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ORIGINAL RESEARCH

Severe Neck and Low Back Pain Predicts Severe Pain 5 Years Later in Older Men: A Cohort Study

Henrik Damm[1], Björn E Rosengren[1], Lars Jehpsson[1], Claes Ohlsson[2,3], Eva L Ribom[4], Dan Mellström[5], Magnus K Karlsson[1]

[1]Orthopedics, Faculty of Medicine, Departments of Orthopaedics and Clinical Sciences, Lund University, Skåne University Hospital, Malmö, Sweden; [2]Sahlgrenska Osteoporosis Centre, Center for Bone Research, Departments of Internal Medicine and Geriatrics, Gothenburg University, Sahlgrenska University Hospital, Gothenburg, Sweden; [3]Department of Drug Treatment, Region Västra Götaland, Gothenburg University, Sahlgrenska University Hospital, Gothenburg, Sweden; [4]Section of Orthopaedics, Department of Surgical Sciences, Uppsala University, Uppsala, Sweden; [5]Departments of Internal Medicine and Geriatrics, Gothenburg University, Sahlgrenska University Hospital, Gothenburg, Sweden

Correspondence: Henrik Damm, Department of Orthopaedics and Clinical Sciences, Lund University, Skåne University Hospital, Malmö, SE-205 02, Sweden, Tel +46 40331000, Email henrik.damm@med.lu.se

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Purpose: To describe the prevalence of neck pain (NP) and low back pain (LBP) of varying severity in older community-dwelling men, identify associated factors, and evaluate whether prevalent NP/LBP are risk factors for experiencing pain 5 years later.

Patients and Methods: MrOS Sweden is a prospective observational study that included 3014 community-dwelling men aged 69–81 years, of whom 1962 attended a 5-year follow-up. NP/LBP were assessed based on 1-year prevalence (yes/no), pain severity (none, mild, moderate, severe), and the presence of radicular pain with or without motor deficits (yes/no), at both baseline and follow-up.

Results: At baseline, the 1-year prevalence for having either NP, LBP, or both was 55%. The 1-year prevalence for NP was 29% and for LBP 45%. Among men with NP, 18% reported severe pain, while 17% of men with LBP reported severe pain. Men with NP at baseline had a relative risk (RR) of 4.0 (95% CI: 3.4–4.6) for reporting NP 5 years later, compared to men without NP at baseline. Men with severe NP had an RR of 10.7 (95% CI: 7.5–15.1) for reporting severe NP 5 years later, compared to men without severe NP at baseline. The corresponding RRs for LBP were 2.8 (95% CI: 2.5–3.1) and 6.5 (95% CI: 4.9–8.6). Poor self-rated health and dizziness were associated with NP/LBP at both time points, while smoking was associated with lower risk of NP.

Conclusion: More than half of community-dwelling men aged 69–81 experience pain in the spinal region during a year (nearly one-third NP and just below half LBP). The majority experience only mild to moderate pain. Baseline pain, especially severe pain, strongly predicts pain 5 years later, and associated factors may help identify high-risk groups suitable for targeted interventions.

Keywords: ageing, epidemiology, musculoskeletal pain, population-based, radiculopathy, motoric symptoms

Introduction

Neck pain (NP) and low back pain (LBP) are leading causes of disability, where numerous studies confirm their substantial burden on both affected individuals and society.[1–5] For elderly men, NP/LBP significantly impacts healthcare utilization, leading to increased costs for outpatient specialty care and hospital admissions.[6] Beyond disability, NP/LBP profoundly diminishes their quality of life, as nearly half of older men with LBP report poor self-estimated health and experience increased depressive symptoms, threatening their autonomy, independence, and overall well-being.[7–9] Reported 1-year prevalence rates vary widely, ranging from 17% to 66% for NP and from 9% to 75% for LBP.[2,7,8,10–12] These differences may be attributed to variations in inclusion criteria regarding sex, age, cohort characteristics and requirement of symptom duration for being classified as having pain.[2,7,8,10–12] While some studies define pain on presence regardless of duration, others require symptoms for at least 12 weeks.[2,7,8,10–12] In previous analyses of the Osteoporotic Fractures in Men (MrOS) Sweden, a population-based cohort of community-dwelling men aged 69–81 years, the 1-year prevalences of NP were reported as 29%, and that of LBP as 45%.[13,14] In these studies, no minimum symptom duration was required to classify an individual as having pain. Due to the heterogeneity in pain definitions across studies, it is a challenge to compare studies as well as establish a definitive 1-year prevalence for NP/LBP.

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When comparing studies that evaluate the prevalences of NP/LBP with varying severity, the heterogeneity between studies becomes even more pronounced, making cross-study comparisons particularly challenging.[15–19] In the MrOS Sweden cohort, 23% of participants with NP reported severe morbidity and 20% of participants with LBP, defined as severe troublesomeness from pain, radiculopathy, and/or motor deficits in the extremities.[13,14] The severity was in these studies based on the subjective assessments of troublesomeness from NP/LBP and/or associated symptoms (that is level of morbidity and not only level of pain), without predefined criteria related to activity restrictions or use of analgesics.

NP/LBP have further been associated with various biopsychosocial factors, including obesity, anxiety, depression, low education attainment, poor self-perceived health status, passive coping strategies, sleep disorders, physical inactivity, smoking, number of comorbidities, and a history of falls.[8,17,20–22] In the MrOS Sweden cohort, LBP was associated with high BMI, being born outside Sweden, smoking, lack of daily walking, poor self-rated health, depression, comorbidities (eg, diabetes, stroke, coronary heart disease, pulmonary disease and/or cancer), dizziness, a tendency to fall, and use of walking aids.[9] If the same factors are associated with NP remains to be determined.

The natural course of NP/LBP in the elderly remains a topic of discussion,[11,12,17,23,24] as well as the natural course of severe NP/LBP.[17,25,26] The mechanisms underlying the development of chronic pain are often unclear; however, it is suggested that the presence of other pain, changes in brain chemistry due to pain stimuli, genetic factors, and central sensitization initiated by peripheral mechanisms all play a role in its development and persistence.[27] Because of these complex mechanisms, treatment typically involves a multifactorial approach that combines pharmacological interventions (eg, paracetamol, NSAIDs, muscle relaxants) with non-pharmacological strategies (eg, exercise, psychological therapies), while also addressing comorbidities and lifestyle factors. Given the global increase in the elderly population and high prevalence of NP/LBP, it is not feasible for all individuals that experience NP/LBP to be referred for clinical evaluation and treatment. It is therefore of value to identify individuals at high risk of developing long-standing or recurrent NP/LBP, especially severe pain, individuals who would benefit most from interventions.

The primary aim of this study was to describe the prevalence of NP/LBP in community-dwelling older men and to evaluate whether men with prevalent NP/LBP are at increased risk of having pain 5 years later. We asked: is there an association between prevalent (i) NP/LBP and NP/LBP 5 years later, (ii) severe NP/LBP and severe NP/LBP 5 years later, (iii) NP/LBP with radicular pain (with or without motor deficits) and similar symptoms 5 years later, and (iv) which factors are independently associated with NP/LBP?

Materials and Method

The Osteoporotic Fracture in Men Study (MrOS) Sweden is a multicenter study that includes 3014 community-dwelling men aged 69–81 years. Participants were recruited by the Department of Geriatrics, Sahlgrenska University Hospital, Gothenburg (n=1010), the Department of Orthopaedics, Skåne University Hospital, Malmö (n=1005), and the Department of Internal Medicine, Uppsala University Hospital, Uppsala (n=999) (Figure 1). The primary aim of the study is to evaluate risk factors for osteoporosis, falls and fractures. The design of this prospective observational cohort study has been described in detail previously.[28–30] The men were randomly selected from the national population register and invited to the study through surface mail, with a response letter included. Individuals who did not respond received a second letter, and those who did not return this letter were contacted by telephone. Those who did not respond at all were classified as non-responders. A total of 45% of the invited men participated. The baseline examination took place between October 2001 and December 2004. To be eligible, the men had to be community-dwelling, able to walk without the assistance of another person, without bilateral hip prostheses, capable of providing self-reported data and written informed consent.

The examinations used in this study included self-administered and interviewer-administered questionnaires that evaluated lifestyle, medical history, nutritional intake, functional status, and quality of life. Specific questions addressed whether participants had experienced NP and/or LBP during the year preceding the evaluation (yes/no), how troublesome the symptoms were perceived to be (not troublesome at all, slightly, moderately, or severely troublesome), and whether they had experienced associated radicular pain (yes/no) and/or motor deficits (yes/no) (supplementary Figure 1). The questions have not undergone formal validation. The baseline evaluation also included clinical measurements of weight and height. Two consecutive height measurements were taken during the same session, and the average was used. In

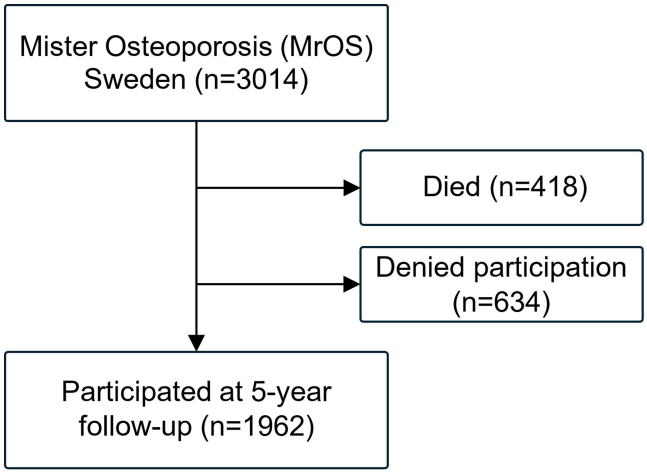

Figure 1 Flow chart of study participants.

cases where the measurements differed by ≥5, a third measurement was taken, and the average of the two closest values was used. Body mass index (BMI) was calculated as the weight divided by the height squared (kg/m^2). The same evaluations and measurements were repeated at the 5-year follow-up, in which 1962 men participated (65% of the initial 3014 participants). For prevalence analyses at baseline, 3000 men provided valid data on NP and 3007 men on LBP. For longitudinal analyses examining the association between baseline and 5-year follow-up, 1931 men had valid NP data and 1951 men had valid LBP data at both time points.

Dropout analysis showed that among the 1052 men who did not attend the 5-year follow-up (418 had died and 634 denied participation), the non-participants were at baseline older, more likely to live alone, had lower level of education, had more comorbidities, used walking aids to a greater extent, had shorter daily walking distances, reported poorer health, were more frequently smokers, and more frequently had high alcohol intake than those who participated at the 5-year follow-up (Table 1). In contrast, there were minimal differences in NP/LBP severity and/or associated symptoms (Table 2).

We used Statistical Package for Social Sciences (SPSS version 28, IBM, Armonk, NY, USA) for statistical analysis. Alluvial diagrams were created using R (version 4.4.3, R Foundation for Statistical Computing) to visually depict the proportions of individuals reporting the same or different NP/LBP status at baseline and the 5-year follow-up.

Table 1 Baseline Characteristics in All 3014 Men in the MrOS Study, the 1052 Men Who Attended Only at Baseline, and the 1962 Men Who Attended Both Baseline and 5-Year Follow-Up

	All MrOS Men n=3014	**Men Who Only Attended Baseline (Dropouts) n=1052**	**Men Who Attended Baseline and 5-Year Follow-Up n=1962**
Anthropometry			
Age (years)	75.4 ± 3.2 (3014)	76.3 ± 3.1 (1052)	74.9 ± 3.1 (1962)
Height (cm)	174.8 ± 6.5 (3014)	174.4 ± 6.7 (1052)	174.9 ± 6.5 (1962)
Weight (kg)	80.8 ± 12.1 (3014)	80.5 ± 12.9 (1052)	80.9 ± 11.6 (1962)
Body mass index, BMI (kg/m^2)	26.4 ± 3.6 (3014)	26.4 ± 3.8 (1052)	26.4 ± 3.4 (1962)
Lifestyle			
Smoking	8.4% (3011)	10.6% (1050)	7.2% (1961)
Alcohol			
<2 drink/day	90.9% (2247)	89.7% (744)	91.5% (1503)
≥2 drinks/day	9.1% (225)	10.3% (85)	8.5% (140)
Daily walking distance (km/day)	2.5 ± 2.6 (3006)	2.3 ± 2.5 (1050)	2.7 ± 2.7 (1956)

(*Continued*)

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Table 1 (Continued).

	All MrOS Men n=3014	Men Who Only Attended Baseline (Dropouts) n=1052	Men Who Attended Baseline and 5-Year Follow-Up n=1962
Sociodemography			
Living alone	19.3% (2932)	22.1% (1024)	17.8% (1908)
Education			
Public school (7 years)	46.5% (1397)	50.2% (525)	44.5% (872)
Primary school/equivalent (9 years)	11.6% (349)	12.0% (125)	11.4% (224)
High school	19.8% (595)	18.1% (189)	20.7% (406)
University/college	22.1% (665)	19.8% (207)	23.4% (458)
Comorbidity			
Diabetes	9.5% (3011)	13.1% (1051)	7.6% (1960)
Hyperthyroidism	1.5% (3000)	1.7% (1047)	1.3% (1953)
Hypothyroidism	2.5% (2999)	1.6% (1047)	3.0% (1952)
Osteoporosis	1.9% (3006)	2.7% (1048)	1.4% (1958)
Stroke	6.4% (3003)	9.2% (1052)	4.9% (1951)
Parkinson's disease	0.8% (3008)	1.6% (1051)	0.3% (1957)
High blood pressure	36.4% (2998)	39.0% (1047)	35.1% (1951)
Myocardial infarction	14.2% (2997)	15.7% (1046)	13.4% (1951)
Angina	15.2% (2993)	19.0% (1043)	13.2% (1950)
Congestive heart failure	9.7% (2980)	12.7% (1042)	8.0% (1938)
Chronic bronchitis/asthma/emphysema	8.4% (2998)	10.4% (1050)	7.4% (1948)
Cancer	15.5% (3010)	18.7% (1050)	13.8% (1960)
Others			
Fall the previous 12 months	16.5% (3003)	18.3% (1049)	15.5% (1954)
Dizziness	25.1% (3007)	29.0% (1051)	23.0% (1956)
Walking aids (cane/crutches/walker)	5.4% (2980)	8.3% (1034)	3.9% (1946)
Self-rated health			
Excellent	23.7% (712)	17.4% (182)	27.1% (530)
Good	50.2% (1509)	48.7% (510)	51.0% (999)
Fair	23.5% (705)	30.0% (314)	20.0% (391)
Poor	2.4% (72)	3.9% (41)	1.6% (31)
Very poor	0.3% (8)	0.1% (1)	0.4% (7)

Notes: Data are presented as means ± standard deviations (SD) or proportions (%). The number of individuals (n) with available data for each variable is provided in brackets.

Table 2 Distribution of Neck Pain (NP) and Low Back Pain (LBP) by Severity and Associated Symptoms in the MrOS Study

	All MrOS Men n=3014	Men Who Only Attended Baseline (Dropouts) n=1052	Men Who Attended Baseline and 5-Year Follow-Up n=1962		
			Baseline	5-Year Follow-Up	P-Value
NP and severity					
Numbers (n) with valid data	n=2988	n=1046	n=1942	n=1939	n=1919[a]
No NP	71.5%	72.2%	71.1%	73.0%	p=0.08
NP not at all/slightly bothersome	11.4%	10.3%	12.0%	11.2%	
NP moderately bothersome	12.0%	11.9%	12.2%	10.5%	
NP severely bothersome	5.1%	5.6%	4.7%	5.3%	

(*Continued*)

Table 2 (Continued).

	All MrOS Men n=3014	Men Who Only Attended Baseline (Dropouts) n=1052	Men Who Attended Baseline and 5-Year Follow-Up n=1962		
			Baseline	5-Year Follow-Up	P-Value
NP and associated symptoms					
Numbers (n) with valid data	n=3000	n=1048	n=1952	n=1941	n=1931[a]
No NP	71.2%	72.0%	70.7%	72.9%	p=0.29
NP with no radicular pain/motor deficit	16.9%	15.8%	17.5%	16.1%	
NP with radicular pain no motor deficit	4.9%	4.5%	5.2%	3.0%	
NP with radicular pain and motor deficit	7.0%	7.6%	6.7%	8.0%	
LBP and severity					
Numbers (n) with valid data	n=2966	n=1038	n=1928	n=1931	n=1900[a]
No LBP	55.5%	54.9%	55.8%	56.0%	p=0.92
Not at all/slightly bothersome	16.6%	14.8%	17.5%	15.6%	
Moderately bothersome	20.4%	20.9%	20.2%	20.0%	
Severely bothersome	7.5%	9.3%	6.5%	8.4%	
LBP and associated symptoms					
Numbers (n) with valid data	n=3007	n=1050	n=1957	n=1956	n=1951[a]
No LBP	54.7%	54.3%	54.9%	55.3%	**p=0.04**
LBP with no radicular pain/motor deficit	22.4%	21.2%	23.0%	19.7%	
LBP with radicular pain no motor deficit	9.0%	8.7%	9.2%	7.1%	
LBP with radicular pain and motor deficit	13.9%	15.7%	12.8%	18.0%	

Notes: [a]Number of individuals with valid data from both evaluations who were included in the statistical analyses. Related-sample sign tests were used for group comparisons. Data are presented as numbers (n) or proportions (%). Significant p-values are bolded.

Categorical variables are presented as numbers (n) and proportions (%) with 95% confidence intervals (95% CI) and continuous variables as means ± standard deviations (SD). Severity scores were categorized into three groups: mild (not at all/slightly troublesome), moderate (moderately troublesome), and severe (severely troublesome). For group comparisons, we used the chi-square test for independent categorical variables, the sign test for paired categorical data, and calculated Relative Risks (RR) with 95% CI to further describe our findings. We regarded $p < 0.05$ as a statistically significant difference.

When evaluating the associations between possible risk factors for NP/LBP, we used a multivariable regression model to calculate Odds Ratios (OR) with 95% CI. Risk factors were categorized as follows: BMI (<25, 25–29.9, ≥30 kg/m^2), alcohol consumption (<2, ≥2 drinks/day), smoking (non/former, current), daily walking (0, 1–3, >3 km/day), country of birth (Sweden, outside Sweden), education (public school, primary, high school, university/college), living arrangement (alone, with another), serious comorbidities (presence of at least one of the following: diabetes, stroke, coronary heart disease, pulmonary disease or malignancy), falls in the last 12 months (yes, no), dizziness (yes, no), walking aids (none, cane/crutches/walker), and self-rated health (excellent, good, fair, poor/very poor). An additional multivariable logistic regression was performed to illustrate the potential influence of confounding factors on the reported RRs, this analysis is provided as supplementary Table 1.

The Ethics Committees and the radiological committee at each center approved the study (LU 693–00, Gbg 014–01, Ups 01–057). All participants gave written informed consent before the study started, and the study was performed in accordance with the Declaration of Helsinki.

Results

Background data of MrOS Sweden are presented in Table 1 and Table 2. At baseline, 55% (95% CI: 53–57%) of the participants reported any pain (NP, LBP or both), while 19% (95% CI: 18–21%) of the participants reported both NP and LBP.

Neck Pain (NP)

The 1-year prevalence of NP was at baseline 29% (95% CI: 27–30%). There was no difference when comparing baseline and 5-year follow-up in the proportion of individuals with/without NP (Table 2).

At baseline, 11% (95% CI: 10–13%) reported mild NP, 12% (95% CI: 11–13%), moderate NP, and 5% (95% CI: 4–6%) severe NP. There was no difference in the distribution of pain severity when comparing baseline and 5-year follow-up (Table 2).

At baseline, 17% (95% CI: 16–18%) reported NP without radicular pain or motor deficits, 5% (95% CI: 4–6%) NP with radicular pain but no motor deficits, and 7% (95% CI: 6–8%) NP with radicular pain and motor deficit. There was no difference in the distribution of associated symptoms when comparing baseline and 5-year follow-up (Table 2).

When including individuals with valid NP data both occasions, individuals with NP at baseline had, compared to those with no NP at baseline, RR 4.0 (95% CI: 3.4–4.6) for having NP at the 5-year follow-up. Individuals with severe NP at baseline had, compared to those without severe NP at baseline (including individuals with no NP as well as those with mild or moderate NP), RR 10.7 (95% CI: 7.5–15.1) for having severe NP at the 5-year follow-up. Individuals with NP with radicular pain (with or without motor deficits) had, compared to those with no NP or NP without radicular pain at baseline, RR 7.5 (95% CI: 6.0–9.5) for having NP with radicular pain at the 5-year follow-up. The data used for the RR calculations are presented in Tables 3–5 and further visualized in Figures 2–4.

In our multivariable regression model, dizziness and low self-rated health were positively associated with having NP at baseline and at both baseline and 5-year follow-up, while smoking was inversely associated. The use of walking aids was positively associated with NP at both baseline and the 5-year follow-up (Table 6).

Low Back Pain (LBP)

The 1-year prevalence of LBP was at baseline 45% (95% CI: 44–47%). There was no difference when comparing baseline and 5-year follow-up in the proportion of individuals with/without LBP (Table 2).

At baseline, 17% (95% CI: 15–18%) reported mild LBP, 20% (95% CI: 19–22%) moderate LBP, and 8% (95% CI: 7–9%) severe LBP. There was no difference in the distribution of pain severity when comparing baseline and 5-year follow-up (Table 2).

At baseline, 22% (95% CI: 21–24%) reported LBP without radicular pain or motor deficits, 9% (95% CI: 8–10%) LBP with radicular pain but no motor deficits, and 14% (95% CI: 13–15%) LBP with radicular pain and motor deficit. There was a higher proportion of individuals reporting LBP with radicular pain and motor deficit at the 5-year follow-up (Table 2).

When including individuals with valid LBP data both occasions, individuals with LBP at baseline had, compared to those with no LBP at baseline, RR 2.8 (95% CI: 2.5–3.0) for having LBP at the 5-year follow-up. Individuals with severe LBP at baseline had, compared to those without severe LBP at baseline (including individuals with no LBP as well as those with mild or moderate LBP), RR 6.5 (95% CI: 4.9–8.6) for having severe LBP at the 5-year follow-up. Individuals

Table 3 Proportion of Individuals with and without Neck Pain (NP)/Low Back Pain (LBP) at the 5-Year Follow-Up Among the 1931 Men with Valid NP Data and the 1951 Men with Valid LBP Data at Both Baseline and the 5-Year Follow-Up, Stratified by Whether They Had No Pain or Had Pain at Baseline

Neck Pain (NP)				Low Back Pain (LBP)			
Baseline	**5-Year Follow-Up**		**P-Value**	**Baseline**	**5-Year Follow-Up**		**P-Value**
No NP n=1362	No NP	85.5%	**<0.001**	No LBP n=1070	No LBP	75.2%	**<0.001**
	NP	14.5%			LBP	24.8%	
NP n=569	No NP	42.7%		LBP n=881	No LBP	31.2%	
	NP	57.3%			LBP	68.8%	

Notes: Chi-square tests were used for group comparisons. Data are presented as numbers (n) or proportions (%). Significant p-values are bolded.

Table 4 Proportion of Individuals with No, Mild, Moderate, or Severe Neck Pain (NP)/Low Back Pain (LBP) at the 5-Year Follow-Up Among the 1919 Men with Valid NP Severity Data and the 1900 Men with Valid LBP Severity Data at Both Baseline and the 5-Year Follow-Up, Stratified by Whether They Had No Pain or Had Pain of Different Severities at Baseline

Neck Pain (NP)				Low Back Pain (LBP)			
Baseline	**5-Year Follow-Up**		**P-Value**	**Baseline**	**5-Year Follow-Up**		**P-Value**
No NP n=1362	No NP Mild Moderate Severe	85.5% 7.9% 5.1% 1.5%	**<0.001**	No LBP n=1058	No LBP Mild Moderate Severe	76.1% 9.8% 10.5% 3.6%	**<0.001**
Mild NP n=233	No NP Mild Moderate Severe	57.5% 20.2% 17.2% 5.2%		Mild LBP n=330	No LBP Mild Moderate Severe	42.1% 28.5% 23.3% 6.1%	
Moderate NP n=233	No NP Mild Moderate Severe	36.1% 22.7% 26.6% 14.6%		Moderate LBP n=386	No LBP Mild Moderate Severe	26.4% 21.2% 38.9% 13.5%	
Severe NP n=91	No NP Mild Moderate Severe	23.1% 11.0% 27.5% 38.5%		Severe LBP n=126	No LBP Mild Moderate Severe	12.7% 13.5% 33.3% 40.5%	

Notes: Chi-square tests were used for group comparisons. Data are presented as numbers (n) or proportions (%). Significant p-values are bolded.

Table 5 Proportion of Individuals Reporting No Neck Pain/Low Back Pain (NP/LBP), or NP/LBP with Radiculopathy (R) or NP/LBP + R + Motor Deficit (MD) at the 5-Year Follow-Up Among the 1931 Men with Valid NP Data and the 1951 Men with Valid LBP Data at Both Baseline and the 5-Year Follow-Up, Stratified by Whether They Had No Pain with or Without These Associated Symptoms at Baseline

Neck Pain (NP)				Low Back Pain (LBP)			
Baseline	**5-Year Follow-Up**		**P-Value**	**Baseline**	**5-Year Follow-Up**		**P-Value**
No NP n=1362	No NP NP -R -MD NP +R -MD NP +R +MD	85.5% 10.4% 1.0% 3.1%	**<0.001**	No LBP n=1070	No LBP LBP -R -MD LBP +R -MD LBP +R +MD	75.2% 11.6% 5.4% 7.8%	**<0.001**
NP –R –MD n=340	No NP NP -R -MD NP +R -MD NP +R +MD	47.6% 37.9% 5.3% 9.1%		LBP –R –MD n=450	No LBP LBP -R -MD LBP +R -MD LBP +R +MD	34.7% 39.3% 8.9% 17.1%	
NP +R –MD n=100	No NP NP -R -MD NP +R -MD NP +R +MD	44.0% 20.0% 18.0% 18.0%		LBP +R –MD n=180	No LBP LBP -R -MD LBP +R -MD LBP +R +MD	30.0% 28.3% 14.4% 27.2%	
NP +R +MD n=129	No NP NP -R -MD NP +R -MD NP +R +MD	28.7% 14.0% 7.0% 50.4%		LBP +R +MD n=251	No LBP LBP -R -MD LBP +R -MD LBP +R +MD	25.9% 12.7% 5.6% 55.8%	

Notes: Chi-square tests were used for group comparisons. Data are presented as numbers (n) or proportions (%). Significant p-values are bolded.
Abbreviations: R, radiculopathy; MD, motor deficit.

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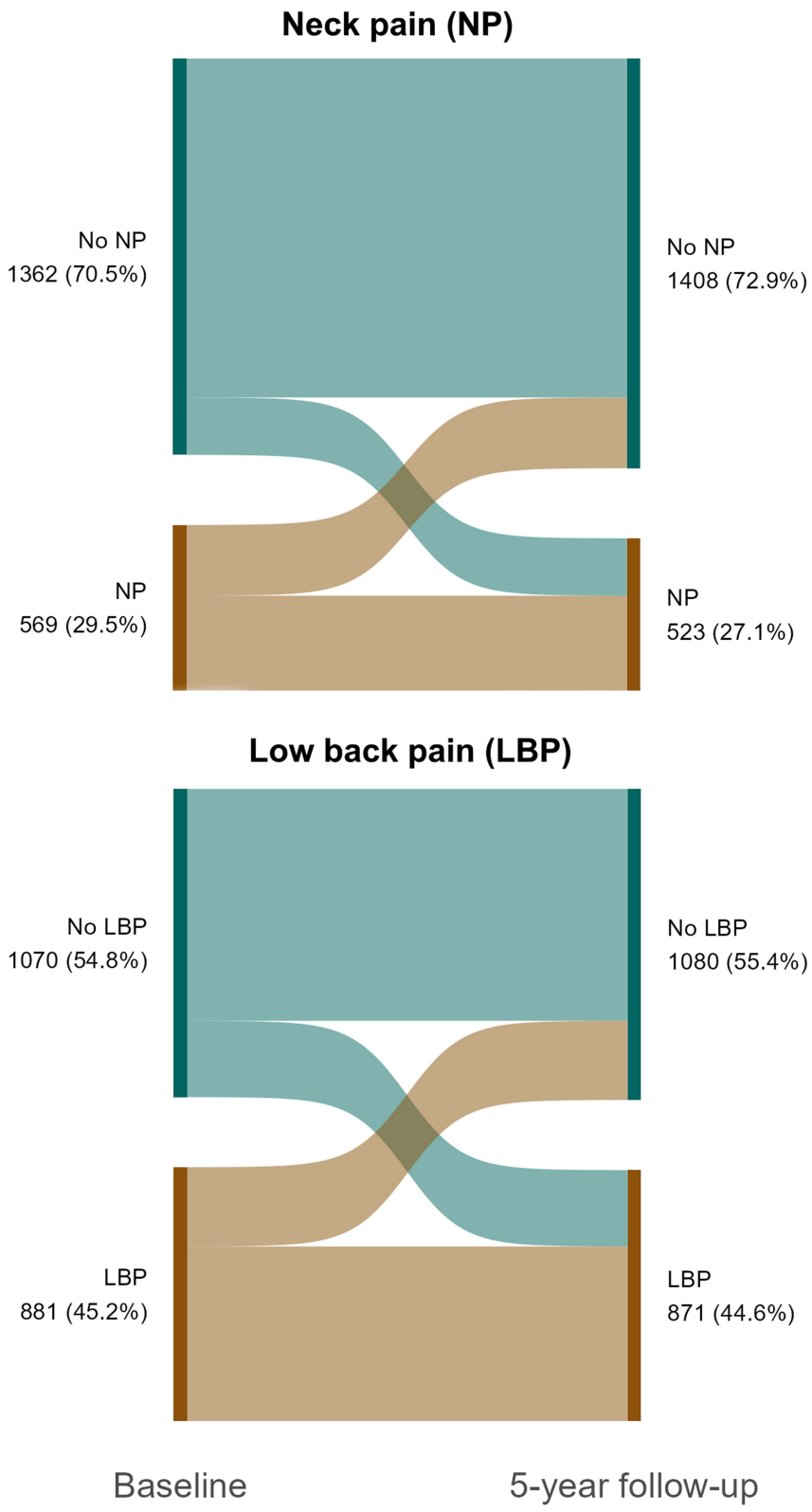

Figure 2 Alluvial diagrams illustrating changes in clinical status between baseline and 5-year follow-up among the 1931 men who provided neck pain (NP) data and the 1951 men who provided low back pain (LBP) data at both time points. Data are presented as numbers with proportions (%) in brackets.

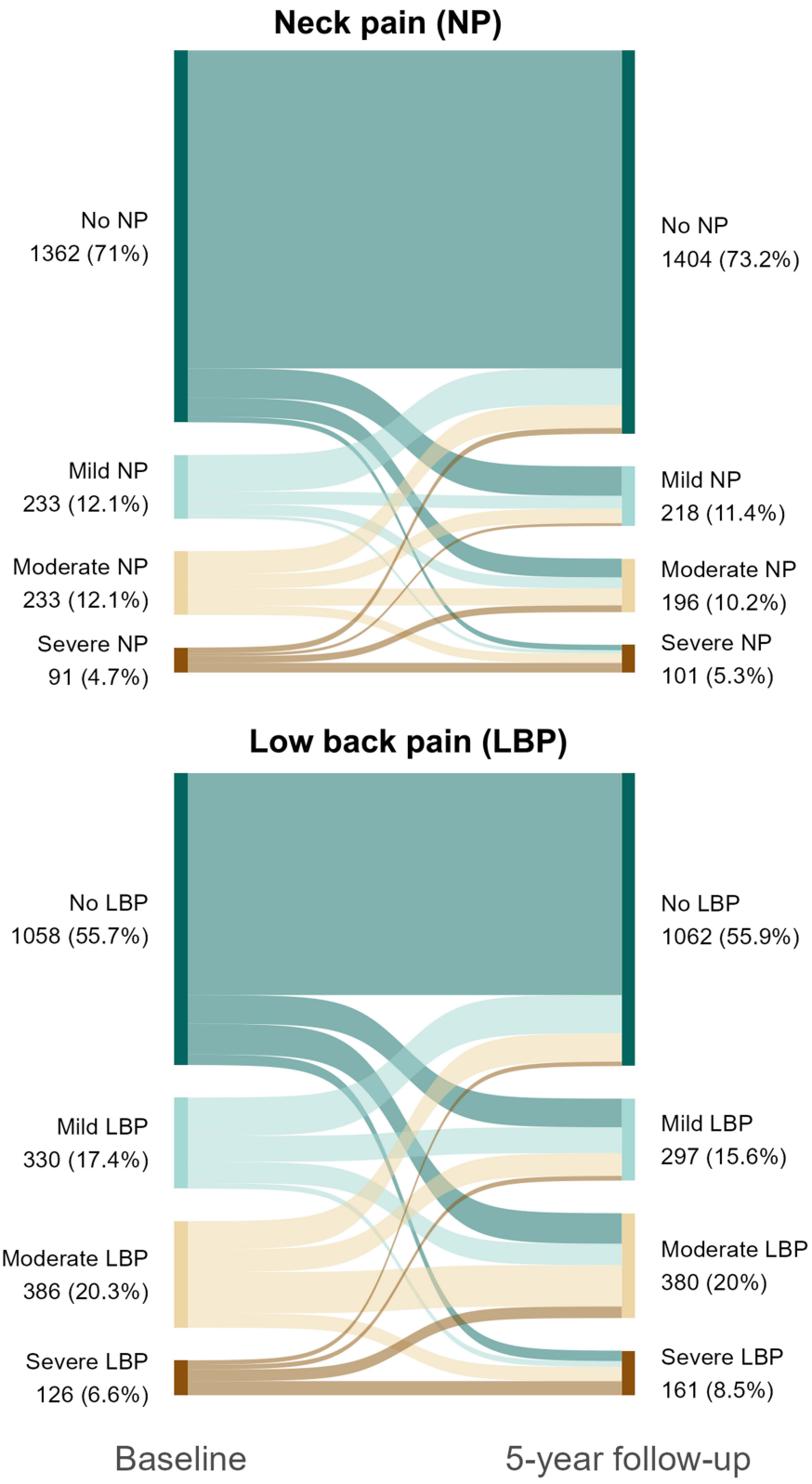

Figure 3 Alluvial diagrams illustrating changes in neck pain (NP)/low back pain (LBP) severity between baseline and 5-year follow-up among the 1919 men with NP severity data and the 1900 men with LBP severity data at both time points. Data are presented as numbers with proportions (%) in brackets.

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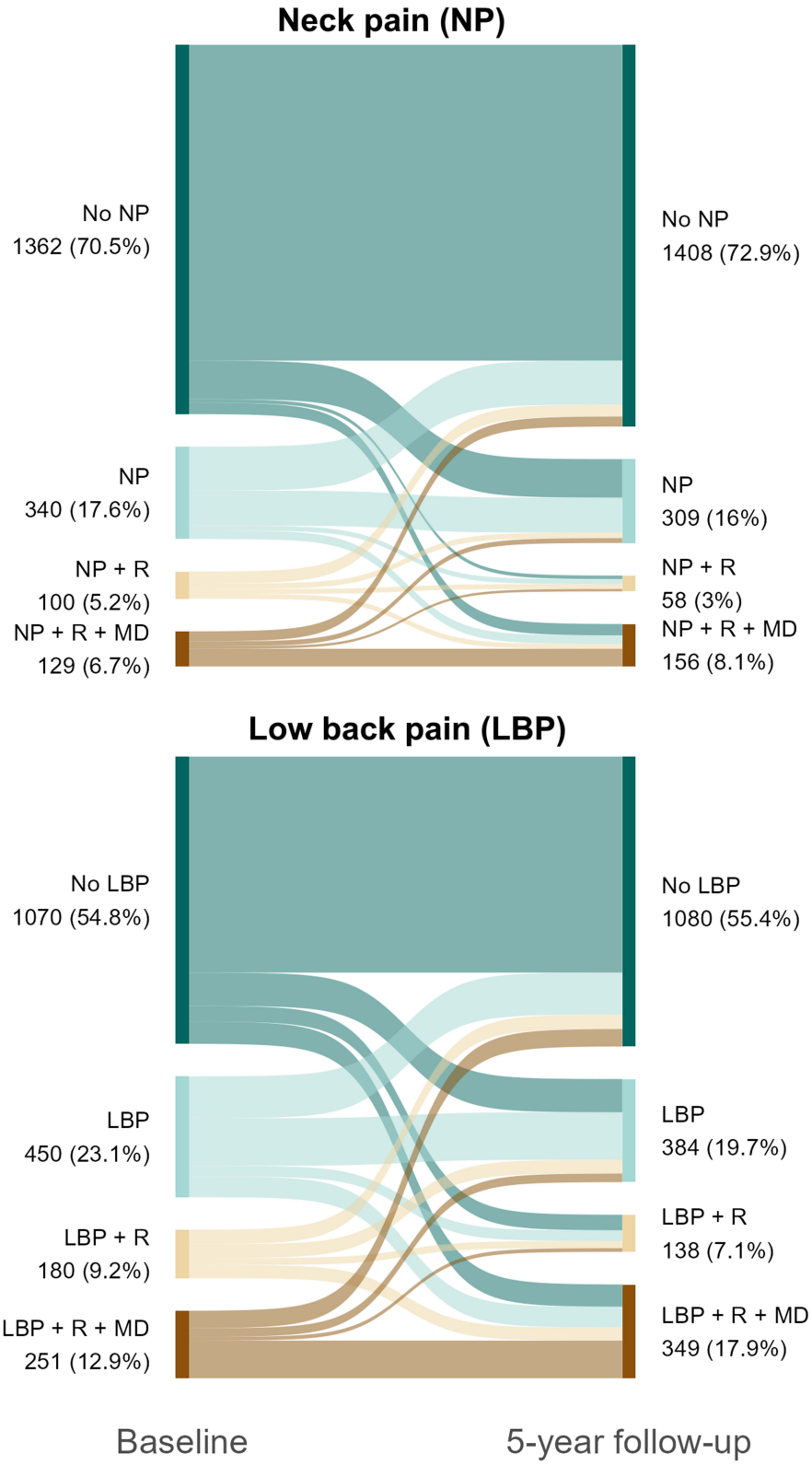

Figure 4 Alluvial diagrams illustrating changes in neck pain (NP) and low back pain (LBP) symptom categories; no pain; NP or LBP with radiculopathy (R); and NP or LBP with R and motor deficit (MD) between baseline and 5-year follow-up. NP associated symptoms were reported by 1931 men and LBP associated symptoms by 1951 men at both time points. Data are presented as numbers with proportions (%) in brackets.

Table 6 Multivariable Logistic Regression Evaluating the Associations Between Exposures/Factors and Risk of Neck Pain (NP)/Low Back Pain (LBP)

	OR for Neck Pain (NP)		OR for Low Back Pain (LBP)	
	At Baseline	**At Baseline and 5-Year Follow-Up**	**At Baseline**	**At Baseline and 5-Year Follow-Up**
Lifestyle factors				
Body mass index, BMI (kg/m^2)				
<25	Reference	Reference	Reference	Reference
≥25 to <30	1.06 (0.86–1.30)	1.27 (0.92–1.76)	1.02 (0.84–1.23)	1.14 (0.89–1.47)
≥30	0.97 (0.71–1.31)	0.85 (0.51–1.41)	0.97 (0.73–1.28)	0.88 (0.59–1.32)
Alcohol (drinks/day)				
<2	Reference	Reference	Reference	Reference
≥2	0.97 (0.70–1.34)	0.71 (0.41–1.25)	0.93 (0.73–1.28)	0.78 (0.52–1.19)
Smoking				
Non-smoker/former smoker	Reference	Reference	Reference	Reference
Smoker	**0.63 (0.44–0.92)**	**0.50 (0.26–0.95)**	0.85 (0.62–1.17)	0.81 (0.51–1.28)
Daily walking (km/day)				
0	Reference	Reference	Reference	Reference
1 to 3	1.14 (0.91–1.44)	1.41 (0.99–2.00)	1.02 (0.83–1.26)	1.11 (0.84–1.48)
>3	1.01 (0.79–1.28)	1.05 (0.73–1.52)	1.04 (0.84–1.28)	1.07 (0.81–1.43)
Social factors				
Born in Sweden	Reference	Reference	Reference	Reference
Born outside Sweden	1.15 (0.80–1.64)	1.33 (0.80–2.24)	1.28 (0.91–1.79)	1.27 (0.83–1.95)
Education				
Public school (7 years)	Reference	Reference	Reference	Reference
Primary school (9 years)	1.29 (0.96–1.75)	1.09 (0.69–1.72)	0.94 (0.71–1.24)	0.93 (0.62–1.37)
High school	1.10 (0.85–1.41)	0.82 (0.56–1.20)	0.96 (0.76–1.21)	1.06 (0.78–1.45)
University/college	0.97 (0.75–1.24)	0.76 (0.51–1.11)	**1.42 (1.13–1.77)**	**1.69 (1.26–2.26)**
Living with another person	Reference	Reference	Reference	Reference
Living alone	1.14 (0.89–1.45)	1.03 (0.70–1.50)	**0.76 (0.60–0.95)**	0.74 (0.54–1.02)
Other factors				
Serious comorbidity[a]				
No	Reference	Reference	Reference	Reference
Yes	1.05 (0.86–1.27)	1.06 (0.78–1.42)	1.08 (0.90–1.29)	1.22 (0.97–1.72)
Fall last 12 months				
No	Reference	Reference	Reference	Reference
Yes	1.02 (0.79–1.32)	1.15 (0.78–1.69)	1.23 (0.97–1.57)	1.25 (0.91–1.72)
Dizziness				
No	Reference	Reference	Reference	Reference
Yes	**1.76 (1.42–2.18)**	**1.98 (1.43–2.73)**	**1.50 (1.23–1.84)**	**1.74 (1.32–2.28)**
Walking aids				
No	Reference	Reference	Reference	Reference
Cane/crutches/walker	0.86 (0.54–1.36)	**2.32 (1.19–4.53)**	0.90 (0.59–1.39)	1.65 (0.88–3.11)
Self-rated health				
Excellent	Reference	Reference	Reference	Reference
Good	**1.38 (1,07–1.77)**	**1.62 (1.09–2.41)**	**1.69 (1.36–2.10)**	**1.64 (1.23–2.19)**
Fair	**2.36 (1.77–3.22)**	**3.14 (1.98–4.99)**	**2.88 (2.18–3.79)**	**3.46 (2.39–4.99)**
Poor/very poor	**2.82 (1.51–5.28)**	**6.35 (2.53–15.92)**	**3.71 (1.98–6.95)**	**5.35 (2.21–12.99)**

Notes: [a]Serious comorbidities include diabetes, stroke, coronary heart disease, pulmonary disease and malignancy. Data are presented as odds ratios (OR) with 95% confident intervals (95% CI) in brackets. Significant ORs are bolded.

with LBP with radicular pain (with or without motor deficits) had, compared to those with no LBP or LBP without radicular pain at baseline, RR 3.1 (95% CI: 2.7–3.6) for having LBP with radicular pain at the 5-year follow-up. The data used for the RR calculations are presented in Tables 3–5 and further visualized in Figures 2–4.

In our multivariable regression model, university/college education, dizziness and poor self-rated health were positively associated with having LBP at both baseline and 5-year follow-up. Living alone was inversely associated with LBP at baseline (Table 6).

Discussion

This study shows that more than half of community-dwelling men aged 69–81 experience spinal pain during a year, close to one third NP and just below half LBP, although mostly with mild or moderate severity. Men with prevalent NP/LBP at baseline have 3–4 times higher risk of experiencing pain in the same region 5 years later, compared to those without pain at baseline. Furthermore, men with severe prevalent NP/LBP at baseline have 7–11 times higher risk of experiencing severe pain in the same region 5 years later, compared to those without severe pain at baseline. We also identified factors that are associated with having NP/LBP both at baseline and 5 years later. It seems possible to identify subgroups of older community-dwelling men at high risk for having severe NP/LBP in an extended perspective.

The 1-year prevalence of NP was 29%, and of LBP 45%, which aligns with previous findings in older male populations.[2,10,12,31,32] This supports the notion that NP/LBP are among the most common chronic pain conditions.[27,33] Given the high prevalence, it is not feasible to refer all individuals with pain, particularly those with mild or moderate symptoms, for thorough medical examination and treatment. Previous research also indicates that NP/LBP prevalence increases through adulthood, peaking around age 50 for NP and age 60 for LBP.[1–3,8,31,34] In middle-aged adults, these patterns can be attributed to heavy physical work demands and inadequate workplace ergonomics.[11,23] In older populations, prevalence tends to stabilize or even decline in the oldest age groups.[1–3,8,31,34] Our findings support the stability of NP/LBP in older men, as prevalence did not change between baseline and 5-year follow-up.

We further found an association between NP/LBP at baseline and NP/LBP 5 years later, consistent with the literature indicating that NP/LBP tend to be recurrent and persistent.[27,33] For example, Parreira et al reported that 58% of 1685 older Australian men with LBP at baseline reported LBP again 2 years later, compared to 28% of those without baseline LBP.[17] In our study, the corresponding proportions were 73% and 27%, respectively (5 years later). Importantly, we also demonstrated that men with severe pain at baseline had significantly higher risk of experiencing severe pain 5 years later (11-fold for NP and 7-fold for LBP), supporting the potential for early identification of high-risk groups.

Another discussion concerns the longitudinal course of NP/LBP associated symptoms. Tubach et al reported that radicular pain is associated with future episodes of similar symptoms among working adults.[23] We have found no such studies in older men, but our study suggests a similar risk pattern in older men. Given that radicular symptoms are associated with greater pain severity than non-radicular NP/LBP,[1,13,14] this may be another group suitable for targeted interventions.

The primary aim of our multivariable analysis was to identify factors being associated with NP/LBP both at baseline and at the 5-year follow-up, that is pain in an extended perspective. In line with common practice, we used ORs, which may overestimate RRs when outcomes are common, and their interpretation should therefore be considered with this limitation in mind. Poor self-rated health and dizziness were associated with NP/LBP at both evaluations, consistent with prior findings, including those from the MrOS US cohort.[8,18,35,36] The inverse association between smoking and NP was however unexpected, as smoking has generally been linked to higher prevalence of both NP and LBP.[37–39] However, the association between smoking and NP has been reported as weaker than that with LBP,[39] and there are also other studies that report smokers to have a lower prevalence of NP/LBP than non-smokers.[8] Another unexpected finding was the positive association between high educational level (university/college) and LBP, data that contrasts previous publications.[8,40,41] We have no clear explanation for this finding, but one reason could be that different studies define high education differently, and that the mechanical load in manual workers may be different in different societies. Our findings, including the heterogeneity to other studies, support the view that the longitudinal course of NP/LBP is complex, involving physical, psychological, and socioeconomic factors[6,31,41,42] as well as highlight the complexity when evaluating the relationship between lifestyle factors and NP/LBP.

Although existing literature suggests that many acute episodes of NP/LBP resolve within weeks or months, substantial evidence indicates that a large proportion of individuals experience episodic and recurrent problems,[11,12,23,43] a pattern also supported by our results. In many cases, the pain is mild and does not require specific treatment. When treatment is necessary, interventions for acute NP/LBP include pharmacological therapies (paracetamol, NSAIDs and muscle relaxants), exercise, and patient education.[23,43] For persistent NP/LBP, while no treatments offer a cure, interventions such as exercise and psychological approaches can effectively reduce pain and disability, particularly when integrated into a multifactorial management plan that consider biological, psychological, and social factors.[20,23,43] Early identification of high-risk groups for long-term pain is a key strategy to decrease disability associated with NP/LBP.

Study strengths include the use of a large, prospective, population-based cohort of older men within a narrow age range, the use of prospective data, and the comparison between baseline and the 5-year follow-up by using the same individuals. Further strengths include the rich dataset and the large number of participants, which enabled us to control for multiple confounding variables in the multivariable analysis.

Limitations include the risk of selection bias due to dropouts (who were older and unhealthier than those who remained in the study). An attendance rate of 45% is however usually regarded as acceptable.[10] Other limitations include the absence of data on pain duration, frequency, and periodicity, as well as the lack of information on treatments received (eg, physiotherapy, chiropractic care, surgery, or analgesic use). Therefore, we cannot claim to describe the natural course of NP/LBP but rather the development of pain in men managed under standard care practices. The narrow age span at baseline, as well as a follow-up period of only 5 years, makes conclusions regarding the influence of age on NP/LBP questionable (which is why age was not included in the multivariable analysis). Furthermore, our inferences are limited to older, community-dwelling men, not to women, younger age groups, or institutionalized individuals.

Conclusion

More than half of community-dwelling men aged 69–81 experience pain in the spinal region during a year (nearly one-third NP and just below half LBP). The majority experience only mild to moderate pain. Baseline pain, especially severe pain, strongly predicts pain 5 years later, and associated factors may help identify high-risk groups suitable for targeted interventions.

Data Sharing Statement

The data that supports the findings of this study are available on request from the corresponding author H.D. The data is not publicly available because their contents could compromise research participant privacy/consent.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

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