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Clinical Study

Associations of socioeconomic and lifestyle characteristics, psychological symptoms, multimorbidity, and multisite pain with sciatica – a 15-year longitudinal study

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ABSTRACT

BACKGROUND CONTEXT: Sciatica is defined as pain radiating from the low back to the leg, usually below the knee. It is a disabling condition that causes a major burden to health care and society. Previous evidence of the multifactorial etiology of sciatica comes mostly from cross-sectional studies. Larger, longitudinal studies with a multidimensional set of variables are needed.

PURPOSE: To examine how socioeconomic and lifestyle characteristics, psychological symptoms, multimorbidity, and multisite pain are associated with sciatica.

STUDY DESIGN: A longitudinal study of the Northern Finland Birth Cohort 1966.

PATIENT SAMPLE: In total 6,683 working-aged members of the Northern Finland Birth Cohort 1966.

OUTCOME MEASURES: Self-reported sciatic pain status over a 15-year study period.

METHODS: We conducted a 15-year longitudinal study from the age of 31 to 46. We used multivariable generalized estimation equations analysis to examine how socioeconomic characteristics (low education, unemployment, and living alone), lifestyle characteristics (overweight, obesity, current smoking, and physical inactivity), psychological symptoms (depression, anxiety), multimorbidity, and multisite pain were associated with sciatica.

RESULTS: At the age of 31, 21.1% of the study population reported sciatic pain and at the age of 46, 36.7%. Multisite pain was clearly the strongest factor associated with sciatica (odds ratio [OR] 2.61, 95% confidence interval [CI] 2.34–2.92). In descending order of effect size, older age, low education, psychological symptoms, multimorbidity, overweight, obesity, physical inactivity and current smoking were positively associated with sciatica. Their ORs varied between 1.17 and 2.18. Living alone was negatively associated with sciatica (OR 0.81, 95% CI 0.72–0.90).

CONCLUSIONS: Multisite pain had the strongest association with sciatica. The effect sizes of the other factors were clearly smaller. To our knowledge this is the first study to evaluate the association of multisite pain with sciatica. This finding may have considerable implications for clinical

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Keywords: Multimorbidity; Multisite pain; Northern Finland Birth Cohort; Psychological symptoms; Sciatica; Socioeconomic and lifestyle characteristics

Introduction

Sciatica is defined as pain radiating from the low back to the leg, usually below the knee. Depending on the definition of sciatica, its prevalence varies considerably, ranging from 1.6% to 43% [1], being 3.8% among middle-aged working individuals in the Health 2000 Survey in Finland [2]. The most common cause of sciatica is a herniated disc compressing the lumbar nerve root [3], and the highest prevalence of symptomatic disc herniations is among males aged 30 to 50 [4]. Sciatica is a major cause of prolonged work disability, and it causes a higher burden to health care systems than nonspecific low back pain [5]. Thus, identifying the factors associated with sciatica is important for developing means of prevention and rehabilitation.

The etiology of sciatica seems to be multifactorial. Overweight, obesity and smoking are well-established risk factors for sciatica [6–8]. Physical occupational workload, including lifting and carrying heavy burdens, and being male increase the risk of sciatica [2,9–11]. In addition, body height, mental stress, and exposure to work related whole-body vibration among obese people are known to be associated with sciatica [7,9,12]. Instead, high levels of physical leisure-time activity and walking or cycling to work seem to protect against sciatica [13,14].

Most previous studies have been carried out in cross-sectional settings. Only a few prospective, over 10-year longitudinal studies have examined large population-based samples [8,10,12,14]. Our study, with a 15-year follow-up of a large population-based cohort, aimed to fill this gap. As for other ethnicities than Northern Finns, certain risk factors for sciatica have been identified in a cross-sectional Tunisian study [11], but to our knowledge there are no prior longitudinal studies conducted on the same topic in other ethnic backgrounds either. General population studies with a multidimensional set of variables including socioeconomic and lifestyle characteristics, psychological symptoms, multimorbidity, and multisite pain are required to obtain a comprehensive understanding of their association with sciatica.

In this study, we aimed to identify factors associating with sciatica from early adulthood to midlife. We assessed how a large set of socioeconomic and lifestyle characteristics, psychological symptoms, multimorbidity, and multisite pain were associated with the incidence of sciatica over a 15-year study period.

Materials and methods

Study population

The study population consisted of the Northern Finland Birth Cohort (NFBC1966), which is a prospective, population-based cohort study of 12,231 children born in the provinces of Oulu and Lapland between January 1, 1966 and December 31, 1966 [15,16]. Data collection started in the antenatal phase and the coverage of all births was 96.3%. In 1997 to 1998, when the cohort members were 31 years old, they responded to a postal questionnaire (n=8,767) and underwent the measurement of height and weight (n=6,033). In 2012 to 2014 in the 46-year survey, 6,774 cohort members responded to the questionnaire and 5,861 attended the measurement of height and weight. An individual was included in the present analysis if they had at least some postal questionnaire or measurement data (or both data) available from 31 to 46 years. The only exclusion criterion was the lack of any data from either follow-up. Our final study population included 6,683 individuals with 9,099 observations over the follow-up (average 1.4 observations per case). Fig. 1 presents a flow chart of the study.

Sciatic pain (outcome)

In the questionnaires sciatic pain was defined as low back pain with pain or numbness radiating from the low back to the leg below the knee. At 31 and 46 years, the respondents were asked whether they had experienced sciatic pain during the previous 12 months (yes/no).

Independent variables

Socioeconomic characteristics

Participants reported their basic education as: (1) Less than nine years of compulsory school, (2) Compulsory school, or (3) Completion of matriculation examination. Additional education was reported according to the following alternatives: (1) None, (2) Occupational course, (3) Vocational school, (4) Other lower-level institute/academy/college, (5) Polytechnic, (6) University, (7) Other, and (8) Not yet completed. Participants were considered to have low education if they had completed only compulsory school (≤9 years), medium education if they had studied for over 9 to 12 years, and high education if they had studied for over 12 years [17].

Employment status was assessed by asking “Which alternative best describes your current employment status?” The response alternatives were (1) Permanent full-time employee, (2) Permanent part-time employee, (3) Temporary full-time employee, (4) Temporary part-time employee, (5) Full-time self-employed or entrepreneur, (6) Part-time self-employed or entrepreneur, (7) Full-time student, (8) Part-time student, (9) Unemployed for <6 months, (10) Unemployed for 6 to 12 months, (11) Unemployed for

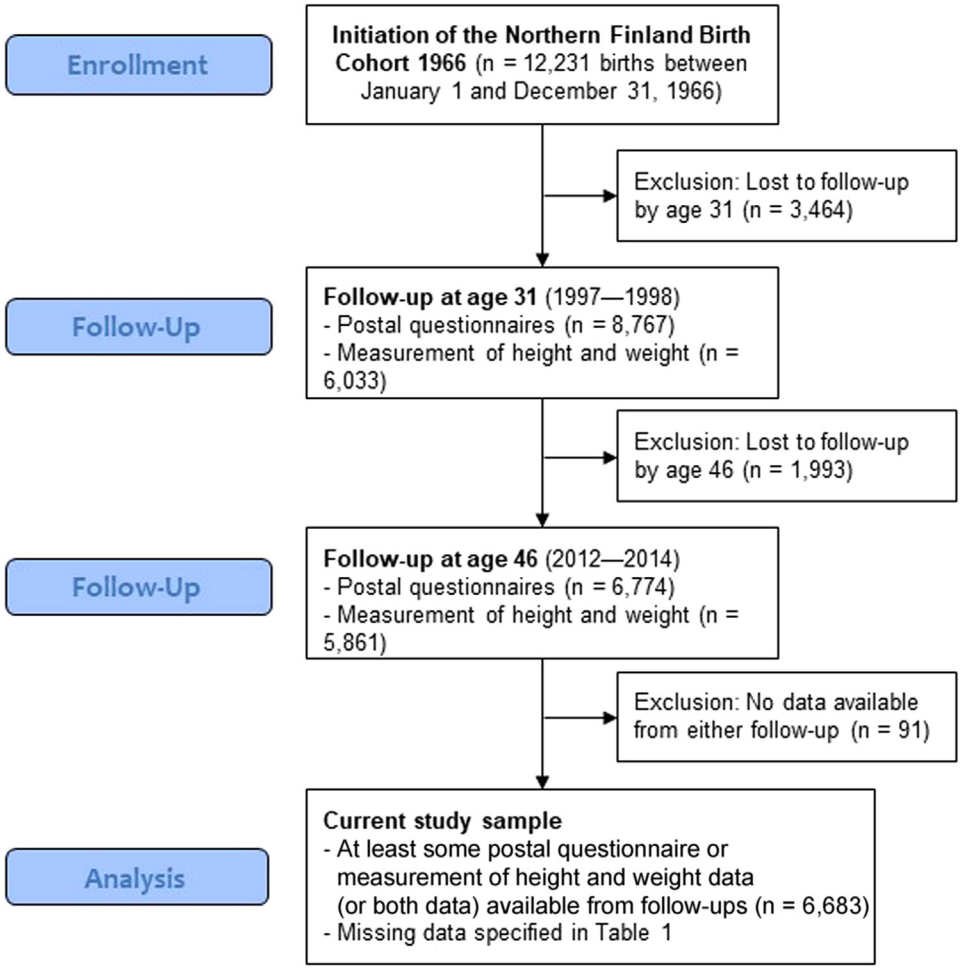

Fig. 1. Flow chart of the study.

>12 months, (12) Employed/educated through labor market support, (13) Laid off or reduced working hours, (14) Maternity/paternity leave or parental leave, (15) Retired, (16) Caring for my household, or (17) Other. Individuals were considered unemployed if they were not working or studying full time or part time, self-employed or entrepreneurs, employed/educated by labor market support or on parental leave [18].

Marital status was selected from the following choices: (1) Married, (2) Cohabiting, (3) In a registered partnership, (4) Unmarried, (5) Divorced and divorced from a registered partnership, or (6) Widow and widow from a registered partnership, and was used as a dichotomized variable (living alone vs not living alone). Living alone was defined as not being married, cohabiting or in a registered partnership [18].

Lifestyle characteristics

A research nurse measured the height and weight of each participant. At the age of 46, height was measured twice and final height was the mean of the two measurements. Self-reported values were used for the few individuals who lacked objective measurements (n=200 at the age of 31, n=307 at the age of 46). Body mass index (BMI) was calculated as weight (kg) divided by height (m) squared. Overweight was defined as BMI $\geq$ 25 kg/m^2 and obesity as BMI $\geq$ 30 kg/m^2. Normal weight was considered as BMI < 25 kg/m^2 [19].

Smoking behavior was elicited by asking whether respondents had ever smoked during their lives and whether they currently smoked. The participants who smoked currently were asked how often they smoked. The alternatives were (1) 7 days a week, (2) 5 to 6 days a week, (3) 2 to 4 days a week, (4) Once a week, (5) Occasionally, and (6) Not at all. A current smoker was an individual who reported smoking more often than once a week. Those who smoked occasionally or not at all were defined as nonsmokers [18].

The level of physical activity was assessed by asking how often the individuals participated in brisk exercise during their leisure-time. Brisk exercise was defined as physical activity that causes at least some breathlessness and sweating. The alternatives were (1) Once a month or less often, (2) 2 to 3 times a month, (3) Once a week, (4) 2 to 3 times a week, (5) 4 to 6 times a week, and (6) Daily. The individual was considered active if they participated in

physical activity 4 to 7 times a week, moderately active if they participated 1 to 3 times a week, and inactive if they participated 2 to 3 times a month or less often [20].

Psychological symptoms

Depression and anxiety were evaluated using the Hopkins Symptom Check List-25 (HSCL-25), which is a 25-item, validated questionnaire that screens symptoms of depression and anxiety. We calculated the mean score from the answers scaled from 1 to 4 (1=not at all, 4=extremely) [21] and then dichotomized the mean score variable. Clinically relevant mental distress was defined as the total mean score ≥1.55 [21,22], thus the following two categories were formulated: psychological symptoms (HSCL-25 mean score ≥1.55) vs no psychological symptoms (HSCL-25 <1.55).

Other independent variables

Multimorbidity was elicited at the ages of 31 and 46 by asking whether the respondents had chronic diseases diagnosed or treated by a medical doctor. We focused on the diseases that were most prevalent among multimorbidity patients [23]: asthma or bronchial dilatation/chronic bronchitis, heart failure or angina pectoris, diabetes, hypertension, epilepsy, migraine, rheumatoid arthritis, depression, or psychosis, drinking problem or other intoxicant problem, obesity, and thyroid disease. Multimorbidity was defined as having two or more chronic diseases [23].

Multisite pain was evaluated by the following questions: "Have you had pain or aches during the last 12 months in the following body parts?" (1) Neck, back of the head, (2) Neck pain radiating to the arm, (3) Shoulder region, (4) Arms or elbows, (5) Wrists, hands, or fingers, (6) Lower back, (7) Hips, (8) Knees, and (9) Ankles, feet. Alternatives were categorized into four anatomical areas: the neck-shoulder region, lower back, upper extremities, and lower extremities [18]. Multisite pain was defined as musculoskeletal pain in more than one anatomical body part [24,25]. At first we included lower back pain in the multisite pain variable, but as the outcome variable includes an item about back pain, we excluded lower back from the list of potential pain sites. As such, the final multisite pain variable was constructed on the basis of pain in the neck-shoulder region, upper extremities, and lower extremities.

The age variable was dichotomous, as the cohort members were evaluated at the ages of 31 and 46. The sex variable (female/male) was extracted from birth records.

Statistical analysis

Data were analyzed using the statistical program IBM SPSS Statistics version 25 (IBM, Armonk, NY, USA). The threshold for statistical significance was p=.05. Frequencies (n) and percentages (%) were used to describe the distributions of the variables. Comparisons of the current study sample with excluded individuals were performed by means of the chi-square test.

We used generalized estimation equations (GEE) to assess the longitudinal associations between the determinants (ie, independent variables as introduced above) and the outcome (ie, sciatica). GEE is a semiparametric regression-based method for analyzing intercorrelated and longitudinal data [26]. The binary logistic model used the "exchangeable" working correlation matrix structure. All observations were included, that is individuals with available data at either time point were included in the analysis, minimizing the need for exclusions and attrition bias. This involved the assumption of data missing completely at random. All variables except for sex were time varying. Longitudinal data were considered to be nested within the individuals. We first ran univariate models for each independent variable and the outcome. As the main approach, we constructed a full multivariable model that included all independent variables. We also ran an intermediate model (ie, full multivariable model except for multisite pain). Sex interaction was explored by including interaction terms in the models, but these were not statistically significant. Exponentiated regression coefficients (ie, odds ratios, ORs), 95% Wald confidence intervals (CIs), and p-values were documented from the SPSS output. The ORs served as measures of effect size, denoting the association between an independent variable and the outcome over the study period.

Results

Our final data included a total of 9,099 observations of 6,683 individuals at the ages of 31 and 46 (or either). Table 1 shows the characteristics of the study population. At the age of 31, 21.1% reported sciatic pain and at the age of 46, 36.7%. Of the 1,306 individuals who reported sciatic pain at the age of 31, it persisted in 603 individuals (46.2%) at the age of 46. Multisite pain at 31 and 46 years was reported by 63.2% and 63.5%, respectively. The prevalence of obesity was 8.7% at the age of 31 and 21.7% at the age of 46. A minority of the population smoked regularly at the ages of 31 (28.4%) and 46 (20.1%). In the analysis of representativeness, we discovered some statistically significant differences in the background variables between the sample and those excluded (eg, higher percentage of females among the sample), but the differences were minor in relation to effect size. Importantly, there was no difference between the sample and those excluded in the prevalence of sciatic pain at 31 or 46 years (Supplementary Table 1).

Table 2 represents the associations of the independent variables with sciatic pain. In the full multivariable model, multisite pain showed the strongest association with sciatic pain (OR 2.61, 95% CI 2.34–2.92). Multimorbidity (OR 1.31, 95% CI 1.16–1.49) and psychological symptoms (OR 1.50, 95% CI 1.33–1.69) were also associated with sciatic pain. Older age (OR 2.18; 95% CI 1.99–2.40), low

Table 1
Characteristics of study population.

Characteristic	Age 31		Age 46	
	%	N	%	N
Number of individuals		5,048. . .6,683		5,068. . .6,683
Sex, female	52.4	3,505	52.4	3,505
Missing	*0*	*0*	*0*	*0*
Education level				
Low	5.1	311	3.2	178
Medium	54.5	3,316	48.7	2,676
High	40.4	2,455	48	2,639
Missing	*9*	*601*	*17.8*	*1,190*
Unemployment*	14.9	924	12.5	695
Missing	*7*	*465*	*17*	*1,133*
Living alone†	26.2	1,632	22.2	1,242
Missing	*6.6*	*444*	*16.4*	*1,094*
Body mass index				
Normal	61.8	3,860	39.2	2,237
Overweight	29.6	1,849	39.1	2,236
Obesity	8.7	541	21.7	1,239
Missing	*6.5*	*433*	*14.5*	*971*
Current smoking‡	28.4	1,769	20.1	1,078
Missing	*7*	*465*	*19.8*	*1,321*
Level of physical activity				
Brisk exercise 2–3 times a month or less often	33.9	2,116	28	1,553
Brisk exercise 1–3 times a week	53.2	3,318	56.3	3,128
Brisk exercise 4–7 times a week	12.9	808	15.7	873
Missing	*6.6*	*441*	*16.9*	*1,129*
Psychological symptoms§	18.2	1,119	19.9	1,076
Missing	*7.8*	*523*	*19.1*	*1,279*
Multimorbidity‖	12.9	804	24.5	1,373
Missing	*6.4*	*429*	*16.2*	*1,083*
Multisite pain¶	63.2	3,188	63.5	3,432
Missing	*24.5*	*1,635*	*19.1*	*1,278*
Sciatic pain#	21.1	1,306	36.7	1,860
Missing	*7.4*	*497*	*24.2*	*1,615*

Number of individuals is different between variables due to missing data. Percentages of missing data are given relative to the full sample (n=6683). Other percentages are given relative to valid responses in the respective variable.

* Not working or studying full time or part time, not an entrepreneur nor self-employed, not employed by labor market support or on parental leave.

† Not married, in a registered partnership nor cohabiting.

‡ Smoking currently more than once a week.

§ Symptoms of depression and anxiety, Hopkins Symptom Checklist-25 total mean score ≥1.55.

‖ Two or more chronic diseases.

¶ Chronic musculoskeletal pain in more than one anatomical body part (lower back excluded from the list of potential pain sites).

Low back pain with pain or numbness radiating from low back to leg below the knee.

education (OR 1.87, 95% CI 1.48–2.36), overweight (OR 1.29, 95% CI 1.15–1.43), obesity (OR 1.19, 95% CI 1.02–1.38), physical inactivity (OR 1.18, 95% CI 1.01–1.38), and current smoking (OR 1.17, 95% CI 1.04–1.32) were also positively associated with sciatic pain. Living alone was negatively associated (ie, a protective factor) with sciatic pain (OR 0.81, 95% CI 0.72–0.90). Sex and unemployment were not significantly associated with sciatic pain. The full multivariable model showed similar effect sizes to those in the univariate and intermediate models.

Discussion

The purpose of this large population-based study was to identify the independent factors associating with sciatica in a multidimensional prospective dataset. The data showed that multisite pain was clearly the factor most strongly associated with sciatic pain. In descending order of effect size, older age, low education, psychological symptoms, multimorbidity, overweight, obesity, physical inactivity, and current smoking were also positively associated with sciatic pain. Living alone was negatively associated with sciatic pain, thus being a protective factor.

The effect size of multisite pain remained significantly high in the full multivariable model that considered all independent variables. The multisite pain variable had the strongest association with sciatica even though the lower back was not included in the list of potential pain sites. This finding suggests that multisite pain has a strong independent association with sciatica. A similar set of multidimensional

Table 2
Associations of socioeconomic and lifestyle characteristics, psychological symptoms, multimorbidity, and multisite pain with sciatic pain

	n=9,099 observations								
	Univariate models			Multivariable model without multisite pain			Full multivariable model		
	OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value
Age*	**2.19**	**2.02; 2.38**	**<.001**	**2.15**	**1.97; 2.36**	**<.001**	**2.18**	**1.99; 2.40**	**<.001**
Sex†	1.08	0.98; 1.19	.104	**1.18**	**1.06; 1.30**	**.003**	1.06	0.95; 1.18	.276
Education level									
Low	**1.89**	**1.52; 2.34**	**<.001**	**2**	**1.59; 2.52**	**<.001**	**1.87**	**1.48; 2.36**	**<.001**
Medium	**1.42**	**1.29; 1.57**	**<.001**	**1.49**	**1.34; 1.66**	**<.001**	**1.43**	**1.28; 1.60**	**<.001**
High	1			1			1		
Unemployment	**1.20**	**1.06; 1.36**	**.005**	1.03	0.90; 1.18	.703	1.04	0.91; 1.20	.553
Living alone	**0.83**	**0.75; 0.93**	**.001**	**0.78**	**0.70; 0.88**	**<.001**	**0.81**	**0.72; 0.90**	**<.001**
Body mass index									
Normal	1			1			1		
Overweight	**1.55**	**1.40; 1.71**	**<.001**	**1.32**	**1.19; 1.47**	**<.001**	**1.29**	**1.15; 1.43**	**<.001**
Obesity	**1.99**	**1.75; 2.27**	**<.001**	**1.23**	**1.06; 1.43**	**.006**	**1.19**	**1.02; 1.38**	**.027**
Current smoking	**1.24**	**1.11; 1.37**	**<.001**	**1.21**	**1.08; 1.36**	**.001**	**1.17**	**1.04; 1.32**	**.007**
Level of physical activity									
Brisk exercise 2–3 times a month or less often	**1.23**	**1.07; 1.43**	**.005**	**1.17**	**1; 1.36**	**.047**	**1.18**	**1.01; 1.38**	**.034**
Brisk exercise 1–3 times a week	1.05	0.92; 1.20	.478	1.04	0.90; 1.20	.585	1.06	0.92; 1.23	.387
Brisk exercise 4–7 times a week	1			1			1		
Psychological symptoms	**1.86**	**1.67; 2.08**	**<.001**	**1.66**	**1.47; 1.87**	**<.001**	**1.50**	**1.33; 1.69**	**<.001**
Multimorbidity	**1.96**	**1.75; 2.18**	**<.001**	**1.43**	**1.26; 1.62**	**<.001**	**1.31**	**1.16; 1.49**	**<.001**
Multisite pain	**2.87**	**2.57; 3.19**	**<.001**				**2.61**	**2.34; 2.92**	**<.001**

OR, Odds ratio; CI, Wald's confidence interval.
Odds ratios (ORs) for sciatic pain from GEE models.
* Time points age 46 versus age 31.
† Sex, female versus male.

predictors have been associated with multisite pain using the same study population in a 15-year follow-up [18]. Although multisite pain has been previously observed as playing a significant role in the onset [27] and persistence [28] of low back pain, to our knowledge, no previous studies have confirmed the strong, independent association of multisite pain with sciatica. Our novel finding emphasizes the importance of acknowledging multisite pain in clinical practice when treating patients suffering from sciatica. However, further studies are needed to replicate these findings.

Multimorbidity and psychological symptoms were associated with sciatica even though their effect sizes were clearly smaller than those of multisite pain. Musculoskeletal conditions are one of the four most common disease clusters among multimorbidity patients [29], but the direction of causality between musculoskeletal conditions and other long-term diseases is not fully understood and the interplays are generally complex [30]. Here we showed that multimorbidity is associated with sciatica in a prospective dataset. According to our knowledge, no previous studies on the association between multimorbidity and sciatica exist. Our results are in line with those of previous studies showing that anxiety and depression are related to disk-related sciatica and lumbar radicular pain [8,11]. Mental distress also has a modifying effect on the association between lumbar disc degeneration and the bothersomeness of low back pain [31]. Future randomized controlled trials could utilize our results in the assessment and treatment strategy of sciatica patients.

We found that overweight, obesity, physical inactivity, and current smoking were independently associated with sciatica, supporting partly the previously reported associations [6,8,32,33]. In our data, obesity was associated with sciatica in relation to normal weight, but the difference between overweight and normal weight was also statistically significant. However, the small effect sizes suggest that other unfavorable factors may have an impact on overweight and obesity, and this may also account for the small effect sizes of overweight and obesity in the full multivariable model. Low-grade inflammation may potentially explain the associations of overweight and obesity with sciatica. Proinflammatory markers that secrete from excess adipose tissue are related to low-grade inflammation among obese people [34]. One of these markers is TNF-α; it appears to be associated with the inflammatory properties of nucleus pulposus, and may thus play a role in the development of sciatica [35]. Physical inactivity showed statistical significance in the full multivariable model. This finding is different from those of previous studies on the

association between physical activity and self-reported sciatica [7] and the association between leisure-time physical activity and lumbar disc herniation among males [12]. In the same study population, participating in any sport or belonging to a sports club in adolescence was not significantly associated with the risk of hospitalization due to sciatica in adulthood [10]. However, it has also been suggested that a moderate to high level of physical activity in leisure-time may reduce the risk of developing lumbar radicular pain [33]. Exercising is nonetheless recommendable, especially walking or cycling to work, which seems to protect against sciatica [13].

Of the socioeconomic variables, education had a stronger association with sciatica than unemployment. In our data, unemployment was not significantly associated with sciatica. Education was associated with sciatica among individuals who had studied ≤9 years in contrast to individuals who had studied over 12 years, as well as among individuals who had studied over 9 to 12 years in contrast to those who had studied over 12 years. This statistically significant finding underlines the importance of taking education into account when evaluating sciatic patients. Our study showed that living alone protects against sciatica, and a similar association has been shown with respect to multisite pain [18]. However, there are also contrary reports that marital status is not associated with sciatica [36].

In this study, the prevalence of sciatica was slightly higher among females, but sex was not independently associated with sciatica in the full multivariable model. In addition, there was no sex-interaction in the models. Previous literature has shown that working-aged men suffer more frequently from sciatica than women [2], but there is also conflicting evidence showing lumbar radicular pain to be more common among women [8]. We found that the odds of experiencing sciatica more than doubled from the age of 31 to the age of 46 in the full multivariable model, suggesting that the pain increases as people get older. This finding is confirmed by a previous study, which showed that the prevalence of lumbar radicular pain increased with age [8].

The results of this study may have considerable implications for clinical practice, as our findings could be exploited to optimize the prevention, treatment, and rehabilitation of sciatica. Regarding multisite pain, more frequent follow-ups, for instance, could be considered for sciatic patients with a history of multisite pain, potentially leading to a more successful outcome. Pain management should consider not only the presence of sciatic pain but also the more comprehensive biopsychosocial context, including multisite pain. When evaluating the significance of multisite pain in our study, it should be acknowledged that not all pain radiating from the low back to the leg is sciatic pain. It is possible that some sciatic symptoms result from, for example, gluteal tendinopathy, which can simulate the symptoms of sciatica. Psychological symptoms seem to prolong recovery from sciatica and thus, their recognition and treatment is crucial. In this study, normal weight and nonsmoking were the most important modifiable lifestyle characteristics related to sciatica. These factors are widely recognized in everyday clinical practice, and our findings highlight their significance for sciatica. These characteristics should be considered from prevention to rehabilitation, and if needed, the patient should be referred to an expert (ie, dietician in weight control). Other factors that cannot be influenced by the means of medicine (ie, age, marital status) should still be acknowledged when evaluating sciatic patients.

The NFBC1966 is an unselected cohort of Northern Finnish adults, which improves the generalizability of the current findings to Northern Finns with sciatic pain. There were some statistically significant differences between the current sample and those excluded, but the effect sizes were small; this is a well-known phenomenon in large unselected observational studies. The main strength of our study was its large population-based cohort of 6,683 people; this increased the applicability of our findings to the general population. The longitudinal setting provided a good opportunity to evaluate the development of sciatica and the underlying factors over a 15-year study period. Our dataset comprised a multidimensional set of variables, including socioeconomic and lifestyle characteristics, psychological symptoms, multimorbidity and multisite pain.

However, the study also had limitations. The outcome variable was self-reported and the duration of sciatica was not enquired in the questionnaires. Although questionnaires for this number of people produce large data, no clinical examinations such as neurological testing and neural tension tests were carried out. A clinical examination for this number of people would have been very challenging to organize. As neither lumbar magnetic resonance imaging nor electroneuromyography were performed, we had no exact information on the etiology of sciatica or radiculopathy. Residual confounding is possible and despite the 15-year study period, data collection only occurred at two time points, which can be also seen as a limitation. Moreover, as the study was observational, causal inference cannot be made.

Conclusion

Multisite pain had the strongest independent association with sciatica in a large population-based sample of Northern Finns. Other factors that associated significantly with sciatica were older age, low education, psychological symptoms, multimorbidity, overweight, obesity, physical inactivity, current smoking and living alone. The effect sizes of other variables were smaller than that of multisite pain, supporting previous evidence that the etiology of sciatica is multifactorial. Our observational study did not allow causal inference. Further studies, also in other ethnic backgrounds, are needed to explore and validate the role of multisite pain and other psychosocial factors among patients with sciatica. Focusing on these previously less studied entities in the treatment and rehabilitation of sciatica, may improve the outcome of sciatic pain patients and speed up their recovery.

Data availability

NFBC data are available from the University of Oulu, Infrastructure for Population Studies. Permission to use the data can requested for research purposes via an electronic material request portal. In the use of data, we followed the EU general data protection regulation (679/2016) and the Finnish Data Protection Act. The use of personal data was based on the cohort participant's written informed consent in their most recent follow-up, which may cause limitations to their use. Please contact the NFBC project center (NFBCprojectcenter@oulu.fi) and visit the cohort website (www.oulu.fi/nfbc) for more information.

Ethical aspects

Ethical approval was obtained from the Ethics Committee of the Northern Ostrobothnia Hospital District 94/2011 (12.12.2011). This study followed the Declaration of Helsinki. Participation in the study was voluntary and the data were processed anonymously.

Declaration of competing interest

One or more of the authors declare financial or professional relationships on ICMJE-TSJ disclosure forms.

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Supplementary materials

Supplementary material associated with this article can be found in the online version at https://doi.org/10.1016/j.spinee.2023.12.013.

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