

Supplementary table 1. Estimates on prognostic factors specified according to musculoskeletal pain type, baseline age, and follow-up in the included studies		Musculoskeletal pain	Neck pain				
		Low back pain	Low limb pain	Headache			
		Knee pain	Back pain	Growing pain			
	Prognostic factors subgrouped according to the biopsychosocial model	Study ID (Follow-up, yrs)	RR (95% CI)	OR (95% CI)	p-value	Adjusted for	
<b>BIOLOGICAL PROGNOSTIC FACTORS</b>							
<b>Female sex compared to male</b>							
8 to 13		37 (3)			0.038		
10 to 16		20 (11)		M 1.8 (1.1-2.9)			
9 to 12		21 (4)	U 1.24 (1.07-1.44)			age	
9 to 12		28 (1)		1.78 (1.18-2.69)	0.006		
10 to 17		50 (3mo)			0.003		
9 to 12		27 (1)			0.001		
12 to 15		34 (2)	CR 1.29 (1.02-1.63)		0.08		
12 to 15		9 (1)		3.66 (1.09-12.33)	0.04		
10 to 11		39 (2)			M < 0.001		
10 to 11		39 (2)			M < 0.001		
8, 11, 14		20 (11)		2.24 (1.24-4.20)			
<b>Older age</b>							
9 to 12	Older age	28 (1)		1.24 (1.02-1.50)	0.031		
9 to 12 F	11 to 13 years vs. 9-10 years	21 (4)	M 1.40 (1.17-1.67)				
12 to 15	Older age, increase per year, 12 years as referent	9 (1)		M 1.45 (1.07-1.95)	0.01		
13	Older age	25 (3)			0.04		
<b>Body measurement factors</b>							
8 to 13	Higher pubertal group (a) group 2 and 3 vs. group 1	37 (3)			0.022		
9 to 12 F	Beighton score 6-9 vs. score < 6	21 (4)	M 1.31 (1.18-1.46)			age	
11 to 14	Height < 158cm	23 (4)	2.2 (1.2-3.8)			age, sex	
9 to 12	Hypomobility score ≥/ = 6 vs. < 6	11 (4)		M 2.93 (1.13-7.70)			
<b>Physical functioning</b>							
14 to 16	Ratio flexion mobility (cm)/extension strength (min) (b)	36 (3)		1.9 (1.1-3.2)	0.02	gender, well being, physical activity	
14 to 16	Ratio extension mobility cm/extension strength (min) (b)	36 (3)		3.2 (1.3-8.3)	0.02	gender	
14 to 16	Ratio flexion + extension mobility (cm)/extension strength (min) (b)	36 (3)		1.5 (1.1-2.2)	0.02	gender, well being, physical activity	
<b>Pain characteristics</b>							
2 to 17	Higher number of painful sites (mean 3.7 vs. 2.8) range 0-6	22 (9)			0.04		
2 to 17	More frequent generalised vs. localised pain (86 vs. 47%)	22 (9)		84.0 (2.1-3000)	0.02		
2 to 17	More intense pain (median 4.3 vs. 0.5cm) range 0-10cm VAS	22 (9)			0.03		
2 to 17	Longer disease duration before first admission (median 1.4 vs. 0.5 years)	22 (9)			<0.01		
9 to 12	Pain at both baseline and 1 year follow-up vs. only baseline	21 (4)		2.9 (1.9-4.4)		age	
9 to 12 M	Multisite vs. localised pain	21 (4)	U 1.32 (1.04-1.66)			age	
9 to 12 M	Headache (psychosomatic symptom (c))	21 (4)	M 1.43 (1.12-1.83)			age	
10 to 17	Conditioned pain modulation CPM (d)	50(3mo)			0.046		
9 to 12 F	Abdominal pain (psychosomatic symptom (c))	21 (4)	U 1.20 (1.03-1.40)			age	
11 to 14	Radiating leg pain vs. no radiating pain	23 (4)	2.2 (1.4-3.6)			age, sex	
11 to 14	Low back pain start > 12 month prior to admission	23 (4)	2.4 (1.3-4.4)			age, sex	
11 to 14	Pain episode > 7 days vs < 24h	23 (4)	2.6 (1.4-4.9)			age, sex	
15 to 19	Patellofemoral pain diagnosis vs. other types of knee pain	34 (2)	1.24 (1.04-1.49)		0.01	age, sex, BMI	
15 to 19	High pressure pain threshold (PPT) around the knee	35 (3mo)			0.03		
12 to 15	Daily vs. rare pain	9 (1)		M 6.31 (1.21-33.01)	0.03		
12 to 15	Pain several times/week vs. monthly	34 (2)	CR 1.58 (1.15-2.17)		0.005		
16 to 18	Daily pain frequency vs. monthly	34 (2)	1.58 (1.17-2.14)		0.003		

16 to 18	Longer pain duration per 10-months increase	34 (2)	CR 1.04 (1.01-1.07)		0.01		
9 to 12 M	Also headache (e) at least once a week	38 (4)			<0.001		
9 to 12 M	Also abdominal pain (e) at least a week	38 (4)			<0.001		
9 to 12 F	Also headache (e) at least once a week	38 (4)			<0.001		
9 to 12 F	Also abdominal pain (e) at least a week	38 (4)			<0.001		
9 to 12	Other musculoskeletal symptoms: upper extremities at least once a week	38 (4)			<0.001		
9 to 12 M	Other musculoskeletal symptoms: chest at least once a week	38 (4)			0.008		
9 to 12 F	Other musculoskeletal symptoms: chest at least once a week	38 (4)			0.001		
9 to 12	Other musculoskeletal symptoms: back at least once a week	38 (4)			<0.001		
9 to 12 M	Other musculoskeletal symptoms as well: lower extremities at least once a week	38 (4)			<0.001		
9 to 12 F	Other musculoskeletal symptoms as well: lower extremities at least once a week	38 (4)			0.003		
8, 11, 14	Headache >/= 1time/week	20 (11)		2.3 (1.1-4.5)			
10 to 16	Duration of pain episodes > 3 hours vs. < 3 hours	20 (11)		U 3.1 (1.1-8.2)			
10 to 16	Lower pain threshold	40 (5)			<0.05		
10 to 16	Lower pain threshold at anterior tibial region (pressure level < 5ke/cm2)	40 (5)			<0.01		
<b>PSYCHOLOGICAL PROGNOSTIC FACTORS</b>							
<b>General psychological factors</b>							
16 M	Internalization (f)	33 (2)		2.32 (1.23-4.37)			
16 M	Externalization (f)	33 (2)		2.17 (1.24-3.81)			
16 F	Internalization (f)	33 (2)		3.70 (1.88-7.27)			
10 to 16	Often/sometimes nervous	20 (11)		M 2.1 (1.3-3.4)			
16 to 18 M	Internalization (f)	24 (2)			< 0.001		
16 to 18 M	Externalization (f)	24 (2)			< 0.001		
16 to 18 F	Higher internalization score (f)	24 (2)			< 0.001		
16 to 18 F	Higher externalization score (f)	24 (2)			< 0.001		
10 to 16	Self-perception of not feeling completely healthy	20 (11)		U 1.7 (1.1-2.8)			
10 to 16	Unsatisfied with own appearance	20 (11)		U 1.6 (1.1-2.5)			
12 to 15	EQ-5D index score 0-25 vs. 75-100% quartiles (g)	9 (1)		U 0.08	<0.001		
12 to 15	EQ-5D index score 0-25 vs. 25-50% quartiles (g)	9 (1)		U 0.29	<0.001		
12 to 15	EQ-5D index score 25-50th % vs. 75th-100th % (g)	34 (2)	CR 1.81 (1.14-2.85)		0.01		
12 to 15	EQ-5D index score 0-25th % vs. 75th-100th % (g)	34 (2)	CR 2.00 (1.28-3.12)		0.002		
10 to 11	Self reported low self esteem	39 (2)			U < 0.01		
10 to 11	Parent reported adolescent low self esteem	39 (2)			U < 0.01		
<b>Depressive factors</b>							
9 to 12 F	Depressive feelings	21 (4)	U 1.21 (1.03-1.42)			age	
9 to 12 F	Depressive symptoms in a frequency of at least once a week	38 (4)			<0.001		
9 to 12 M	Depressive symptoms in a frequency of at least once a week	38 (4)			<0.001		
12 to 16	Higher score of anxiety and depressive symptoms (h)	18 (4)		1.4 (1.03-1.90)	0.032		
10 to 11	Self reported anxiety/depression	39 (2)			M <0.01		
10 to 11	Parent reported adolescent anxiety/depression	39 (2)			< 0.05		
<b>SOCIAL PROGNOSTIC FACTORS</b>							
<b>General social factors</b>							
2 to 17	Lower paternal educational level (median 10 vs. 14 years education)	22 (9)			p<0.01		
2 to 17	Lower maternal educational level (median 10 vs. 14 years education)	22 (9)			p<0.01		
2 to 17	More chronic family difficulties (mean 4.3 vs. 2.9) (i)	22 (9)			p<0.01		
10 to 16	Doing well in school	20 (11)		U 1.8 (1.1-2.9)			
9 to 12	Higher disability index (j) 1-2 vs 0	28 (1)	1.72 (1.09-2.73)		0.005		
9 to 12	Higher disability index (j) 3-5 vs 0	28 (1)	3.17 (1.54-6.55)		0.005		
9 to 12	Higher disability index (j) 3-5 vs. 0	21 (4)	U 1.23 (1.02-1.49)			age	
11 to 14	High vs. low peer relationship problems	23 (4)	2.4 (1.3-4.2)			age, sex	
11 to 14	Difficulty standing in line for 10 minutes	23 (4)	2.7 (1.5-4.9)				
11 to 14	Difficulties carrying a schoolbag	23 (4)	2.1 (1.1-4.0)				
11 to 14	High limitation level HFAQ (k) 4-9 vs. 0-1 limitations	23 (4)	4.1 (1.05-16.2)				

8, 11, 14	Headache on non-school days	20 (11)		3.1 (1.3-7.3)			
13 M	Use of physiotherapy for headache or neck pain during the past 6 months	25 (3)			0.004		
10 to 11 F	Parental recurrent headache	39 (2)			p<0.05		
10 to 16	<b>At least one parent with a pain syndrome</b>	40 (5)			0.047		
	<b>Factors related to sleep/daytime tiredness</b>						
9 to 12 F	Waking up during nights	21 (4)	U 1.18 (1.01-1.37)			age	
16 F	Sleep $\leq$ 7h vs. 8-9 h/day	33 (2)		1.68 (1.05-2.68)			
9 to 12	Day tiredness, fatigue	28 (1)		1.86 (1.16-3.00)	0.010		
16 to 18 M	Insufficient sleeping time h/day (mean 8 vs. 8.5 h/day)	24 (2)			0.001		
9 to 12 M	Difficulties falling asleep	38 (4)			<0.001		
9 to 12 M	Daytime tiredness	38 (4)			<0.001		
9 to 12 M	Walking up during nights	38 (4)			0.001		
9 to 12 F	Difficulties falling asleep	38 (4)			<0.001		
9 to 12 F	Daytime tiredness	38 (4)			<0.001		
9 to 12 F	Walking up during nights	38 (4)			<0.001		
	<b>Physical activity / inactivity</b>						
16 F	$\geq$ 4 vs. 2-3 hours of moderate-to-vigorous physical activity/week	33 (2)		1.63 (1.04-2.56)			
16 to 18 M	Longer sitting time outside school hours (mean 6.2 h/day)	24 (2)			0.004		
12 to 15	Sports participation 3-7 t/wk vs. 0-2 t/wk	9 (1)		M 2.01 (1.20-3.36)	0.008		
9 to 12	Exercise frequency 5-7 t vs. 0-2/week	11 (1)		M 2.43 (1.16-5.05)			
	<b>Alcohol</b>						
16 to 18 F	<b>More than occasional consumption</b>	24 (2)			0.038		
	<b>Smoking</b>						
16 F	Smoking vs. nonsmoking	33 (2)		1.89 (1.23-2.90)			
16 F	Smoking 5-7 days/week vs. nonsmoking	30 (2)		2.52 (1.40-4.53)		family's SES, physical activity, BMI, depressive mood	
16 F	Smoking 1-9 cigarettes/day vs. nonsmoking	30 (2)		2.39 (1.40-4.08)		family's SES, physical activity, BMI, depressive mood	
16 F	Smoking > 9 cigarettes/day vs. nonsmoking	30 (2)		2.57 (1.03-6.46)		family's SES, physical activity, BMI, depressive mood	
16 M	Smoking 1-9 cigarettes/day vs. nonsmoking	30 (2)		2.68 (1.35-5.32)		family's SES, physical activity, BMI, depressive mood	
<b>Explanatory notes</b>							
F = prognostic factor only applicable for female participants, M = Male, when unspecified = unisex							
RR > 1 or < 1, OR > 1 or < 1, p < 0.05 indicate that the prognostic factor is associated with a higher risk of persistent MSK pain.							
CI = confidence interval M = Multivariate analysis U = Univariate analysis CR = Crude							
a = Group 1: prepubertal, group 2: became pubertal during 3 years follow-up, and group 3: pubertal at baseline. The pubertal stage was assessed by the presence of secondary signs of pubertal development. For females, puberty was defined by the stage of breast development (Tanner stage $\geq$ 3) and menarche. For males, puberty was defined in presence of a testicles volume $\geq$ 12 ml and presence of pubic and underarm hair.							
b = Low lumbar extension strength and high ratios between lumbar mobility and lumbar extension strength predicts future low back pain							
c = childhood abdominal pain, headache, depressive symptoms, day tiredness, difficulties in falling asleep, waking up during nights are believed to be having a psychosomatic origin in the great majority of cases.							
d = Conditioned pain modulation CPM calculated using a ratio of conditioned heat pain threshold with a conditioned stimulus (cold pressor) (50).							
e = Classified as: other physical and psychological symptoms, without further definition							
f = Internalizing score calculated from subscales: anxious/depressed, withdrawn/depressed symptoms, and somatic complaints. Externalizing from rule-breaking and aggressive behaviour.							
g = EQ-5D assesses self-reported health status in 5 dimensions: mobility, self-care, usual activities, pain/discomfort, anxiety/depression and within 3 levels of severity: no problems, moderate or severe problems as well as scoring own current self-rated health status on VAS 0-100.							
h = Anxiety symptoms: been constantly scared and uneasy, felt tense and restless, worried too much about different matters. Depressive symptoms: felt hopeless when thinking of the future, felt down or sad.							
i = Assessment of information about employment and education, economic matters, housing, marital or family discord, social networks and the physical and mental health of the family members. Score range 0-6, 6 = severe family difficulties.							
j = Subjective disability index calculated from answers to the following proposals: difficulty in falling asleep because of pain, difficulty sitting during a lesson, pain disturbs a walk more than 1km, pain disturbs physical exercise, pain disturbs hobbies. Range 0-5.							
k = The modified Hannover functional ability Questionnaire HFAQ assesses whether pain and ache in low back make any of the following daily activities difficult: reaching up to get a book from a high shelf, carrying your school bag to school, sitting on a school chair for a 45-min lesson, standing in a queue for 10 min, sitting up in bed from a lying position, bending down to put your socks on, standing up from an arm chair at home, running fast to catch a bus, and sports activities at school. Low = 0-1 limitation, moderate = 2-3 limitations or high = 4-9 limitations (23).							
l = Yunus criteria: pain modulation by physical activity, by weather, by anxiety and stress, poor sleep, headache, irritable bowel, soft tissue swelling in hands and feet, fatigue, numbness in hands and feet, feeling excited and nervous. Yes to minimum 3 symptoms to meet the Yunus criteria.							
m = SES: Socioeconomic status							
n = CDI: Children's depression Inventory. Cut off point $\geq$ 13 indicating depressive symptoms							
<b>Identified baseline factors without association to persistent musculoskeletal pain, divided in pain type (study ID)</b>							
<b>Musculoskeletal</b>	Female: sitting h/day, sleep h/day, Male: physical activity MET-h/week and above occasional alcohol consumption, unisex: smoking pack years, body mass index (BMI) (24)						
	Exercise frequency >3 vs. <3 t/week, disability index 1-5 vs. 0 (i), waking up during nights (Male), day tiredness, difficulty falling asleep, depressive feelings (Male), headache (Female), absence one day or more from school vs. never being absent due to pain, maximum volume O2 intake (per unit increase) measured during a shuttle run test (21)						

	Headache, stomachache, depressive feelings, difficulty falling asleep, waking up during nights, Yunus criteria (l), increasing exercise amount, and hypermobility (28)						
	Male: physical activity level, sitting >4 h/day, sleep <= 7 h/day, smoking and overweight. Female: externalization, sitting > 4h/day, overweight (33)						
	Increasing age (20, 27)						
	Increasing age, sex, family history of related diseases, VAS score assessed by physicians, elevated C-reactive protein (CRP), erythrocyte sedimentation rate (ESR), platelet count, lower score in psychosocial functioning reflecting mental health and functioning at school/work, within the family, with friends and in other social activities (Children's Global Assessment Scale, CGAS) (22)						
<b>Low back</b>	Extension strength (minutes) and plain saggital mobility (36)						
	Akward trunk postures, physically demanding job (working hands above shoulders, awkward trunk posture and standing or walking), working regularly or irregularly, duration of work, work with specific physical load factors (31)						
	BMI (32)						
	Male: smoking 5-7 d/week vs. no smoking, smoking <9 cigarettes/day (30)						
	High emotional vs. low emotional problems, reaching to a high shelf, sitting up in bed, bending down to put on socks, high conduct problems, high hyperactivity, high prosocial behavior, widespread pain, headache, stomachache in the past month compared to none, daytime tiredness on a scale 0-10, 5-10 vs. 0-4, pain start < 12 months ago, pain lasts <= 7 days, pain today, pain severity on a scale 0-10, 4-10 vs. 0-3, Hannover 2-3 vs. 0-1 (23)						
	Sex, increasing age, tobacco, profession: hairdresser and media/design compared to electrician, western ethnicity compared to non-western ethnicity, moderate/high vs. low socio-economic status (SES) (m), moderate/high vs. low physical activity level, BMI, moderate/high physical work demand vs. low (26)						
<b>Knee</b>	Increasing age compared to 15, participation in sports, BMI, EQ-5D index score 50-75th percentile compared to 75-100th, weekly pain frequency compared to monthly (34)						
	BMI, EQ-5D 50-75th percentile compared to 0-25th, monthly, weekly, several times a week pain frequency compared to rarely (9)						
<b>Lower limb</b>	After 1 year follow-up: traumatic limb at baseline, exercise 3-4 t/week vs. 0-2 t, hypermobility score >= 6 vs. < 6. After 4 years follow-up: exercise frequency 5-7 t/week vs. 0-2 t, lower limb trauma at baseline. Common after both 1 and 4 years follow-up: age 11-14 vs. 9-11, frequency of exercise 2-4 times vs. once a week, multisite pain, female sex, headache, stomachache, depressive feelings, difficulty falling asleep, day tiredness, waking up during nights, school abscence due to pain vs. never absent, disability symptoms >=3 vs. <=2, volume .02 max average or above, exercise frequency 3-4 t/week vs. 0-2 t (11)						
<b>Neck</b>	Joint hypermobility Beighton 6-9, physical activity at least half and hour more than 3 times a week (38)						
<b>Growing pain</b>	Sex, ethnicity, increasing age (39)						
<b>Headache</b>	Sex (19)						
	Pain frequency, pain in daily activities, physiotherapy, relaxation therapy, sport activity, stress at home or in hobbies, pain on palpation, pain threshold measured by dolorimeter, depressive symptoms, temporomandibular disorder, stress at school, use of computer (25)						
	Stress (20)						
<b>Widespread</b>	Female sex, increasing age, tender point count, CDI > 13 (n), Yunus criteria >=3, sleep score, disability index (f), psychosomatic symptoms (29)						
<b>Back</b>	Stress (20)						

Prognostic factors are divided primarily in biological, psychological, and social factors and secondary according to musculoskeletal pain type. The prognostic value were reported with RR, OR, and/or p-value.

