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Birth Year of the Cohort (academic year)	Grade at Survey 1 (2008)	Grade at Survey 2 (2009)
1990	12th grade (HS)	-
1991	11th grade (HS)	12th grade (HS)
1992	10th grade (HS)	11th grade (HS)
1993	9th grade (JHS)	10th grade (HS)
1994	8th grade (JHS)	9th grade (JHS)
1995	7th grade (JHS)	8th grade (JHS)
1996	-	7th grade (JHS)

Serial cross-sectional analysis, n=2403 (single/repeated measurements)

Cross-sectional analysis, n=1816 (single measurement, sensitivity analysis)

Longitudinal analysis, n=374 (among students free of pain at survey 1)

Figure S1. Inclusion scheme for the data in the analyses.
JHS: junior high school; HS: high school.

eQuestionnaire 1. Pain questionnaire for adolescents.

Questions about pain

For each part of your body, please answer about "pain" that you have felt recently.
If you do not have any pain, please circle "no pain".

(Example)   <u>**0. (Location)**</u>   ＜ (have pain) ・ no pain → Proceed to 2. Upper limb ＞

(1) Is it because you were injured (e.g., fell, hit a person or an object)?

         ＜ Yes ・ (No) ＞

The anatomical locations are shown in black.
↓

(2) How long have you had the pain?

     ＜ 1 year or longer ・ (3 months or less) ・ 1 month or less ・ 1 week or less ＞

(3) How often do you feel the pain?

     ＜ everyday ・ (several times a week) ・ several times a month ・ several times a year ＞
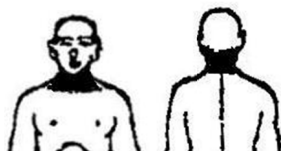
<u>**1. Neck**</u>   ＜ have pain ・ no pain → Proceed to 2. Upper limb ＞

(1) Is it because you were injured (e.g., fell, hit a person or an object)?

         ＜ Yes ・ No ＞

(2) How long have you had the pain?

     ＜ 1 year or longer ・ ___ months or less ・ 1 month or less ・ 1 week or less ＞

(3) How often do you feel the pain?

     ＜ everyday ・ several times a week ・ several times a month ・ several times a year ＞
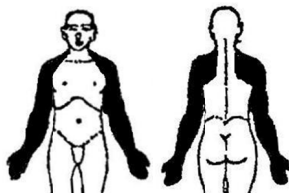
<u>**2. Upper limbs**</u> (shoulder, arms, hands) ＜ have pain ・ no pain → Proceed to 3.Chest ＞

(1) Is it because you were injured (e.g. fell, hit a person or an object)?

         ＜ Yes ・ No ＞

(2) How long have you had the pain?

     ＜ 1 year or longer ・ ___ months or less ・ 1 month or less ・ 1 week or less ＞

(3) How often do you feel the pain?

     ＜ everyday ・ several times a week ・ several times a month ・ several times a year ＞

(4) At which location do you have the pain?

     ＜ (e.g., shoulder, elbow, wrist, finger)_____ ＞

*If you have pain at two or more locations in your upper limbs, please answer only about one with the most severe (strongest) pain.

<u>**3. Chest**</u>   ＜ have pain ・ no pain → Proceed to 4. Upper back ＞

(1) Is it because you were injured (e.g., fell, hit a person or an object)?

         ＜ Yes ・ No ＞

(2) How long have you had the pain?

     ＜ 1 year or longer ・ ___ months or less ・ 1 month or less ・ 1 week or less ＞

(3) How often do you feel the pain?

     ＜ everyday ・ several times a week ・ several times a month ・ several times a year ＞
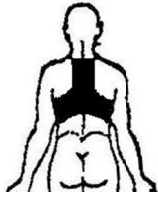
4. Upper back   ＜ have pain ・ no pain → Proceed to 5. Lower back ＞

(1) Is it because you were injured (e.g., fell, hit a person or an object)?

＜ Yes ・ No ＞

(2) How long have you had the pain?

＜ 1 year or longer ・ ___months or less ・ 1 month or less ・ 1 week or less ＞

(3) How often do you feel the pain?

＜ everyday ・ several times a week ・ several times a month ・ several times a year ＞

5. Lower back   ＜ have pain ・ no pain → Proceed to 6. Buttock ＞

(1) Is it because you were injured (e.g., fell, hit a person or an object)?

＜ Yes ・ No ＞

(2) How long have you had the pain?

＜ 1 year or longer ・ ___months or less ・ 1 month or less ・ 1 week or less ＞

(3) How often do you feel the pain?

＜ everyday ・ several times a week ・ several times a month ・ several times a year ＞
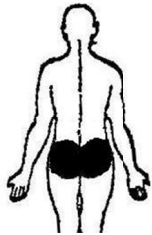
6. Buttocks   ＜ have pain ・ no pain → Proceed to 7. Lower limb ＞

(1) Is it because you were injured (e.g., fell, hit a person or an object)?

＜ Yes ・ No ＞

(2) How long have you had the pain?

＜ 1 year or longer ・ ___months or less ・ 1 month or less ・ 1 week or less ＞

(3) How often do you feel the pain?

＜ everyday ・ several times a week ・ several times a month ・ several times a year ＞
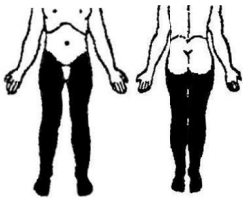
7. Lower limbs(thigh, hip, knee, foot, etc.)   ＜ have pain ・ no pain ＞

(1) Is it because you were injured (e.g. fell, hit a person or an object)?

＜ Yes ・ No ＞

(2) How long have you had the pain?

＜ 1 year or longer ・ ___months or less ・ 1 month or less ・ 1 week or less ＞

(3) How often do you feel the pain?

＜ everyday ・ several times a week ・ several times a month ・ several times a year ＞

(4)At which location do you have the pain?

＜(e.g., hip, knee, shin, ankle, instep, toe)_____＞

*If you have pain at two or more locations in your lower limbs, please answer only about one with the most severe (strongest) pain.

Table S1. Baseline prevalence and risk of new onset of pain by location

	Prevalence[a], n=2403			**Risk**[b], n=374		
	Total	traumatic	Non-traumatic	Total	traumatic	Non-traumatic
Overall	634 (27.4)	129 (5.8)	509 (22.3)	82 (22.7)	11 (3.1)	74 (20.6)
Location						
Neck	56 (2.4)	5 (0.2)	50 (2.1)	9 (2.5)	2 (0.5)	6 (1.6)
Upper limbs	224 (9.5)	41 (1.8)	169 (7.2)	23 (6.3)	3 (0.8)	18 (4.9)
Chest	14 (0.6)	1 (0.04)	13 (0.6)	3 (0.8)	0 (0)	3 (0.8)
Upper back	34 (1.4)	2 (0.1)	30 (1.3)	1 (0.3)	0 (0)	1 (0.3)
Lower back	202 (8.5)	16 (0.7)	177 (7.5)	26 (7.0)	1 (0.3)	23 (6.2)
Buttocks	19 (0.8)	2 (0.1)	17 (0.7)	4 (1.1)	0 (0)	4 (1.1)
Lower limbs	360 (15.4)	77 (3.3)	257 (11.1)	44 (11.9)	5 (1.4)	38 (10.3)

Values are numbers (percentages). Sample sizes (denominators) of number counts vary due to missing values.

[a] No duplication by student (1 record for each student).

[b] Point prevalence (new onset) of pain at 1-year follow-up, among those who had no pain and in 7th or 10th grade at baseline.

Table S2. Cross-sectional association between sports activity and pain prevalence by type of sport

	Number of students participating in[a]	P for linearity	PR (95% CI) per 1 hour/week of sports activity[b]
Track & field	59	0.02	**1.03 (1.01-1.07)**
Soft tennis	128	0.75	1.00 (0.98-1.02)
Table tennis	52	0.84	1.00 (0.95-1.04)
Badminton	74	0.07	1.02 (1.00-1.05)
Kendo	61	0.004	**1.04 (1.01-1.07)**
Baseball	238	<0.001	**1.03 (1.02-1.04)**
Softball	150	<0.001	**1.04 (1.02-1.05)**
Basketball	146	<0.001	**1.05 (1.03-1.06)**
Soccer	62	0.018	**1.03 (1.01-1.06)**
Volleyball	279	<0.001	**1.03 (1.02-1.04)**

CI, confidence interval; PR, prevalence ratio. Prevalence ratios were calculated with multiply imputed data. Each model included non-sports students (2078 records from 2008 and 2009 surveys) and students who participated in each type of sport. Other sports with small samples (n≤40) were not analyzed.

[a]The sum of both years (2008 and 2009).

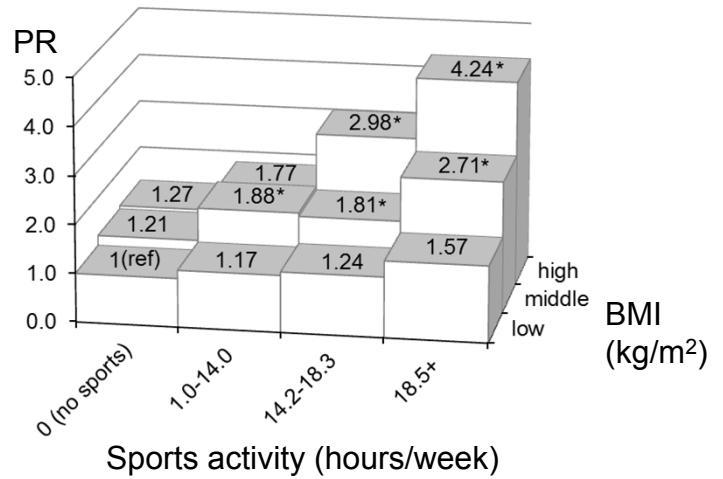[b]Adjusted for sex, age, body mass index, sleep length, and screen time.
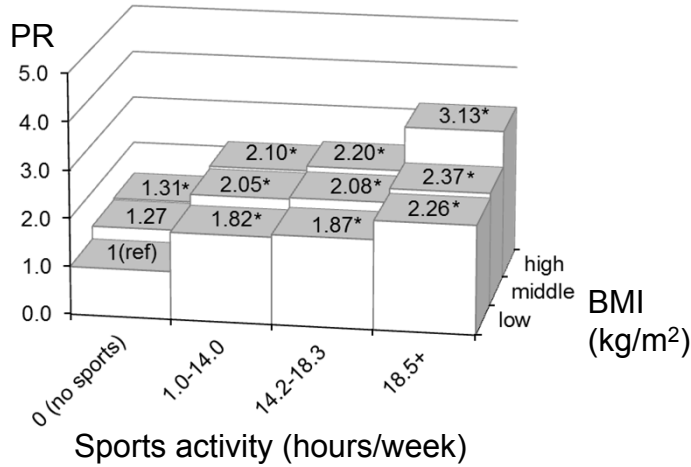
Figure S2. **Associations of sports activity and weight status with pain prevalence (n=2403).** Significant prevalence ratios (PRs) of (A) pain overall and (B) upper limb pain are indicated with asterisks (*P<0.05). Tertiles of time spent in sports activity within students engaged in organized sports activity and tertiles of body mass index (BMI) within grades were used for cutpoints, and the group of students who did not participate in sports (0 hours/week) and had the lowest BMI served as the reference category.