis & Not Experiencing Arthritis Pain	Experiencing Fibromyalgia Pain	Not Experiencing Fibromyalgia Pain	Experiencing Back Problems	Not Experiencing Back Problems	Experiencing Surgical or Medical Procedure Pain	Not Experiencing Surgical or Medical Procedure Pain
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Quality of Life	569 K (n=41)	137.4 M (n=11,959)	1.3 M (n=118)	3.2 M (n=284)	2.8 M (n=253)	135.2 M (n=11,747)	16.8 M (n=1,425)	121.2 M (n=10,575)	1.2 M (n=107)	136.8 M (n=11,893)
Mental component summary score (MCS)	44.32 (12.17)	46.94 (11.37)	41.21 (11.19)	45.86* (10.46)	39.50 (10.81)	47.08* (11.33)	41.36 (11.25)	47.70* (11.17)	41.96 (12.24)	46.97* (11.35)
Physical component summary score (PCS)	33.19 (13.53)	49.76* (8.63)	38.23 (9.94)	41.88 (10.23)	40.22 (11.79)	49.88* (8.54)	44.90 (9.83)	50.35* (8.34)	37.93 (13.56)	49.79* (8.60)
Health care Resource	0.555 (0.092)	0.732* (0.139)	0.591 (0.116)	0.671* (0.125)	0.586 (0.101)	0.735* (0.138)	0.641 (0.118)	0.744* (0.137)	0.588 (0.116)	0.733* (0.139)
Health utilities Utilization	% (n)	% (n)	% (n)	% (n)	% (n)	% (n)	% (n)	% (n)	% (n)	% (n)
% hospitalized in past six months	59.79%* (340 K)	9.59% (13176 K)	23.91% (321 K)	14.42% (454 K)	22.61%* (626 K)	9.54% (12890 K)	16.72%* (2803 K)	8.84% (10713 K)	59.24%* (683 K)	9.38% (12833 K)
% visited ER in past six months	65.31%* (371 K)	21.60% (29663 K)	49.89%* (669 K)	31.74% (1000 K)	47.56%* (1317 K)	21.25% (28717 K)	36.46%* (6113 K)	19.74% (23921 K)	66.20%* (764 K)	21.40% (29271 K)
Visited any traditional healthcare provider (past six months)	97.30% (553 K)	75.95% (104321 K)	98.79% (1326 K)	91.27% (2877 K)	95.32%* (2640 K)	75.64% (102235 K)	87.12%* (14608 K)	74.50% (90266 K)	99.59%* (1149 K)	75.84% (103726 K)
Mean number of hospitalizations	2.82* (5.65)	0.18 (1.21)	0.32 (0.71)	0.26 (1.43)	0.70* (2.83)	0.18 (1.21)	0.40* (1.71)	0.16 (1.19)	1.02* (1.36)	0.18 (1.26)
Mean Number of visits to any traditional healthcare provider (past six months)	13.08* (10.83)	4.12 (7.23)	17.08* (27.62)	5.66 (7.43)	13.91* (20.77)	3.95 (6.56)	7.39* (12.04)	3.71 (6.20)	15.54* (14.56)	4.06 (7.10)
Work Productivity and Activity Impairment										
% of missed work time (absenteeism) <sup>^</sup>	26.04* (27.75)	6.80 (18.91)	21.52 (31.93)	17.51 (30.11)	25.48* (35.33)	6.53 (18.39)	10.67* (22.94)	6.31 (18.27)	49.36* (46.56)	6.59 (18.37)
% of impairment at work (presenteeism) <sup>^</sup>	59.65* (40.68)	15.72 (25.00)	44.47 (31.61)	32.52 (29.35)	44.51* (33.87)	15.42 (24.78)	27.60* (29.84)	14.21 (24.02)	27.43* (31.7)	15.83 (25.16)
% of overall work impairment <sup>^</sup>	59.78* (40.79)	19.72 (29.02)	53.06 (35.16)	41.17 (35.71)	53.43* (36.77)	19.26 (28.65)	32.50* (33.40)	18.04 (28.03)	59.00* (42.86)	19.60 (28.88)
% of activity impairment	60.44* (30.03)	20.97 (27.96)	54.91* (31.19)	37.64 (30.06)	51.26* (31.82)	20.52 (27.66)	36.22* (31.28)	19.05 (26.95)	60.04* (36.03)	20.81 (27.77)

Note. Presented are weighted results projected to the population on the basis of age, gender, and socioeconomic status. BMI = Body Mass Index; NP = neuropathic pain; SD = standard deviation.

<sup>^</sup> Results are for employed respondents only.  
\* p < 0.05 for differences across pain versus no-pain groups.

impairment (54.91% versus 37.64%) but did not differ significantly on the work productivity measures.

### Healthcare resource utilization

Fibromyalgia, back pain, and surgery/medical procedure pain patients were more likely to have visited any traditional healthcare provider in the past six months; however, all pain vs. no-pain groups had significantly higher mean number of visits to any traditional healthcare provider (Table 4). All of the patients experiencing disease-specific pain states were more likely to have been hospitalized and visited the emergency room in the past six months, with the exception of patients experiencing arthritis pain, who did not have significantly more hospitalizations than arthritis patients not experiencing pain. Additionally, the aforementioned groups had a significantly higher number of hospitalizations.

### DISCUSSION

Pain continues to cause a tremendous humanistic and economic burden worldwide. Despite its prevalence and impact, little research has examined the experience of pain outside of the U.S. and Europe, so the current study provides unique insight into the burden of pain in Brazilian adults. Consistent with previous findings, pain was reported by a significant number of adults, with back pain noted as the most common complaint<sup>5,7,8,11</sup>. Fibromyalgia and neuropathic pain were also reported by a substantial minority of survey respondents.

The current study also examined the rates of treatment associated with various pain conditions. A majority of individuals reporting diagnosis with neuropathic pain also reported receiving treatment; however, this rate was only 72% among those experiencing neuropathic pain, and the treatment rates dropped considerably for other conditions, with only 18% of those experiencing back pain receiving treatment. These differences in reported treatment may be associated with pain treatment practices, patients' treatment-seeking practices, condition severity, and the impact of the condition and its treatment on health-related outcomes. Back pain, for example, is highly prevalent, can often become chronic in nature, and can present a number of challenges in its management. Despite its prevalence and potential impact on health-related outcomes, relatively few individuals seek care for this condition<sup>37</sup>. Clinical guidance suggests that self-management, with support as needed from health professionals, is preferable to invasive procedures (i.e., surgery) or overtreatment (i.e., excessive use of medication).

Therefore, those reporting no treatment for back pain may represent a combination of lack of access (i.e., not having seen a provider or being able to afford medication) and exhaustion and discontinuation of inadequate treatment options, despite ongoing pain. Importantly, both possibilities present unique challenges in the effective management of back pain (i.e., improved access, better therapies), thus warranting further investigation.

The low rate of reported treatment by those suffering from rheumatoid arthritis (RA) and osteoarthritis in the current study is also noteworthy. Once again, this is likely to represent a complex interaction between patient and provider attitudes towards care, and the degree of burden most often associated with these particular conditions. A recent review of the qualitative literature by Stack and colleagues reported a number of themes that may influence rates of care seeking for RA<sup>38</sup>. These included the impression that RA was a mild condition associated with aging, a lack of accurate knowledge concerning symptomatology, and a consistent tendency to minimize symptoms. Although it was reported that care was often sought once symptoms began affecting activity, each of these issues could be associated with delayed care-seeking or lack of follow-up with health care professionals. Similar findings have been reported in other research examining care-seeking decisions among RA sufferers<sup>39,40</sup>. Together with the current study findings, this may represent an important target for public health education, and warrants further investigation of barriers to treatment seeking in Brazilian adults diagnosed with RA.

A set of differences emerged in demographic and health behaviors between pain groups. Respondents reporting a diagnosis of fibromyalgia were more likely to be female, overweight or obese, and to smoke, compared with those not reporting this pain condition. This is consistent with previous findings that have found fibromyalgia more likely to be diagnosed in female patients<sup>41</sup>; however, there is a paucity of research regarding the association between this pain condition and health behaviors. A study by Weingarten and colleagues examined the prevalence and correlates of cigarette smoking in a sample of 984 individuals evaluated at a multidisciplinary fibromyalgia clinic, with smoking status reported to be associated with greater disease severity<sup>42</sup>. Previous research has also examined the role of excess weight in patients diagnosed with fibromyalgia. For example, Kim and colleagues noted that individuals with a BMI greater than 35 reported greater symptom severity, as well as impairments in quality of life domains<sup>43</sup>. The current study suggests similar associations between fibromyalgia

and lifestyle behaviors and provides fertile ground for future exploration of their impact on disease management and severity.

Further differences were established in those respondents reporting back pain. Sufferers were more likely to be female, younger, consume alcohol, and smoke, and were less likely to exercise than those not reporting back pain. The management of a chronic condition such as back pain often necessitates a partnership between a patient and provider, with self-management and patient responsibility emphasized in clinical decision making, and health promoting behavior a critical component of care planning. The relationship between reported back pain and lifestyle behaviors in the current study raises possible concerns regarding patients' ability and willingness to engage in health promoting practices. Similarly, for example, Briggs and colleagues found that individuals with chronic lower back pain were more likely to report difficulty engaging in health behaviors than those without lower back pain<sup>44</sup>.

Pain conditions were associated with a range of important negative health outcomes. Other NHWS-based studies, using the same type of pain measure as in the current study, have seen similarly impressive burdens associated with pain<sup>2</sup>. Generally, adults experiencing pain were more likely to report depression, sleep difficulties, and anxiety, as well as higher rates of healthcare utilization than those not reporting pain. Importantly, those reporting back pain, fibromyalgia, and pain associated with medical or surgical conditions reported significantly more hospitalizations and visits to health care providers in the past six months than those not reporting these types of pain. Further, these same conditions were associated with consistent and significant impairments across all work and activity impairment indexes. Taken together, these results highlight the broad and significant impact that pain conditions can have on patients' lives, as well as the potential need for multidisciplinary approaches to address these conditions. The current study also provides insight into differences in the experience of patients based on their diagnosed condition, including variations in rates of treatment, comorbid conditions, and health behaviors. These results provide important and novel guidance in the development of effective pain management strategies in Brazil.

Limitations of the current study include smaller sample sizes, especially among arthritis patients, which may have limited our ability to detect differences associated with smaller effect sizes. Additionally, the causal impact of pain cannot be determined from a cross-sectional study, even if several measured variables did

not differ significantly across groups, as there may be other unmeasured differences across groups that correlate with the outcomes of interest. Future studies should examine the longitudinal impact of pain, controlling for possible confounds.

The current study highlights the prevalence and burden of different pain conditions, providing important insight into the experience of those with pain in Brazil. The significant number of individuals reporting pain, despite these conditions being under-diagnosed and under-treated, further emphasizes the challenge in providing effective and safe pain management. Across various conditions, pain was associated with a range of negative outcomes, including impaired quality of life, increased healthcare utilization, and impairments in work productivity and daily activities. These results further emphasize the far-reaching impact of pain and the ongoing need for improvements in our understanding of this domain of medical care.

## Disclosure

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