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To cite this article: Hafþís Skúladóttir, Guðmundur Kristján Óskarsson, Þorbjörg Jónsdóttir, Sigfríður Inga Karlsdóttir & Eva Halapi (2025) Chronic pain and quality of life among people with whiplash injury in Iceland, International Journal of Circumpolar Health, 84:1, 2556085, DOI: [10.1080/22423982.2025.2556085](https://doi.org/10.1080/22423982.2025.2556085)

To link to this article: <https://doi.org/10.1080/22423982.2025.2556085>



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Published online: 03 Sep 2025.



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## Chronic pain and quality of life among people with whiplash injury in Iceland

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### ABSTRACT

The purpose was to examine the participants' pain severity, pain interference, health-related quality of life (HRQoL), needs, access and use of healthcare services, and the difference between those reporting whiplash injury (>12 months) with and without chronic pain and those without whiplash injury but with chronic pain. This is a cross-sectional cohort study. The survey was sent by email to a sample of 12,400 individuals, aged 18–78 years. The response rate was 45% ( $n = 5,557$ ), of whom 929 (16.7%) experienced whiplash injury after an accident. Participants with whiplash injury (59%) were more likely to report chronic pain ( $\geq 3$  months) than those without whiplash injury (36.3%) ( $p > 0.001$ ). The participants with whiplash injury and chronic pain ( $n = 543$ , 59%) were significantly more likely to have more severe pain, lower HRQoL, be disabled, and live outside the capital area compared to those with whiplash injury but without chronic pain ( $n = 386$ , 41%). Whiplash injury was more common among younger individuals and women. Participants with whiplash injury had higher pain severity, pain interference and lower HRQoL compared to those without whiplash injury. Participants with whiplash injury were more likely to have chronic pain and most of them had constant pain.

### ARTICLE HISTORY

Received 10 February 2025  
Revised 8 August 2025  
Accepted 29 August 2025



### KEYWORDS

Whiplash injury; pain; quality of life; health services need; cross-sectional study

## Introduction

Chronic pain ( $\geq 3$  months) is ranked as the second largest contributor to disability worldwide [1]. Chronic pain can be classified as either a condition in itself, known as chronic primary pain (e.g. fibromyalgia or low back pain) or as a symptom secondary to an underlying disease or injury [2]. According to a National Health Interview Survey conducted in the U.S. in 2019, 50.2 million adults (20.5%) reported currently experiencing chronic pain. Chronic pain was defined as having pain on most days or every day during the past three months, causing limitations in daily functioning and missed workdays [3]. Previous studies of the Icelandic population have shown the prevalence of chronic pain ranging from 30.65% to 47.5% [4,5]. Neck pain is a highly prevalent condition and one of the many complaints of whiplash-associated disorder (WAD), which is common in car accidents [6,7] in which one car crashes into another, usually from the rear or the side [8].

Whiplash injuries represent a global health problem and contribute significantly to the financial burden on healthcare systems and insurance providers. WAD is a source of disability that can lead to sleep problems, limited work ability, chronic pain, and poorer health-related quality of life (HRQoL) [9–12]. In a longitudinal study among the general population in Iceland, chronic pain has been showed to have significant negative impact on both physical and mental components of HRQoL [13]. Assessment of HRQoL, using various standardised instruments, provides valuable insight into patients' subjective experiences of pain and its impact on their daily lives. HRQoL has been described as the impact of health of people's ability to function and participate in meaningful activities [14]. In one study, HRQoL was measured using the 12-item Short Form Health Survey (SF-12) and the results indicated that participants experienced moderate to severe pain intensity and disability, along with reduced physical HRQoL [15]. Similarly, a Swedish study using the EQ-5D

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found that individuals with WAD reported low HRQoL, with slightly lower scores among women compared to men [16].

In the United States, it is estimated that around 869,000 crash-related cervical spine injuries are seen in hospitals annually, including approximately 841,000 with whiplash injury [17]. In 2021, there were 6,450 reported motor vehicle accidents in Iceland. Of these, about a fifth ( $n = 1,386$ ) involved rear-end collisions. There were 115 (13.2%) neck injuries recorded [18].

Approximately 45% of patients with WAD initially experience mild symptoms, which largely resolve within two months. The percentage of those who develop chronic pain after whiplash injury has varied between 2% and 58%, and symptoms can persist for years [19]. The onset of discomfort may be delayed for up to 12–15 hours with complaints such as neck pain, thoracic and lumbar spine pain, upper limb paraesthesia, headache, and balance disturbances (e.g. dizziness) [12,19].

WAD has been classified into five categories (grades 0–IV) on the Quebec Task Force severity scale. Grade 0 represents no pain and no symptoms on clinical examination, while grade IV classifications indicate fracture or dislocation in the cervical segment [19,20].

WAD grade II is the most common type and is characterised by cervical pain and related symptoms without neurological symptoms [19,20]. A recent meta-analysis, encompassing 54 studies with data from 390,644 patients and 918 controls, found that approximately one-third of patients with chronic WAD exhibited nerve pathology that was independent of traditional WAD classification. These findings suggest that existing WAD classification systems may require re-evaluation, with greater emphasis on clinical assessment of nerve integrity [20].

Women are at higher risk for developing long-term complications [8,21]. Higher age and having low back pain are prognostic factors associated with worse long-term outcomes after whiplash injury [22]. Sleep disturbances, pain catastrophizing, depression, anxiety, and post-traumatic stress disorder (PTSD) are all well-known symptoms in WAD that can be associated with worse health outcomes [11,23,24]. It has been estimated that one-third of individuals with WAD may have symptoms of PTSD, and the combination of PTSD and pain can be difficult to manage in general practice [25]. In Western societies, the high prevalence of WAD underscores the importance of accurate diagnosis and timely, evidence-informed management [7]. Early intervention is particularly important, as it has been associated with better outcomes in terms of reducing pain-related disability [23]. Current recommendations emphasise the early provision of education and reassurance about the typically favourable prognosis of WAD, alongside strategies for pain relief and restoration of function [6,24]. Interventions may include analgesic medication, graded exercise, and physiotherapy. Importantly, early return to normal activities should be encouraged, and prolonged rest or routine use of soft collars is discouraged due to lack of benefit and potential for delayed recovery [6].

In Iceland, there is no rehabilitation programme specifically designed for people with neck pain [26]. However, an Icelandic study among 81 participants showed that 44% of participants reported that the primary cause of their pain was accidents; 62% reported having neck pain. Rehabilitation with specific exercises for people with neck pain related to WAD has been shown to be beneficial for both physical and mental health by lowering anxiety, depression, pain intensity, and interference with life [8] and offering pain relief, improved physical function and working capacity [9], effectiveness at meeting the needs of individuals in their return-to-work processes [10] and reducing dizziness [12].

This is the first time a nationwide study concerning whiplash injury has been conducted in Iceland. In January 2021, the population of Iceland was 358,298 (47.7% women), of which 265,042 were aged 18–80 years (49.0% women). About 70% of the population lived in municipalities with more than 15,000 residents, and 64.1% resided in the capital area [27]. The purpose of the study was to describe the pain severity, pain interference, HRQoL, need for, access to, and use of healthcare services among people in Iceland and to compare these factors between individuals with a whiplash injury lasting more than 12 months and those without such injury.

## Materials and methods

### *Sample and data collection procedures*

This is a cross-sectional cohort study; the data were collected as a part of the ICEPAIN nationwide study, on a web-based platform provided by a service contractor, Maskina (<https://maskina.is/en/maskinan/fyrirtaekid/>), an Icelandic company specialising in surveys.

A sample of 12,400 individuals, aged 18–78 years were randomly selected and invited by email to participate in the study. To secure a proportional sample of men and women and people from all regions of the country, the sample was stratified in relation to gender and residence.

### *Instruments*

The questionnaire consisted of instruments (Brief Pain Inventory [BPI] and the Short Form-12 health survey version 2 [SF-12v2]) featuring questions on pain severity, pain interference, and HRQoL, with additional questions crafted for this study concerning other pain-related questions, need for, access to, and use of healthcare services both generally and in relation to pain; sociodemographic data were also collected.

### *Pain severity and interference*

The Icelandic version of the BPI was used to evaluate pain experience, pain severity, and interference with life [28]. Participants were asked a yes/no question on whether they had experienced pain (other than minor headaches, sprains, or toothache) in the previous week. They were asked to answer questions about the pattern of pain (constant, daily intermittent, frequent intermittent, and periodic) and about the cause of pain. They also indicated on a body map where they felt pain.

The BPI contains three questions regarding pain severity during the previous 24 hours: worst pain, least pain, and average pain. The fourth severity item measures pain at present. Participants rated their pain on a scale from 0 to 10, where 0 indicates no pain and 10 is the worst pain imaginable. Interference with life is evaluated by questions on the impact of pain on seven aspects of daily life: general activities, mood, walking ability, work, social activity, sleep, and life enjoyment. Participants rated the impact of pain on these seven items on a scale anchored by 0 “does not interfere” and 10 “completely interferes” [28]. By using separate means of the four severity items and the seven interference items, two composite scores, the pain severity index and the pain interference index are calculated [29].

### *Pain medication*

The participants were asked whether they used pain medication. They could choose from the following options: only when needed (for example, when the pain becomes very strong), regularly, or both regularly and when needed. They were also asked if they used any over the counter (OTC) pain medications, such as paracetamol, NSAIDs (for example, ibuprofen, Voltaren Dolo, Vostar, naproxen), or other similar medicines.

### *Health-related quality of life (HRQoL)*

SF-12v2 is a 12-item self-rating questionnaire developed to assess some primary aspects of HRQoL and perceived health status in various health conditions [30]. The instrument comprises multiple-choice questions measuring eight domains (physical functioning, physical role limitations, bodily pain, general health, vitality, social functioning, emotional role limitations, and mental health). Two higher-order clusters are derived from these eight domains, a physical component scale (PCS) and a mental component scale (MCS). Scores are between 0 and 100 ( $M = 50$ ), with higher scores indicating better HRQoL [30,31]. The reliability and validity of the instrument have been tested and confirmed in relation to public health [30,32,33] and chronic non-cancer pain [31].

### **Need for, access to, and use of healthcare services**

Respondents were asked if they had used healthcare services in the previous 12 months (yes/no) and what specific services (nearest community healthcare centre, general practitioner outside the healthcare centre, outpatient ward, specialist in a specific field, nearest doctor's on-call service, nearest hospital, and pharmacist at the nearest pharmacy) and how much they needed healthcare services because of their pain last 6 months (none, little, neither much nor little, much, very much).

To evaluate access to pain-related health services, participants were asked the following questions:

- Access to pain-related healthcare services (none, bad, neither bad nor good, good, very good).
- Have you used pain-related health care services for the last 6 months (yes/no).
- If you use pain-related healthcare services, what services do you usually use (nearest community health care centre, GP outside of the healthcare centre, outpatient ward, specialist in the specific field, nearest doctor's on-call service, nearest hospital, pharmacist in the nearest pharmacy).

### **Sociodemographic data**

The sociodemographic data collected were: Age (years), gender (male/female), marital status (married/cohabiting/steady relationship, single/divorced/widowed), residence (capital area/outside the capital area), education (primary/secondary/tertiary), body mass index (BMI), smoking (never/previous/current), alcohol drinking (once a month or less/twice a month or more), on disability allowance (yes/no).

Participants were asked whether they had ever been involved in any accidents (traffic, work, leisure, domestic, sport). The response options were: never/yes/it happened more than 12 months ago. A follow-up question for those responding "yes" was: Did the accident result in a whiplash injury?

### **Statistical analysis**

Data were analysed using SPSS for Windows (version 28.0). Descriptive statistics for continuous variables are presented as mean ( $M$ )  $\pm$  standard deviation ( $SD$ ).

Prevalence ratios were adjusted for age, gender, and education. Mann-Whitney U-tests were used when comparing age, BMI, pain intensity, pain interference, PCS, and MCS between participants, and chi-square tests for independence were used to analyse the association between categorical variables.

## **Results**

The overall response rate was 45% ( $n = 5,557$ ), of whom 929 (16.7%) had experienced whiplash injury (> 12 months earlier) following an accident. The vast majority of whiplash injury had been sustained after traffic accidents (86%). Among those with whiplash injury, the most common pain location was the head and shoulder region (78.1%). Most participants used pain medication as needed. The most commonly used pain medications were paracetamol (62% of participants) and NSAID drugs (58% of participants). Whiplash injury was more common in the younger age groups than in the oldest, with the highest frequency in the 40–49 cohort (22.1%).

Among those who had experienced a whiplash injury, 65% were female and 35% were male; this gender difference was statistically significant ( $p < 0.001$ ). Significant group differences were also found between individuals with and without a history of whiplash injury in terms of age group ( $p < 0.001$ ), BMI category ( $p < 0.001$ ), smoking status ( $p = 0.001$ ), alcohol consumption frequency ( $p < 0.001$ ), chronic pain ( $p < 0.001$ ), pain pattern among those reporting pain ( $p < 0.001$ ), and disability allowance status ( $p < 0.001$ ), as shown in [Table 1](#). In contrast, marital status ( $p = 0.399$ ), residence ( $p = 0.131$ ), and education level ( $p = 0.467$ ) were not significantly associated with whiplash experience.

**Table 1.** Descriptive statistics and bivariate analysis of demographic, lifestyle and pain variables related to whiplash injury ( $n = 5,557$ ).

	Experienced whiplash injury		<i>p</i> -value <sup>a</sup>
	No	Yes	
<i>n</i> (%)	<i>n</i> (%)		
<b>Gender</b>			
Female	2572(55.6)	601(64.7)	<0.001
Male	2041(44.1)	324(34.9)	
Total	4613(99.7)	925(99.6)	
Missing	15(0.3)	4(0.4)	
<b>Age groups</b>			
18–29 years	206(4.5)	50(5.4)	<0.001
30–39 years	504(10.9)	102(11.0)	
40–49 years	828(17.9)	235(25.3)	
50–59 years	1104(23.9)	253(27.2)	
60–69 years	1214(26.2)	196(21.1)	
70–80 years	772(16.7)	93(10.0)	
Total	4628(100)	929(100)	
Missing	0(0)	0(0)	
<b>Marital status</b>			
Married/cohabit/steady relationship	3662(79.1)	724(77.9)	0.399
Single/Divorced/Widowed	949(20.6)	202(21.7)	
Total	4611(99.6)	926(99.7)	
Missing	17(0.4)	3(0.3)	
<b>Residence</b>			
Capital area	2302(49.7)	490(52.7)	0.131
Outside the capital area	2294(49.6)	438(47.1)	
Total	4596(99.3)	928(99.9)	
Missing	32(0.7)	1(0.1)	
<b>Education</b>			
Primary	656(14.2)	123(13.2)	0.467
Secondary	1607(34.7)	332(35.7)	
Tertiary	2009(43.4)	432(46.5)	
Total	4272(92.3)	887(95.5)	
Missing	356(7.7)	42(4.5)	
<b>BMI (kg/m<sup>2</sup>)</b>			
< 25	1001(21.6)	185(19.9)	<0.001
25–30	1509(32.6)	290(31.2)	
> 30	1245(26.9)	326(35.1)	
Total	3755(81.1)	801(86.2)	
Missing	873(18.9)	128(13.8)	
<b>Smoking</b>			
Never	2223(48.0)	425(45.7)	0.001
Previous	1488(32.2)	367(39.5)	
Current	471(10.2)	81(8.7)	
Total	4182(90.4)	873(94.0)	
Missing	446(9.6)	56(6.0)	
<b>Alcohol drinking</b>			
Once a month or less	1857(40.1)	474(51.0)	<0.001
Twice a month or more	2562(55.4)	454(48.9)	
Total	4419(95.5)	929(99.9)	
Missing	209(4.5)	1(0.1)	
<b>Chronic pain</b>			
No chronic pain	2945(63.6)	386(41.6)	<0.001
Chronic pain	1683(36.4)	543(58.4)	
Total	4628(100)	929(100)	
Missing	0(0)	0(0)	
<b>Pain pattern<sup>b</sup></b>			
Constant	681(33.0)	305(49.6)	<0.001
Daily intermittent	515(25.0)	144(23.4)	
Frequent intermittent	489(23.7)	94(15.3)	
Periodic	271(13.1)	47(7.6)	
Total	1956(94.8)	590(95.9)	
Missing	108(5.2)	25(4.1)	
<b>On disability allowance</b>			
No	4067(87.9)	788(84.8)	<0.001
Yes	209(4.5)	100(10.8)	
Total	4276(92.4)	888(95.6)	
Missing	352(7.6)	41(4.4)	

<sup>a</sup>Chi-Square Tests. <sup>b</sup>( $n = 2,679$  Participants reporting pain last week).

**Table 2.** Comparison of means for age, BMI, pain and HRQoL among participants with chronic pain with or without whiplash.

	Without whiplash <i>M(SD/n)</i>	With whiplash <i>M(SD/n)</i>	<i>p</i> -value <sup>a</sup>
Age	55.3(13.8/4628)	52.5(12.8/929)	<0.001
BMI	28.5(5.5/3755)	29.2(5.5/801)	<0.001
Pain interference	2.6(2.2/1859)	3.4(2.4/560)	<0.001
Pain severity	3.3(1.9/1886)	4.1(1.8/572)	<0.001
Physical component score (PCS)	49.0(10.1/4492)	44.7(11.6/928)	<0.001
Mental component score (MCS)	49.3(9.7/4496)	46.7(10.3/929)	<0.001

<sup>a</sup>Mann-Whitney U-test.**Table 3.** Comparison of means for age, BMI, pain and HRQoL among participants with whiplash with or without chronic pain.

	Without chronic pain <i>M(SD/n)</i>	With chronic pain <i>M(SD/n)</i>	<i>p</i> -value <sup>a</sup>
Age	52.3(13.6/386)	52.6(12.3/543)	0.819
BMI	28.0(5.0/323)	30.0(5.7/478)	<0.001
Pain interference	3.0(2.8/56)	3.5(2.4/504)	0.079
Pain severity	3.5(2.3/56)	4.2(1.7/516)	0.049
Physical component score (PCS)	49.6(9.9/386)	41.1(11.4/542)	<0.001
Mental component score (MCS)	48.4(9.4/386)	45.5(10.8/543)	<0.001

<sup>a</sup>Mann-Whitney U-test.

### **Pain and HRQoL**

The mean age (52.5, *SD* = 12.8) of participants who had chronic pain and whiplash was significantly lower than those with chronic pain but without whiplash (55.3, *SD* = 13.8). Participants with whiplash also had a significantly higher BMI (29.2 vs. 28.5), pain interference (3.4 vs. 2.6), and pain severity (4.1 vs. 3.3) than those without whiplash. When comparing the PCS (49 vs. 44.7) and MCS (49.3 vs. 46.7) between those with whiplash and those without whiplash, participants with whiplash had significantly lower scores ( $p < 0.001$ ; see Table 2).

### **Need for healthcare services**

When comparing need for, access to, and use of healthcare services among participants with pain, 27.2% of those with whiplash reported a high or very high need for healthcare services, compared to 20.4% of those with other types of pain. The proportion of those with pain that had used healthcare services in the previous six months was significantly higher among those with whiplash (66.4% vs. 54.5%), and a higher proportion of those with whiplash (19.0%) reported insufficient or no access to healthcare services, compared to 14.5% of others with pain.

### **Whiplash and chronic pain**

Participants who had whiplash and chronic pain ( $n = 543$ , 59%) had a significantly higher BMI (30.0 vs. 28.0,  $p < 0.001$ ) and reported higher pain severity (4.2 vs. 3.5,  $p = 0.049$ ) than those with whiplash but without chronic pain ( $n = 386$ , 41%). When comparing PCS and MCS, participants with whiplash and chronic pain had significantly lower scores ( $p < 0.001$ ; see Table 3).

The participants with chronic pain and whiplash were significantly more likely to live outside the capital area, have higher educational status and higher BMI, be current smokers, consume alcohol, experience constant and daily intermittent pain, and receive disability allowance (Table 4).

## **Discussion**

The aim of the current study was to examine the participants' pain severity, pain interference, HRQoL, and self-reported need for, access to, and use of pain-related health care services. The study compared the

**Table 4.** Descriptive statistics and bivariate analysis of demographic and lifestyle variables in participants with whiplash injury with or without chronic pain.

	Without chronic pain n (%)	With chronic pain n (%)	p-value <sup>a</sup>
<b>Residence</b>			
The capital area	229(46.7)	261(53.3)	< .001
Outside the capital area	156(35.6)	282(64.4)	
<b>Education</b>			
Primary	43(35.0)	80(65.0)	0.013
Secondary	125(37.7)	207(62.3)	
Tertiary	201(46.5)	231(53.5)	
<b>BMI (kg/m<sup>2</sup>)</b>			
< 25	103(55.7)	82(44.3)	< 0.001
25–30	116(40.0)	174(60.0)	
> 30	104(31.9)	222(68.1)	
<b>Smoking</b>			
Never	195(45.9)	230(54.1)	0.009
Previous	147(40.1)	220(59.9)	
Current	23(28.4)	58(71.6)	
<b>Alcohol drinking</b>			
Once a month or less	179(37.8)	295(62.2)	0.019
Twice a month or more	206(45.4)	248(54.6)	
<b>Pain pattern</b>			
Constant	23(7.5)	282(92.5)	0.002
Daily intermittent	13(9.0)	131(91.0)	
Frequent intermittent	12(12.8)	82(87.2)	
Periodic	12(25.5)	35(74.5)	
<b>On disability allowance</b>			
No	351(44.5)	437(55.5)	< 0.001
Yes	19(19.0)	81(81.0)	

<sup>a</sup>Chi-Square Tests.

differences between those participants reporting whiplash injury (> 12 months) with and without chronic pain and those without whiplash injury but with chronic pain.

The participants with whiplash and chronic pain had more pain and worse HRQoL than both those with chronic pain without whiplash and those with whiplash without chronic pain. Earlier studies have shown that whiplash can lead to limited ability to work, chronic pain, and decreased HRQoL [9,10,12].

The results from the present study show that 59% of those with whiplash had chronic pain. Other research shows that around 45% of individuals with WAD present with mild initial symptoms, most of which resolve within two months [19]. In the present study, the vast majority of participants with whiplash were women aged between 50 and 59. This aligns with previous research indicating that women are at higher risk for developing long-term complications [8,21]. Most participants in this study had constant pain in the head and shoulders. In a study by Jonsdottir et al. [5], women reporting constant or daily pain were significantly more likely to have consulted pain-related healthcare services in the previous six months than women with intermittent or periodic pain.

The participants in the present study only used pain medication that they could access over the counter for pain relief. According to another study's results, the most common method of pain relief for people in chronic pain is pain medication [34]. Early intervention has been shown to be more effective in reducing pain-related disability after whiplash [35], highlighting the importance of good access to pain-related healthcare services. The proportion of those with pain in the present study that had used healthcare services in the previous six months was significantly higher among those with whiplash (66.4% vs. 54.5%), and a higher proportion of those with whiplash (19%) had insufficient or no access to healthcare services, compared to 14.5% of others with pain. According to Jonsdottir et al. [5], those who reported good or very good access to pain-related healthcare when needed were more likely to have consulted healthcare for pain in the previous six months than those who reported access that was neither good nor bad access or was very bad.

In the present study, a higher proportion (27.2%) of participants with whiplash had much or very much need for healthcare services than others with pain (20.4%). No questions were asked about the specific types of services participants needed, so it remains unclear whether they required a targeted rehabilitation programme.

Rehabilitation with specific exercises for people with neck pain related to WAD has been shown to be beneficial for both physical and mental health, anxiety, depression, pain intensity, and interference with life

[8]. Iceland has no pain rehabilitation programmes focusing specifically on chronic pain due to whiplash injury. The existing pain rehabilitation programmes include those with neck pain and where the perceived cause of pain is accidents [26]. In other jurisdictions, these programmes have been shown to be effective in pain relief [26], decreasing the use of pain medication [34], and improving HRQoL [36]. The effectiveness of the pain rehabilitation programmes in Iceland for those with whiplash and chronic pain has not been evaluated and needs to be studied. In Jonsdottir et al.'s study [5], the use of pain-related healthcare was not related to residence, but in the present study when participants with whiplash and chronic pain were compared to those without pain, the results showed that those with chronic pain were more likely to live outside the capital area. That raises the question of whether poor access to pain-related healthcare services can increase the likelihood of chronic pain after whiplash injury. More research is needed to answer that question.

This study has several limitations. Pain and health-related quality of life (HRQoL) were assessed using retrospective self-reported measures, which may have introduced recall bias. Such bias could have resulted in either underreporting or overreporting the severity and impact of pain, potentially skewing the findings. Additionally, the response rate was relatively low, which may have affected the reliability of the results. Nonetheless, a major strength of this study is that it provides valuable insights into the relationships between chronic pain and a range of demographic, lifestyle among people with whiplash injury.

## Conclusions

Whiplash injury was more common among younger individuals and women. Participants with whiplash injury had higher pain severity and pain interference and lower HRQoL than those without whiplash injury. Participants with whiplash were more likely to have chronic pain, and most had constant pain.

Overall, the present study provides valuable insights into the prevalence and impact of whiplash injury and chronic pain in Iceland. It highlights the need for improved access to healthcare services, early intervention strategies, and specific rehabilitation programmes for individuals with whiplash injury and chronic pain. By addressing these issues, Iceland's healthcare professionals can better support individuals with whiplash injury and chronic pain, improve their pain management, and enhance their overall quality of life.

## Acknowledgments

Sincere thanks to the participants for their contributions.

## Disclosure statement

No potential conflict of interest was reported by the author(s).

## Author contributions

All authors have accepted responsibility for the entire content of this manuscript and approved its submission.

## Informed consent

Participants received information about the study by email and an invitation to participate by logging into a website containing the questionnaire. Participants gave their informed consent by answering and sending in the web-based questionnaire.

## Research ethics

The study was approved by the Icelandic National Bioethics committee (VSNb2011030002/03.7) and the Icelandic Data Protection authority (S5197/2011). It was carried out in accordance with the Declaration of Helsinki.

## Funding

The study was funded by the University of Akureyri Research Fund and the Icelandic Public Health Fund.

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