

## Supplementary materials

**Supplementary Table 1.** Encoding of covariates

---

Underlying diseases	Mood disorders: F30-F39 Hypertension: I10-I15 Heart diseases: I20-I25, I30-I52 Diabetes: E10, E11 Nicotine dependence: F17 Alcohol dependence: F10 Chronic lower respiratory diseases: J40, 41, 42, 43, 44, 45, 47 Chronic kidney disease: N18 Stroke: I63 Malignant neoplasm: C00-C97
Analgesics	Antidepressants: clomipramine, amitriptyline, imipramine, nortriptyline, duloxetine, milnacipran, venlafaxine, desvenlafaxine Anticonvulsants: pregabalin, gabapentin, carbamazepine, oxcarbazepine Opioids: alfentanil, buprenorphine, butorphanol, fentanyl, hydrocodone, hydromorphone, morphine, oxycodone, pentazocine, remifentanil, sufentanil, tapentadol, tramadol
Conditions applied to the new control groups	Upper respiratory tract infection: J01, J02, J03, J04, J05, J06 Fracture of a large bone: S32, S42, S52, S72, S82 Depressive disorders: F30, F31, F32, F33, F34, F38, F39

---

**Supplementary Table 2.** Baseline characteristics of the participants before matching

Characteristic	Entire cohort		Cohort without a history of the pain diagnoses	
	COVID-19 (n = 8,070)	Control group (n = 116,628)	COVID-19 (n = 1,557)	Control group (n = 24,321)
Age (yr)				
0–19	357 (4.4)	4,929 (4.2)	102 (6.6)	1,392 (5.7)
20–39	2,889 (35.8)	41,297 (35.4)	724 (46.5)	11,538 (47.4)
40–59	2,603 (32.3)	37,530 (32.2)	458 (29.4)	7,554 (31.1)
60–69	1,199 (14.9)	17,668 (15.1)	160 (10.3)	2,298 (9.4)
70–79	617 (7.6)	9,174 (7.9)	60 (3.9)	847 (3.5)
≥ 80	405 (5.0)	6,030 (5.2)	53 (3.4)	692 (2.8)
Sex				
Female	4,834 (59.9)	69,629 (59.7)	754 (48.4)	11,315 (46.5)
Male	3,236 (40.1)	46,999 (40.3)	803 (51.6)	13,006 (53.5)
Region of residence				
Capital	996 (12.3)	14,427 (12.4)	271 (17.4)	3,655 (15.0)
Daegu/Gyeongbuk	6,218 (77.1)	89,575 (76.8)	1,088 (69.9)	17,634 (72.5)
Others	856 (10.6)	12,626 (10.8)	198 (12.7)	3,032 (12.5)
Economic status				
Medical aid	673 (8.3)	4,258 (3.7)	121 (7.8)	523 (2.2)
0–25%	1,825 (22.6)	24,912 (21.4)	344 (22.1)	5,458 (22.4)
26–50%	1,499 (18.6)	23,254 (19.9)	286 (18.4)	5,078 (20.9)
51–75%	1,674 (20.7)	26,542 (22.8)	339 (21.8)	5,627 (23.1)
76–100%	2,270 (28.1)	35,458 (30.4)	442 (28.4)	7,121 (29.3)
Underlying diseases				
Mood disorders	1,342 (16.6)	16,540 (14.2)	152 (9.8)	1,378 (5.7)
Hypertension	1,890 (23.4)	28,073 (24.1)	219 (14.1)	2,957 (12.2)
Diabetes	1,441 (17.9)	19,672 (16.9)	151 (9.7)	1,907 (7.8)
Obesity	19 (0.2)	375 (0.3)	3 (0.2)	35 (0.1)
Nicotine dependence	2 (0.0)	48 (0.0)	0 (0.0)	4 (0.0)
Alcohol dependence	122 (1.5)	968 (0.8)	34 (2.2)	162 (0.7)
Chronic lower respiratory diseases	3,930 (48.7)	54,397 (46.6)	447 (28.7)	6,042 (24.8)
Heart diseases	835 (10.3)	11,348 (9.7)	57 (3.7)	928 (3.8)
Chronic kidney diseases	100 (1.2)	1,460 (1.3)	14 (0.9)	146 (0.6)
Malignant neoplasms	492 (6.1)	7,570 (6.5)	46 (3.0)	613 (2.5)
Stroke	314 (3.9)	3,991 (3.4)	16 (1.0)	154 (0.6)
Admission to skilled nursing facilities	334 (4.1)	1,342 (1.2)	75 (4.8)	243 (1.0)

Values are presented as number (%).

**Supplementary Table 3.** Incidence rate of prescription of analgesic medications

Medication	Entire cohort		Cohort without a history of the pain diagnoses		P value
	COVID-19 (n = 7,911)	Control (n = 7,911)	COVID-19 (n = 1,504)	Control (n = 1,504)	
Antidepressant	124 (1.67%, 1.40-1.99)	133 (1.70%, 1.43-2.01)	9 (0.65%, 0.33-1.20)	11 (0.74%, 0.39-1.28)	0.792
Antidepressant, not prescribed by a psychiatrist	123 (1.66%, 1.39-1.97)	133 (1.70%, 1.43-2.01)	9 (0.65%, 0.33-1.20)	11 (0.74%, 0.39-1.28)	0.792
Anticonvulsant	61 (0.82%, 0.64-1.05)	39 (0.50%, 0.36-0.67)	3 (0.22%, 0.06-0.61)	4 (0.27%, 0.09-0.66)	0.785
Anticonvulsant without epilepsy	55 (0.74%, 0.57-0.96)	36 (0.46%, 0.33-0.63)	2 (0.15%, 0.03-0.51)	3 (0.20%, 0.06-0.56)	0.730

Values are presented as number (%; 95% confidence interval).

**Supplementary Table 4.** HRs of prescribed analgesic medications

Medication	Entire cohort (n = 7,911)		Cohort without a history of the pain diagnoses (n = 1,504)	
	HR (95% CI)	<i>P</i> value	HR (95% CI)	<i>P</i> value
Antidepressant	0.92 (0.72–1.17)	0.498	0.73 (0.29–1.86)	0.514
Antidepressant, not prescribed by a psychiatrist	0.91 (0.71–1.17)	0.455	0.73 (0.29–1.86)	0.514
Anticonvulsant	1.45 (0.97–2.18)	0.007	0.61 (0.12–3.12)	0.554
Anticonvulsant without epilepsy	1.43 (0.94–2.19)	0.097	0.46 (0.06–3.80)	0.473
Opioid	1.19 (1.09–1.31)	< 0.001	2.32 (1.63–3.31)	< 0.001
Opioid without malignant neoplasm	1.20 (1.09–1.32)	< 0.001	2.54 (1.75–3.67)	< 0.001

HR: hazard ratio, CI: confidence interval.

**Supplementary Table 5.** Propensity score matched baseline characteristics with the new control group who was hospitalized at least once

Characteristic	Entire cohort			Cohort without a history of the pain diagnoses		
	COVID-19 (n = 4,294)	Control group (n = 4,294)	SMD	COVID-19 (n = 470)	Control group (n = 470)	SMD
Age (yr)						
0–19	180 (4.2)	89 (2.1)	0.120	35 (7.4)	19 (4.0)	0.154
20–39	979 (22.8)	1,042 (24.3)	0.035	150 (31.9)	169 (36.0)	0.085
40–59	1,204 (28.0)	1,328 (30.9)	0.063	150 (31.9)	152 (32.3)	0.009
60–69	957 (22.3)	876 (20.4)	0.046	56 (11.9)	59 (12.6)	0.019
70–79	577 (13.4)	538 (12.5)	0.027	36 (7.7)	28 (6.0)	0.068
≥ 80	397 (9.2)	421 (9.8)	0.019	43 (9.1)	43 (9.1)	< 0.001
Sex						
Female	2,928 (68.2)	2,705 (63.0)	0.112	248 (52.8)	230 (48.9)	0.077
Male	1,366 (31.8)	1,589 (37.0)	0.112	222 (47.2)	240 (51.1)	0.077
Region of residence						
Capital	341 (7.9)	465 (10.8)	0.099	84 (17.9)	78 (16.6)	0.034
Daegu/Gyeongbuk	3,452 (80.4)	3,316 (77.2)	0.078	326 (69.4)	331 (70.4)	0.023
Others	501 (11.7)	513 (11.9)	0.009	60 (12.8)	61 (13.0)	0.006
Economic status						
Medical aid	491 (11.4)	423 (9.9)	0.051	57 (12.1)	47 (10.0)	0.068
0–25%	839 (19.5)	842 (19.6)	0.002	98 (20.9)	100 (21.3)	0.010
26–50%	782 (18.2)	759 (17.7)	0.014	97 (20.6)	75 (16.0)	0.120
51–75%	858 (20.0)	971 (22.6)	0.064	108 (23.0)	118 (25.1)	0.050
76–100%	1,316 (30.6)	1,293 (30.1)	0.012	107 (22.8)	129 (27.4)	0.110
Underlying diseases						
Mood disorders	1,233 (28.7)	1,023 (23.8)	0.113	77 (16.4)	60 (12.8)	0.100
Hypertension	1,488 (34.7)	1,569 (36.5)	0.039	139 (29.6)	109 (23.2)	0.150
Diabetes	1,121 (26.1)	1,113 (25.9)	0.004	87 (18.5)	76 (16.2)	0.062
Obesity	18 (0.4)	14 (0.3)	0.015	1 (0.2)	1 (0.2)	0.000
Nicotine dependence	2 (0.0)	2 (0.0)	0.000	0 (0.0)	0 (0.0)	–
Alcohol dependence	111 (2.6)	96 (2.2)	0.023	21 (4.5)	14 (3.0)	0.079
Chronic lower respiratory diseases	2,300 (53.6)	2,383 (55.5)	0.039	159 (33.8)	148 (31.5)	0.050
Heart diseases	758 (17.7)	741 (17.3)	0.010	36 (7.7)	41 (8.7)	0.039
Chronic kidney diseases	100 (2.3)	105 (2.4)	0.008	10 (2.1)	8 (1.7)	0.031
Malignant neoplasms	448 (10.4)	464 (10.8)	0.012	31 (6.6)	23 (4.9)	0.073
Stroke	293 (6.8)	313 (7.3)	0.018	12 (2.6)	13 (2.8)	0.013
Admission to skilled nursing facilities	323 (7.5)	358 (8.3)	0.030	49 (10.4)	59 (12.6)	0.067

Values are presented as number (%).

SMD: standardized mean difference.

**Supplementary Table 6.** Propensity score matched baseline characteristics with the new control group who had acute upper respiratory infections

Characteristic	Entire cohort			Cohort without a history of the pain diagnoses		
	COVID-19 (n = 7,525)	Control group (n = 7,525)	SMD	COVID-19 (n = 907)	Control group (n = 907)	SMD
Age (yr)						
0–19	346 (4.6)	358 (4.8)	0.008	82 (9.0)	77 (8.5)	0.019
20–39	2,739 (36.4)	2,802 (37.2)	0.017	507 (55.9)	497 (54.8)	0.022
40–59	2,471 (32.8)	2,456 (32.6)	0.004	218 (24.0)	239 (26.4)	0.053
60–69	1,109 (14.7)	1,093 (14.5)	0.006	63 (6.9)	60 (6.6)	0.013
70–79	565 (7.5)	548 (7.3)	0.009	27 (3.0)	24 (2.6)	0.020
≥ 80	295 (3.9)	268 (3.6)	0.019	10 (1.1)	10 (1.1)	0.000
Sex						
Female	4,585 (60.9)	4,634 (61.6)	0.013	446 (49.2)	450 (49.6)	0.009
Male	2,940 (39.1)	2,891 (38.4)	0.013	461 (50.8)	457 (50.4)	0.009
Region of residence						
Capital	955 (12.7)	956 (12.7)	< 0.001	153 (16.9)	158 (17.4)	0.015
Daegu/Gyeongbuk	5,750 (76.4)	5,765 (76.6)	0.005	622 (68.6)	621 (68.5)	0.002
Others	820 (10.9)	804 (10.7)	0.007	132 (14.6)	128 (14.1)	0.013
Economic status						
Medical aid	468 (6.2)	464 (6.2)	0.002	9 (1.0)	13 (1.4)	0.040
0–25%	1,767 (23.5)	1,717 (22.8)	0.016	215 (23.7)	193 (21.3)	0.058
26–50%	1,433 (19.0)	1,456 (19.3)	0.008	201 (22.2)	199 (21.9)	0.005
51–75%	1,639 (21.8)	1,627 (21.6)	0.004	191 (21.1)	222 (24.5)	0.082
76–100%	2,205 (29.3)	2,247 (29.9)	0.012	289 (31.9)	275 (30.3)	0.033
Underlying diseases						
Mood disorders	1,176 (15.6)	1,131 (15.0)	0.017	40 (4.4)	56 (6.2)	0.079
Hypertension	1,686 (22.4)	1,612 (21.4)	0.024	91 (10.0)	86 (9.5)	0.019
Diabetes	1,306 (17.4)	1,281 (17.0)	0.009	58 (6.4)	68 (7.5)	0.043
Obesity	19 (0.25)	15 (0.20)	0.011	2 (0.22)	2 (0.22)	0.000
Nicotine dependence	2 (0.03)	1 (0.01)	0.009	0 (0.0)	0 (0.0)	0.000
Alcohol dependence	68 (0.90)	58 (0.77)	0.015	3 (0.33)	2 (0.22)	0.021
Chronic lower respiratory diseases	3,735 (49.6)	3,776 (50.2)	0.011	301 (33.2)	318 (35.1)	0.040
Heart diseases	756 (10.0)	700 (9.3)	0.025	19 (2.1)	24 (2.6)	0.036
Chronic kidney diseases	83 (1.1)	60 (0.80)	0.032	4 (0.44)	3 (0.33)	0.018
Malignant neoplasms	452 (6.0)	423 (5.6)	0.016	24 (2.6)	21 (2.3)	0.021
Stroke	229 (3.0)	178 (2.4)	0.042	5 (0.55)	5 (0.55)	0.000
Admission to skilled nursing facilities	99 (1.3)	108 (1.4)	0.010	10 (1.1)	9 (1.0)	0.011

Values are presented as number (%).

SMD: standardized mean difference.

**Supplementary Table 7.** Propensity score matched baseline characteristics with the new control group who had fracture of a large bone

Characteristic	Entire cohort			Cohort without a history of the pain diagnoses		
	COVID-19 (n = 1,210)	Control group (n = 1,210)	SMD	COVID-19 (n = 95)	Control group (n = 95)	SMD
Age (yr)						
0–19	35 (2.9)	28 (2.3)	0.036	14 (14.7)	9 (9.5)	0.16
20–39	181 (15.0)	170 (14.0)	0.026	13 (13.7)	28 (29.5)	0.39
40–59	320 (26.4)	337 (27.9)	0.032	34 (35.8)	31 (32.6)	0.067
60–69	269 (22.2)	280 (23.1)	0.022	24 (25.3)	16 (16.8)	0.21
70–79	229 (18.9)	224 (18.5)	0.011	3 (3.2)	4 (4.2)	0.056
≥ 80	176 (14.5)	171 (14.1)	0.012	7 (7.4)	7 (7.4)	0.000
Sex						
Female	710 (58.7)	767 (63.4)	0.097	44 (46.3)	44 (46.3)	0.000
Male	500 (41.3)	443 (36.6)	0.097	51 (53.7)	51 (53.7)	0.000
Region of residence						
Capital	161 (13.3)	131 (10.8)	0.076	14 (14.7)	12 (12.6)	0.061
Daegu/Gyeongbuk	902 (74.5)	957 (79.1)	0.11	68 (71.6)	71 (74.7)	0.071
Others	147 (12.1)	122 (10.1)	0.066	13 (13.7)	12 (12.6)	0.031
Economic status						
Medical aid	158 (13.1)	103 (8.5)	0.15	7 (7.4)	3 (3.2)	0.19
0–25%	244 (20.2)	252 (20.8)	0.016	21 (22.1)	23 (24.2)	0.050
26–50%	228 (18.8)	199 (16.4)	0.063	22 (23.2)	25 (26.3)	0.073
51–75%	240 (19.8)	239 (19.8)	0.002	16 (16.8)	18 (18.9)	0.055
76–100%	338 (27.9)	414 (34.2)	0.14	27 (28.4)	26 (27.4)	0.023
Underlying diseases						
Mood disorders	406 (33.6)	321 (26.5)	0.15	15 (15.8)	8 (8.4)	0.23
Hypertension	598 (49.4)	570 (47.1)	0.046	23 (24.2)	17 (17.9)	0.16
Diabetes	459 (37.9)	379 (31.3)	0.14	16 (16.8)	9 (9.5)	0.22
Obesity	6 (0.50)	4 (0.33)	0.026	0	0	–
Nicotine dependence	0	0	–	0	0	–
Alcohol dependence	35 (2.9)	16 (1.3)	0.11	2 (2.1)	1 (1.1)	0.085
Chronic lower respiratory diseases	692 (57.2)	702 (58.0)	0.017	30 (31.6)	24 (25.3)	0.14
Heart diseases	310 (25.6)	265 (21.9)	0.087	9 (9.5)	7 (7.4)	0.076
Chronic kidney diseases	47 (3.9)	42 (3.5)	0.022	3 (3.2)	1 (1.1)	0.15
Malignant neoplasms	173 (14.3)	130 (10.7)	0.11	7 (7.4)	5 (5.3)	0.087
Stroke	117 (9.7)	96 (7.9)	0.061	1 (1.1)	1 (1.1)	0.000
Admission to skilled nursing facilities	96 (7.9)	67 (5.5)	0.096	5 (5.3)	4 (4.2)	0.050

Values are presented as number (%).

SMD: standardized mean difference.

**Supplementary Table 8.** Propensity score matched baseline characteristics with the new control group who were diagnosed with depressive disorder

Characteristic	Entire cohort			Cohort without a history of the pain diagnoses		
	COVID-19 (n = 2,080)	Control group (n = 2,080)	SMD	COVID-19 (n = 182)	Control group (n = 182)	SMD
Age (yr)						
0–19	40 (1.9)	28 (1.3)	0.046	7 (3.8)	4 (2.2)	0.096
20–39	390 (18.8)	484 (23.3)	0.11	55 (30.2)	77 (42.3)	0.25
40–59	643 (30.9)	677 (32.5)	0.035	62 (34.1)	56 (30.8)	0.070
Sex						
Female	1,252 (60.2)	1,383 (66.5)	0.13	99 (54.4)	97 (53.3)	0.022
Male	828 (39.8)	697 (33.5)	0.13	83 (45.6)	85 (46.7)	0.022
Region of residence						
Capital	296 (14.2)	192 (9.2)	0.16	21 (11.5)	28 (15.4)	0.11
Daegu/Gyeongbuk	1,557 (74.9)	1,699 (81.7)	0.17	135 (74.2)	134 (73.6)	0.013
Others	227 (10.9)	189 (9.1)	0.061	26 (14.3)	20 (11.0)	0.099
Economic status						
Medical aid						
0–25%	335 (16.1)	320 (15.4)	0.020	31 (17.0)	32 (17.6)	0.015
26–50%	430 (20.7)	456 (21.9)	0.031	40 (22.0)	40 (22.0)	0.000
51–75%	331 (15.9)	346 (16.6)	0.020	22 (12.1)	32 (17.6)	0.16
76–100%	407 (19.6)	398 (19.1)	0.011	30 (16.5)	27 (14.8)	0.045
76–100%	572 (27.5)	557 (26.8)	0.016	57 (31.3)	48 (26.4)	0.11
Underlying diseases						
Mood disorders	1,316 (63.3)	1,316 (63.3)	0.000	110 (60.4)	111 (61.0)	0.011
Hypertension	896 (43.1)	775 (37.3)	0.12	46 (25.3)	37 (20.3)	0.12
Diabetes	716 (34.4)	613 (29.5)	0.11	47 (25.8)	29 (15.9)	0.25
Obesity	11 (0.53)	3 (0.14)	0.066	1 (0.55)	0	0.11
Nicotine dependence	1 (0.05)	1 (0.05)	0.000	0	0	–
Alcohol dependence	101 (4.9)	77 (3.7)	0.057	15 (8.2)	13 (7.1)	0.041
Chronic lower respiratory diseases	1,202 (57.8)	1,236 (59.4)	0.033	64 (35.2)	59 (32.4)	0.058
Heart diseases	477 (22.9)	388 (18.7)	0.11	20 (11.0)	16 (8.8)	0.074
Chronic kidney diseases	51 (2.5)	39 (1.9)	0.040	3 (1.6)	2 (1.1)	0.047
Malignant neoplasms	226 (10.9)	178 (8.6)	0.078	13 (7.1)	13 (7.1)	0.000
Stroke	205 (9.9)	157 (7.5)	0.082	2 (1.1)	3 (1.6)	0.047
Admission to skilled nursing facilities	171 (8.2)	109 (5.2)	0.12	12 (6.6)	12 (6.6)	0.000

Values are presented as number (%).

SMD: standardized mean difference.



**Supplementary Table 9.** Incidence rates of the unspecified pain diagnoses and idiopathic pain disorders with the new control group who was hospitalized at least once

Variable	Entire cohort			Cohort without a history of the pain diagnoses			P value
	COVID-19 (n = 4,294)	Control (n = 4,294)	P value	COVID-19 (n = 470)	Control (n = 470)	P value	
Unspecified pain	532 (13.3%, 12.2–14.3)	798 (19.9%, 18.7–21.1)	< 0.001	29 (6.8%, 4.7–9.5)	61 (13.5%, 10.5–16.8)	0.002	
Pain in throat and chest	267 (6.6%, 5.8–7.4)	260 (6.2%, 5.5–7.0)	0.401	18 (4.2%, 2.6–6.4)	18 (3.9%, 2.4–5.9)	0.792	
Abdominal and pelvic pain	203 (5.0%, 4.4–5.7)	450 (10.9%, 10.0–11.9)	< 0.001	8 (1.9%, 0.9–3.5)	36 (7.8%, 5.6–10.5)	< 0.001	
Pain associated with micturition	14 (0.34%, 0.20–0.57)	35 (0.82%, 0.58–1.13)	0.004	1 (0.23%, 0.02–1.24)	1 (0.21%, 0.02–1.14)	0.952	
Pain, not elsewhere classified	102 (2.5%, 2.1–3.0)	155 (3.7%, 3.1–4.3)	0.003	2 (0.47%, 0.10–1.58)	14 (3.0%, 1.7–4.9)	0.004	
Idiopathic pain	444 (11.1%, 10.1–12.1)	569 (13.8%, 12.8–14.9)	< 0.001	25 (5.8%, 3.9–8.3)	26 (5.6%, 3.8–8.0)	0.835	
Fibromyalgia	0	0	-	0	0	-	
Temporomandibular joint disorders	0	0	-	0	0	-	
Headaches	298 (7.4%, 6.6–8.2)	343 (8.2%, 7.4–9.0)	0.232	22 (5.1%, 3.3–7.5)	12 (2.6%, 1.4–4.3)	0.041	
Chronic prostatitis	14 (0.34%, 0.20–0.57)	24 (0.56%, 0.37–0.82)	0.144	0	0	-	
CRPS	4 (0.10%, 0.03–0.24)	10 (0.23%, 0.12–0.42)	0.131	0	0	-	
Atypical facial pain	0	1 (0.00%, 0.00–0.13)	0.328	0	0	-	
Irritable bowel syndrome	152 (3.8%, 3.2–4.4)	240 (5.7%, 5.0–6.5)	< 0.001	4 (0.93%, 0.31–2.25)	14 (3.0%, 1.7–4.9)	0.027	
Interstitial cystitis	1 (0.02%, 0.00–0.14)	5 (0.12%, 0.05–0.26)	0.170	0	0	-	
Opioid	708 (17.5%, 16.4–18.7)	1,592 (40.8%, 39.2–42.3)	< 0.001	44 (10.3%, 7.6–13.4)	131 (30.5%, 26.2–34.9)	< 0.001	
Opioid without malignant neoplasm	643 (15.9%, 14.8–17.0)	1,422 (35.7%, 34.2–37.2)	< 0.001	41 (9.6%, 7.0–12.6)	121 (27.7%, 23.6–31.9)	< 0.001	

Values are presented as number (%; 95% confidence interval).

CRPS: complex regional pain syndrome.

**Supplementary Table 10.** Incidence rate of unspecific and idiopathic pain with the new control group who had acute upper respiratory infections

Variable	Entire cohort			Cohort without a history of the pain diagnoses			P value
	COVID-19 (n = 7,525)	Control (n = 7,525)	P value	COVID-19 (n = 907)	Control (n = 907)	P value	
Unspecified pain	825 (11.8%, 11.1–12.6)	910 (16.9%, 15.5–18.3)	< 0.001	55 (6.7%, 5.1–8.5)	61 (8.9%, 6.8–11.4)	0.158	
Pain in throat and chest	431 (6.1%, 5.6–6.7)	250 (4.1%, 3.6–4.7)	< 0.001	31 (3.7%, 2.6–5.2)	21 (3.3%, 2.0–5.1)	0.368	
Abdominal and pelvic pain	310 (4.4%, 3.9–4.9)	461 (9.1%, 8.0–10.3)	< 0.001	18 (2.2%, 1.3–3.3)	27 (3.9%, 2.6–5.6)	0.045	
Pain associated with micturition	19 (0.27%, 0.17–0.41)	39 (0.77%, 0.45–1.25)	0.001	1 (0.12%, 0.01–0.66)	3 (0.54%, 0.14–1.57)	0.095	
Pain, not elsewhere classified	138 (2.0%, 1.6–2.3)	252 (4.1%, 3.5–4.7)	< 0.001	7 (0.85%, 0.38–1.68)	17 (2.2%, 1.3–3.4)	0.022	
Idiopathic pain	713 (10.2%, 9.5–10.9)	1,023 (18.3%, 16.9–19.7)	< 0.001	44 (5.4%, 4.0–7.0)	56 (7.8%, 5.9–10.0)	0.060	
Fibromyalgia	0	0	–	0	0	–	
Temporomandibular joint disorders	0	0	–	0	0	–	
Headaches	470 (6.7%, 6.1–7.3)	666 (11.1%, 10.2–12.1)	< 0.001	32 (3.9%, 2.7–5.4)	34 (4.8%, 3.3–6.7)	0.408	
Chronic prostatitis	25 (0.35%, 0.24–0.51)	48 (0.75%, 0.56–0.99)	< 0.001	1 (0.12%, 0.01–0.66)	1 (0.13%, 0.01–0.70)	0.815	
CRPS	6 (0.08%, 0.04–0.18)	6 (0.10%, 0.04–0.21)	0.755	0	1 (0.12%, 0.01–0.67)	0.313	
Atypical facial pain	0	1 (0.00%, 0.00–0.08)	0.324	0	0	–	
Irritable bowel syndrome	243 (3.4%, 3.0–3.9)	378 (7.5%, 6.5–8.6)	< 0.001	12 (1.5%, 0.8–2.5)	21 (2.9%, 1.9–4.4)	0.054	
Interstitial cystitis	2 (0.03%, 0.01–0.10)	3 (0.07%, 0.02–0.21)	0.466	0	0	–	
Opioid	872 (12.4%, 11.6–13.1)	1,843 (29.8%, 28.3–31.4)	< 0.001	44 (5.3%, 3.9–7.0)	140 (19.6%, 16.1–23.3)	< 0.001	
Opioid without malignant neoplasm	802 (11.4%, 10.6–12.1)	1,757 (28.1%, 26.6–29.6)	< 0.001	42 (5.1%, 3.7–6.7)	138 (19.3%, 15.9–23.0)	< 0.001	

Values are presented as number (%; 95% confidence interval).

CRPS: complex regional pain syndrome.

**Supplementary Table 11.** Incidence rate of unspecific and idiopathic pain with the new control group who had fracture of a large bone

Variable	Entire cohort		Cohort without a history of the pain diagnoses		P value	P value
	COVID-19 (n = 1,210)	Control (n = 1,210)	COVID-19 (n = 95)	Control (n = 95)		
Unspecified pain	138 (12.5%, 10.6–14.5)	246 (28.6%, 24.2–33.0)	1 (1.1%, 0.10–5.5)	13 (19.4%, 9.3–32.3)	< 0.001	< 0.001
Pain in throat and chest	68 (6.1%, 4.8–7.6)	54 (5.3%, 4.0–6.8)	1 (1.1%, 0.10–5.4)	6 (7.9%, 3.1–15.6)	0.388	0.033
Abdominal and pelvic pain	58 (5.2%, 4.0–6.6)	172 (20.8%, 16.7–25.2)	0	10 (16.0%, 6.5–29.1)	< 0.001	< 0.001
Pain associated with micturition	6 (0.54%, 0.23–1.12)	8 (1.7%, 0.5–4.4)	0	0	0.320	–
Pain, not elsewhere classified	25 (2.2%, 1.5–3.2)	43 (4.5%, 3.3–6.0)	0	1 (1.3%, 0.1–6.3)	0.005	0.275
Idiopathic pain	123 (11.1%, 9.3–13.0)	184 (19.2%, 16.3–22.3)	4 (4.5%, 1.5–10.3)	11 (26.8%, 8.0–50.3)	< 0.001	0.004
Fibromyalgia	0	0	0	0	–	–
Temporomandibular joint disorders	0	0	0	0	–	–
Headaches	79 (7.1%, 5.7–8.7)	86 (8.4%, 6.7–10.2)	3 (3.3%, 0.89–8.6)	3 (3.7%, 0.97–9.4)	0.251	0.578
Chronic prostatitis	5 (0.44%, 0.17–1.00)	23 (2.22%, 1.43–3.30)	0	2 (2.5%, 0.5–8.0)	< 0.001	0.125
CRPS	1 (0.09%, 0.01–0.49)	4 (0.36%, 0.12–0.90)	0	0	0.174	–
Atypical facial pain	0	0	0	0	–	–
Irritable bowel syndrome	45 (4.0%, 3.0–5.3)	90 (9.9%, 7.6–12.6)	1 (1.1%, 0.10–5.5)	6 (21.6%, 4.2–47.5)	< 0.001	0.004
Interstitial cystitis	0	1 (0.09%, 0.01–0.51)	0	0	0.308	–
Opioid	230 (20.6%, 18.3–23.0)	441 (45.8%, 41.7–49.8)	11 (12.2%, 6.5–19.9)	31 (42.8%, 27.7–57.0)	< 0.001	< 0.001
Opioid without malignant neoplasm	202 (18.1%, 15.9–20.4)	412 (42.4%, 38.5–46.2)	10 (11.1%, 5.7–18.6)	30 (40.9%, 26.5–54.8)	< 0.001	< 0.001

Values are presented as number (%; 95% confidence interval).

CRPS: complex regional pain syndrome.

**Supplementary Table 12.** Incidence rate of unspecific and idiopathic pain with the new control group who were diagnosed with depressive disorder

Variable	Entire cohort		Cohort without a history of the pain diagnoses		P value
	COVID-19 (n = 2,080)	Control (n = 2,080)	COVID-19 (n = 182)	Control (n = 182)	
Unspecified pain	276 (14.3%, 12.8-15.9)	312 (19.8%, 17.3-22.4)	18 (10.9%, 6.7-16.2)	9 (6.3%, 3.0-11.2)	0.001
Pain in throat and chest	129 (6.6%, 5.6-7.8)	87 (5.2%, 4.2-6.4)	10 (6.0%, 3.1-10.4)	3 (2.1%, 0.6-5.6)	0.023
Abdominal and pelvic pain	114 (5.9%, 4.9-7.0)	188 (12.3%, 10.2-14.7)	6 (3.6%, 1.5-7.3)	4 (2.6%, 0.8-6.1)	<0.001
Pain associated with micturition	10 (0.51%, 0.26-0.91)	10 (0.51%, 0.26-0.91)	1 (0.60%, 0.05-3.05)	0	0.970
Pain, not elsewhere classified	53 (2.7%, 2.1-3.5)	63 (3.6%, 2.8-4.6)	3 (1.8%, 0.5-4.8)	2 (1.5%, 0.3-5.0)	0.122
Idiopathic pain	235 (12.2%, 10.8-13.7)	442 (27.8%, 24.6-31.0)	10 (6.1%, 3.1-10.4)	17 (11.6%, 6.7-18.0)	<0.001
Fibromyalgia	0	0	0	0	-
Temporomandibular joint disorders	0	0	0	0	-
Headaches	154 (7.9%, 6.8-9.1)	301 (18.3%, 15.9-20.9)	9 (5.4%, 2.6-9.6)	14 (9.7%, 5.2-15.8)	<0.001
Chronic prostatitis	5 (0.25%, 0.10-0.58)	14 (0.74%, 0.43-1.22)	0	2 (1.2%, 0.2-3.9)	0.010
CRPS	3 (0.15%, 0.04-0.43)	5 (0.29%, 0.11-0.68)	0	0	0.424
Atypical facial pain	0	1 (0.07%, 0.01-0.39)	0	0	0.244
Irritable bowel syndrome	89 (4.6%, 3.7-5.6)	159 (10.2%, 8.2-12.5)	2 (1.2%, 0.2-4.0)	1 (0.72%, 0.07-3.65)	<0.001
Interstitial cystitis	0	2 (0.15%, 0.03-0.57)	0	0	0.089
Opioid	406 (20.9%, 19.1-22.7)	451 (26.9%, 24.1-29.8)	25 (15.0%, 10.0-20.8)	20 (12.0%, 7.6-17.5)	0.004
Opioid without malignant neoplasm	369 (18.9%, 17.2-20.7)	419 (24.8%, 22.1-27.6)	24 (14.4%, 9.5-20.2)	19 (11.2%, 7.0-16.5)	0.002

Values are presented as number (%; 95% confidence interval).

CRPS: complex regional pain syndrome.