Access to medical care and its association with physical injury in adolescents: a cross-national analysis

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ABSTRACT

Background Strong variations in injury rates have been documented cross-nationally. Historically, these have been attributed to contextual determinants, both social and physical. We explored an alternative, yet understudied, explanation for variations in adolescent injury reporting—that varying access to medical care is, in part, responsible for cross-national differences.

Methods Age-specific and gender-specific rates of medically treated injury (any, serious, by type) were estimated by country using the 2013/2014 Health Behaviour in School-aged Children study (n=209 223). Available indicators of access to medical care included: (1) the Healthcare Access and Quality Index (HAQ; 39 countries); (2) the Universal Health Service Coverage Index (UHC; 37 countries) and (3) hospitals per 100 000 (30 countries) then physicians per 100 000 (36 countries). Ecological analyses were used to relate injury rates and indicators of access to medical care, and the proportion of between-country variation in reported injuries attributable to each indicator.

Results Adolescent injury risks were substantial and varied by country and sociodemographically. There was little correlation observed between national level injury rates and the HAQ and UHC indices, but modest associations between serious injury and physicians and hospitals per 100 000. Individual indicators explained up to 9.1% of the total intercountry variation in medically treated injuries and 24.6% of the variation in serious injuries.

Conclusions Cross-national variations in reported adolescent serious injury may, in part, be attributable to national differences in access to healthcare services. Interpretation of cross-national patterns of injury and their potential aetiology should therefore consider access to medical care as a plausible explanation.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Rates of adolescent injury are known to vary cross-nationally. Access to medical care is vital for injury treatment, and disparities in access may provide an explanation for such cross-national differences in injury reporting.

WHAT THIS STUDY ADDS

⇒ Variations in reported rates of serious medically treated injury in adolescents across countries are, in part, attributable to country-level differences in access to healthcare services.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Differences in access to medical care and like services may contribute to under-reporting of health events, including injury, among adolescents with poor access.

INTRODUCTION

Injuries in adolescents account for a substantial global health burden.[1 2] Strong variations in rates of injury have been demonstrated across and within countries.[3 4] Historically, this has been attributed to social and environmental determinants that place individuals in some countries at a higher risk for injury.[5 6] An important, yet understudied, potential explanation for the existence of cross-national variations in the reporting of injury is access to medical care. The potential for under-reporting needs to be considered in the interpretation of injury trends and patterns across populations and contexts.[7]

In the field of health services research, one well accepted definition of medical care access is 'the timely utilisation of healthcare services to achieve optimal health outcomes'.[8] Access is a multidimensional concept and is impacted by structural, social and individual-level factors, including lack of health coverage, insufficient transportation, geographical location (rural vs urban areas) and cultural constraints (ie, lack of culturally competent healthcare providers).[9 10] Penchansky and Thomas summarised these elements into five core dimensions describing healthcare access, including *affordability* (ie, cost of services, degree of health insurance), *availability* (ie, supply of providers, facilities and programming), *accommodation* (ie, availability of appointments, wait times), *acceptability* (ie, sociodemographic characteristics of the health provider and individual) and *accessibility* (geographical location of services relative to the individual).[11] It is helpful to consider each of these dimensions in formal studies.[12]

With respect to adolescent injury, barriers to healthcare access can inhibit treatment seeking behaviours, and lead to increased injury severity and potentially prolonged or impaired recovery.[7] In a US study, decreased rates of reported medically treated injuries (30% of total injuries and 40% of

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serious injuries) were identified among children without health coverage, compared with those with coverage.[13] Similarly, a UK-based cohort study identified lower rates of medical treatment for injury among children with poorer geographical access to primary care.[14] An analysis of sports injuries displayed that up to 30% of patients did not obtain medical care for their injury; determinants such as race, socioeconomic status, lack of health coverage and a lack of available care were important aetiological factors.[15] Such studies suggest that a lack of access to medical care may decrease young people's tendency to identify or to report injuries, especially as many injury measures used in population-based studies ask whether the young person experienced injuries that required medical treatment.[16]

Variations in reported rates of injury across populations, including countries, may be affected by different dimensions of medical care access. However, recent studies of adolescent injury that examine trends across countries and health systems are rare, and none (to our knowledge) examine deeper explanations for *why* injuries vary by context. From a public health perspective, ongoing study of injuries across countries is important to reaffirm injury as a universal health priority and inform countermeasures.[16]

In this study, we, therefore, conducted a cross-national analysis of injuries in young people across 42 countries who participated in the ongoing Health Behaviour in School-aged Children (HBSC): WHO Collaborative Cross-National Study.[16] Through this analysis, we document the burden of injury experienced internationally, we explore variations in injury across 42 countries, and we explore the idea that variations in reports of injury are, in part, attributable to differences in access to medical care. Understanding whether access drives these variations assists interpretively and provides foundational population health information about its potential role in explaining international differences in adolescent injury.

METHODS

Study population

Adolescent health surveys that included assessments of injury, demographics and other social factors were conducted in 42 countries in 2013/2014 according to the international HBSC protocol.[16] Countries involved were from Europe, North America and the Middle East. While more recent cycles of HBSC exist, 2013/2014 was the last international cycle where adolescent injury items were collected in all participating countries.

Data collection

Young people in each country were recruited following a multistage sampling design, with participants nested within schools, then geographical regions (eg, provinces, states, territories), then countries. Sampling was stratified by type of school and geographical regions on a replacement basis. Eligible and participating students then completed an anonymous questionnaire during a 40–60 min in-classroom session. Questionnaires were returned by the school staff to central research centres in each country for data entry, cleaning and analysis.

Injury

Injuries were assessed via four items measured in all countries included in the 2013/2014 HBSC study: (1) reports of injuries that required medical treatment; then additional items describing injury events by (2) location of injury, (3) activity leading to injury and (4) medical consequences.[16] *Any medically treated injury*. Students reported whether they were injured and had to be treated by a doctor or nurse in the past 12 months ('Yes' (1 or more times) or 'No'). *Serious Injury*. Using the Modified Abbreviated Injury Score for health survey data,[13] students identified injuries that required medical treatment such as the placement of a cast, stitches, surgery or staying in a hospital overnight (three response options: 'I was not injured in the past 12 months', 'Yes' or 'No'). This item was not available in the following four countries: Greenland, North Macedonia, Slovakia and Spain. *By Location and Activity*. In 38 of 42 participating countries, students were asked where they were when they experienced their most serious injury: 'At home/in yard (yours or someone else's)', 'school, including school grounds, during school hours', 'school, including school grounds, after school hours', 'at a sports facility or field (not at school)', 'in the street/road/parking lot' or 'other location'). They were also asked what they were doing at the time of their most serious injury ('biking/cycling', 'playing or training for sports/recreational activity', 'walking/running (not for a sports team or exercise)', 'riding/driving in a car or other motor vehicle', 'fighting', 'paid or unpaid work' or 'other location').

Covariates

With respect to sample demographics, *age* at time of survey completion was calculated using self-reported month and year of birth. *Gender* ('male' or 'female') was self-reported and *family affluence* was measured using the 6-item Family Affluence Scale, which captures the material conditions of the student's household and is the best available indicator of socioeconomic status.[17] For purposes of analyses, this scale was categorised into three groups: low (score of 0–3), medium (score of 4–8) and high (score of 9–13). Students were also presented with a short definition of *moderate and vigorous physical activity* and were asked to report the number of days in the past week (0–7 days) that they participated in such physical activity for at least 60 min.

Healthcare access

At the country level, available macrolevel indicators describing different aspects of healthcare access included: (1) the Healthcare Access and Quality (HAQ) Index (2015; available in 39 countries), a standardised summary measure of six indicators of access or quality including: health expenditure per capita; hospitals beds per 1000; universal health coverage tracer index of 11 interventions; physicians, nurses and midwives per 1000; proportion of population with formal coverage; coverage index of three primary healthcare interventions;[18 19] (2) the Universal Health Service Coverage (UHC) Index (2015; available in 37 countries) produced by the WHO, which quantifies the health service coverage of a country, with values ranging from 0 (lower UHC) to 100 (higher UHC)[20]; WHO European Health Information Gateway estimates of: (3) hospitals per 100 000 population (2013; available in 30 countries)[21]; then (4) physicians per 100 000 population (2013; available in 36 countries).[22] See online supplemental table 1 for countries included in each macro indicator dataset.

Statistical analysis

Students missing data on the *any medically treated injury* item were excluded from analyses (n=10 669), representing 4.9% of the original study population. To be consistent with the macro indicator databases, the HBSC countries of England, Scotland and Wales (UK) were combined for the second and third stages of the analysis, as were French and Flemish Belgium. The analysis was conducted in three stages. First, the prevalence of medically

Table 1 Description of the 2014 international HBSC study sample

	No
No of countries	42
Total participants (n)	209 223
By country	
Median	4674
Minimum (country)	966 (Greenland)
Maximum (country)	12 577 (Canada)
By gender (n, %)	
Boys	102 788 (49.1)
Girls	106 435 (50.9)
By age group (n, %)	
11 years	66 702 (32.1)
13 years	71 622 (34.5)
15 years	69 361 (33.4)

All values (n) are weighted.
HBSC, Health Behaviour in School-aged Children.

Table 2 Description of injury outcomes among 209 223 adolescents in 42 countries, by gender

	Boys	Girls
	% (95% CI)	% (95% CI)
Any injury in the past 12 months (%)	48.6 (45.9 to 51.2)	39.1 (36.3 to 41.9)
By age group		
11 years	49.2 (46.1 to 52.2)	39.2 (36.2 to 42.2)
13 years	50.0 (47.3 to 52.8)	40.9 (37.8 to 43.9)
15 years	46.5 (44.0 to 49.1)	37.3 (34.6 to 40.1)
By family affluence (%)		
Low (0–3)	42.3 (39.7 to 44.9)	32.4 (28.7 to 36.0)
Medium (4–8)	46.4 (43.5 to 49.3)	37.2 (34.3 to 40.2)
High (9–13)	51.8 (49.0 to 54.5)	42.6 (36.9 to 45.7)
Most serious injury by location (col%)*		
Home or yard	22.0 (19.7 to 24.3)	29.8 (26.5 to 33.0)
School or school grounds	19.2 (17.6 to 20.8)	20.3 (18.4 to 22.3)
Sports facilities or field	30.0 (27.2 to 32.9)	21.2 (17.4 to 25.0)
Street, road or parking lot	10.3 (9.1 to 11.4)	8.7 (7.4 to 9.9)
Other location	18.6 (16.7 to 20.4)	20.0 (18.0 to 22.0)
Most serious injury by activity (col%)*		
Biking/cycling	13.2 (11.6 to 14.8)	8.9 (7.3 to 10.5)
Playing or training for sports/ recreational activity	42.9 (40.2 to 45.7)	35.9 (32.9 to 38.8)
Walking/running	9.8 (8.8 to 10.9)	15.0 (13.3 to 16.7)
Riding/driving in a motor vehicle	2.8 (2.1 to 3.6)	2.2 (1.6 to 2.7)
Fighting	4.8 (4.2 to 5.4)	2.0 (1.6 to 2.4)
Paid or unpaid work	1.9 (1.4 to 2.4)	1.3 (0.7 to 1.9)
Other activity	24.5 (21.9 to 27.1)	34.7 (32.3 to 37.0)
Injury requiring serious medical treatment (eg, cast, stitches, surgery) in the past 12 months (%)†	22.3 (21.0 to 23.6)	15.7 (14.5 to 16.9)

All values are weighted.
95% CI adjusted for country-level clustering.
*No data for Slovakia, Greenland, England or Spain (n=23 590; 11 796 boys and 11 794 girls).
†No data for Slovakia, Greenland, Spain or North Macedonia (n=22 473; 11 142 boys and 11 331 girls).

treated injury (any, serious and by type) was estimated for boys and girls within each of the 42 participating countries. Population weights (where data were not self-weighted) were applied to ensure national representativeness. Descriptive statistics were used to estimate median prevalence levels and their variability (range) across the countries. Second, basic graphical analyses (scatter plots with accompanying simple linear regression models) were used to assess country-specific rates of injury (any, serious) in relation to the available indicators of access to medical care. Third, multivariable linear regression was used to estimate the proportion of between-country variation in injury outcomes explained by each indicator of access, with and without adjustment for salient country-level covariates. Partial R^2 values were used to estimate the proportion of variation explained, and the indicators were modelled separately due to issues of collinearity.

RESULTS

Table 1 highlights the available weighted sample by country, gender and age group. The full sample included 209 223 young people; 106 435 (50.9%) were girls and 102 788 (49.1%) were boys. The country of Greenland had the smallest sample of adolescents (n=966), and Canada had the largest (n=12 577).

The prevalence of injuries reported in the overall (42-country) study sample are further described in table 2. Risks for injury were highest among boys versus girls, among those reporting the highest levels of affluence in both genders, but with less discernable trends by age. The most common location of injury occurrence differed by gender, with boys reporting injuries most often at sports facilities or fields, and girls more often at home or in a yard. The most common activities leading to injury in both genders were playing or training for sports/recreation, biking/cycling and walking or running. Overall, 22.3% of boys and 15.7% of girls reported injuries that required serious medical treatment, as per the Modified Abbreviated Injury Score criteria.[13]

Cross-national variations in the reported occurrence of injury (overall, by location, by activity) are reported in table 3. Among 15-year-old boys and girls, large differences were observed in reported prevalence levels for the occurrence of any injury and by type. These findings are further illustrated in figure 1 (serious medically treated injury) and in online supplemental figure 1 (any medically treated injury). These point to the substantial burden of injury as a universal pattern, as well as the nature of variations in reported injury seen across the 42 countries.

Graphical depictions of the correlations between each macro indicator of medical care access and injury rates are provided for serious injury (figure 2; see also online supplemental figure 2, for any medically treated injury). There was little correlation observed between national level overall and serious injury rates and macro indicators of access, but modest associations observed between serious injury and physicians and then hospitals per 100 000 population; this directs towards some aspects of availability as a potential explanation for variations in country-specific rates. This is further illustrated in table 4, which demonstrates that the individual macro indicators explained up to 9.1% of the total intercountry variation in any reported medically treated injuries and 24.6% of the variation in serious injuries.

DISCUSSION

This cross-national study described the burden of adolescent injury across 42 countries and then explored the extent to which differences in access to medical care could potentially explain the occurrence of any observed international variations. Our most important findings were: (1) the identification of large cross-national variations; (2) we affirmed that the prevalence,

Table 3 Description of injury outcomes reported by boys and girls in 42 countries participating in the 2013/2014 HBSC (% reporting)

	Boys				Girls			
	Min	Median	Max	Diff*	Min	Median	Max	Diff*
Any injury, past 12 months	29.4	47.2	68.1	38.7	16.2	37.1	57.3	41.2
Injury type by location (most serious injury)†								
Home or yard	6.4	9.8	22.8	16.4	6.2	10.7	23.5	17.3
School or school grounds	4.0	8.8	15.6	11.6	3.6	7.8	14.4	10.9
Sports facilities or field	1.7	14.1	22.7	21.0	0.4	6.5	16.2	15.7
Street, road or parking lot	2.5	5.0	8.9	6.4	1.3	3.2	6.0	4.7
Other location	1.6	8.7	15.3	13.7	1.5	7.2	14.7	13.2
Injury type by activity (most serious injury)†								
Biking/cycling	3.1	5.9	11.7	8.6	0.9	3.1	8.3	7.5
Playing or training for sports/recreational activity	11.0	21.1	30.7	19.7	4.6	12.7	20.4	15.9
Walking/running	1.1	5.0	7.6	6.6	0.8	5.6	9.6	8.8
Riding/driving in a motor vehicle	0.4	1.2	3.7	3.3	0.1	0.7	2.5	2.4
Fighting	0.3	2.5	4.5	4.2	0.2	0.7	1.5	1.4
Paid or unpaid work	0.2	0.8	3.7	3.5	0.0	0.3	3.7	3.7
Other activity	1.6	11.6	18.9	17.3	2.6	13.4	22.5	20.0
Injury requiring serious medical treatment (eg, cast, stitches, surgery)‡	14.3	22.1	33.2	18.9	7.9	15.0	26.8	19.0

All values are weighted.
*Difference between the highest and lowest country values.
†No data for Slovakia, Greenland, England or Spain.
‡No data for Slovakia, Greenland, Spain or North Macedonia.
HBSC, Health Behaviour in School-aged Children.

severity, location and activity related to these injuries varied by gender; (3) the national rates of any medically treated injury were not meaningfully associated with macro indicators of medical care access; however, (4) reported rates of serious injury did relate to the availability of physicians and hospitals per 100 000 population.

In the last two decades, adolescent injury mortality rates have declined in many developed countries; a finding attributed to advances in the practice of injury prevention.[23–26] Cross-national trends in child injury morbidity are less consistent, with widespread variations reported cross-nationally in historical analyses.[27–29] The current analysis pointed to similar variations, with reported injury risks remaining higher in boys, among those with the highest family affluence, and most often attributed to playing or training for a sport or recreational activity.

Building on these descriptive findings, past international analyses have hypothesised and even explored the underlying reasons why variations in risks for adolescent injury exist. Many such analyses have shown excesses in risk exhibited among young people with a lower socioeconomic status, even in more developed and affluent countries; this has been attributed to various area-level factors which differentially affect children of varying socioeconomic gradients.[2 4 13 28 30–32] Differences in the types of injuries experienced and contexts where the injury occurred have also been shown to differ by such gradients. For example, higher rates of sport-related injury are often reported among adolescents with higher family affluence, which commonly represents those with more opportunity to engage in organised sport.[33 34] While access to medical care has been identified as a potential contributing factor to such variations, to our knowledge, it has never been explored in formal study at a cross-national level.[27 30] This represents an important gap and provides a deeper explanation for reported variations that are often attributed to commonly accepted aetiological factors.

Interpretively, our analysis was telling in terms of our failure to identify associations between some country-level measures of healthcare access and the occurrence of medically treated injury. We failed to identify any meaningful or statistically significant associations between the HAQ index, UHC index, physician and hospital availability and the national rates of any medically treated injury. Speculatively, minor injuries may be more likely to be treated in alternative health services (eg, health clinic, community health centre) or in the school itself, rather than in a traditional hospital or primary care setting. When examining correlations with serious injury, we similarly failed to identify associations with the HAQ and UHC indices, suggesting that the degree of access or quality did not alter treatment seeking behaviours for those injuries which may require more urgent and extensive care. This finding aligns with past observations, which have highlighted lower rates of variability in treatment seeking behaviours for serious injuries, compared with minor injuries.[13 35 36] However, moderate positive associations were found between national rates of serious injury and both physicians and hospitals per 100 000. This finding suggests that a lack of *availability* of medical care may impede an individual's decision to seek medical treatment. This may be especially true for adolescents residing in rural or remote settings that often are required to travel further distances to receive medical care, and thus face barriers to receiving timely treatment.[5 7 14 37]

The finding that *availability* of medical services is associated with lower prevalence of reported serious injuries has potentially important implications. On a methodological level, if assessing serious injury through questions asking about utilisation of health services (eg, 'did you have an injury that demanded a cast, stitches, surgery, or staying in a hospital overnight'), it may be that young people with lower access to services will under-report injury, and as an extension, will not deem or consider themselves as experiencing such injuries. This latter point may relate to a larger issue about young people's ability to 'name' their experiences, injury or other, in the absence of appropriate care or institutionally sanctioned responses.[38] This may suggest that a young person who did *not*

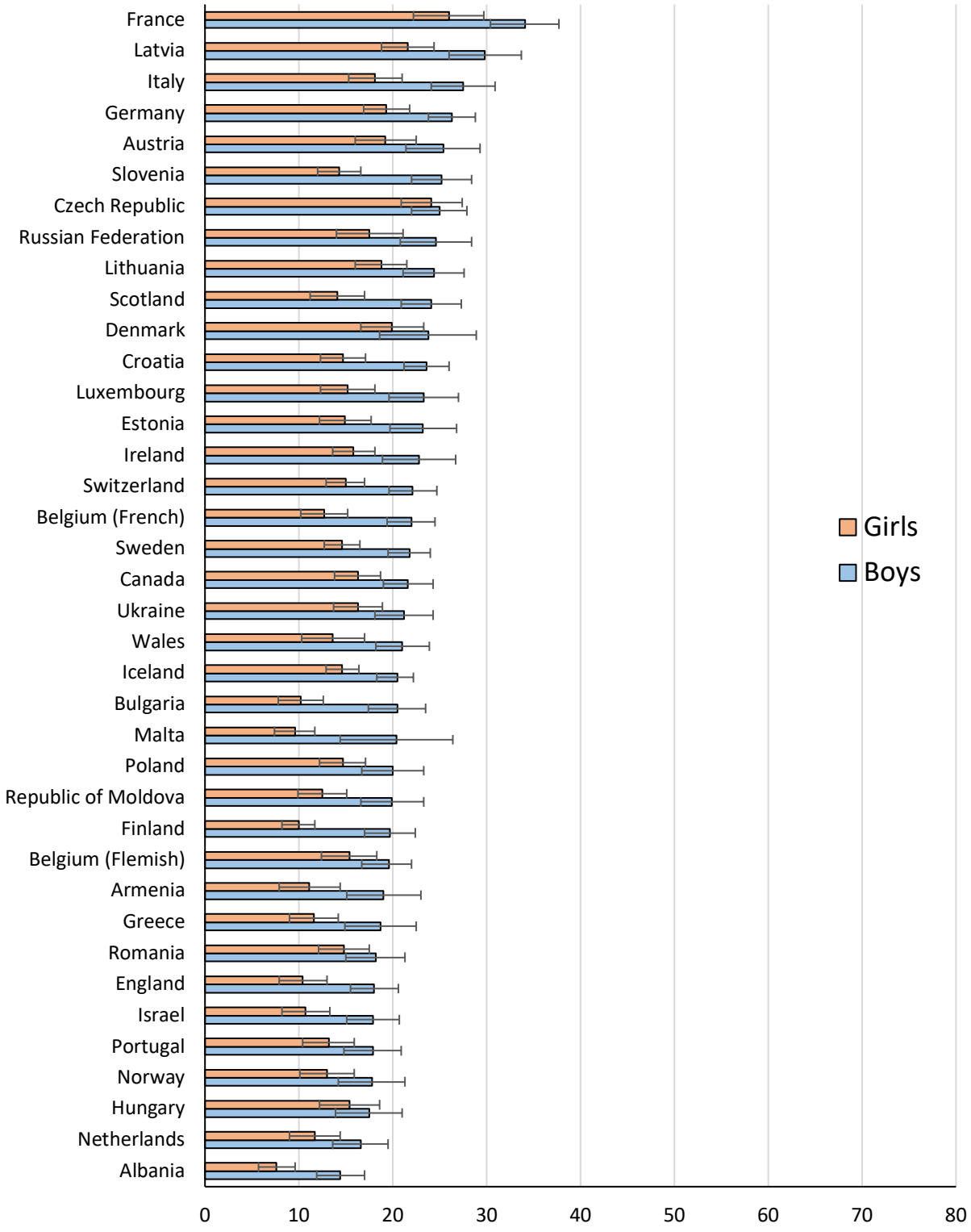

Figure 1 Proportion of 15-year-old boys and girls reporting an injury in the past 12 months requiring serious medical treatment (e.g., cast, stitches, surgery), by country.

Countries with no data: Spain, Greenland, MKD, Slovakia.

receive medical treatment will *not* see themselves as having had a serious injury (despite that they may have suffered long-term and short-term consequences of it). There may indeed be other health outcomes that young people experience (eg, trauma, stressors, negative interpersonal experiences) that they may not report or even 'name' to themselves in the absence of treatment or acknowledgement that they have taken place. This observation is important, interpretively.

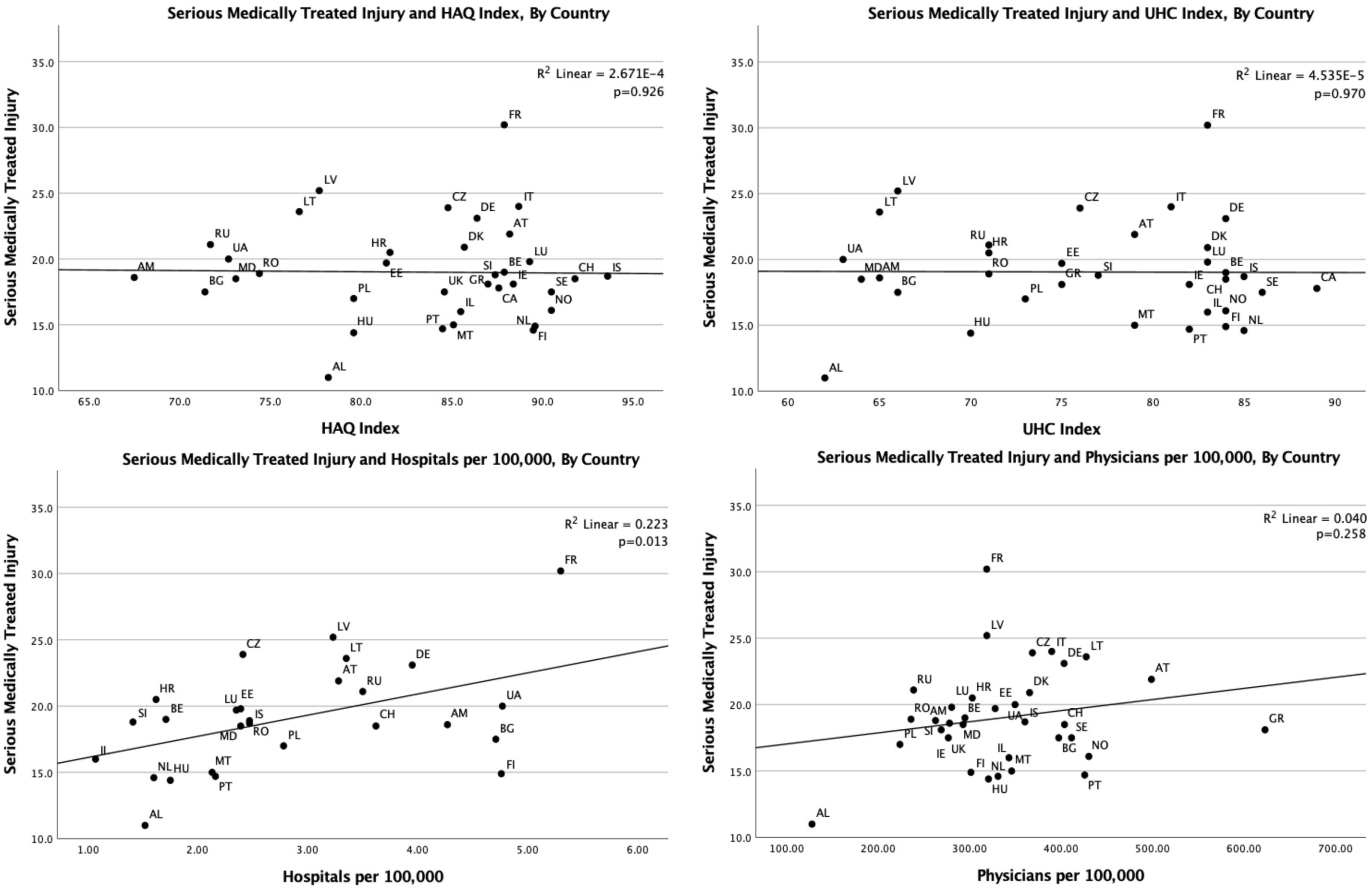

Figure 2 Serious medically treated injury and four country-level indicators of health services access: HAQ Index, UHC Index, Hospitals per 100,000, and Physicians per 100,000.

HAQ, Healthcare Access and Quality; UHC, Universal Health Service Coverage Index.

Strengths of our study warrant comment. First, the HBSC study is robust, nationally representative, and includes standard indicators of injury, which have been used and validated cross-nationally.[16] Second, the population under study involved young people aged 11–15 years, a critical time of life where children experience serious risks for morbidity and mortality, including accidents and injuries.[1] Third, this study addressed an important gap in adolescent injury literature, with potential methodological importance in the field of injury prevention. Past analyses have been quick to attribute cross-national variations in injury risks to social, physical and other aetiological factors, but have seldom attributed them to basic issues of medical care access. Our analysis addresses this fundamental idea in a robust and systematic manner. Limitations of our analysis included the modestly dated nature of our source of injury data, our reliance on self-reports which are prone to misclassification errors, and our focus here on non-fatal types of injuries. With respect to available 'macro indicators' of healthcare access, not all 42 countries reported each of the four available indicators and we were unable to evaluate the importance of each of the five dimensions of healthcare access.[11]

We argue that this cross-national study makes an important methodological contribution to the international injury prevention literature. Building on our core findings, future research of a similar nature should be extended to other countries and regions, and analyses of this type should be explored with other acute indicators of disease and health status. Our analysis was mainly ecological, and there is a need to conduct studies with individual measures of healthcare access to more definitively explore core hypotheses about its importance as a predictor of injury reporting. In addition, such analysis could potentially explore more in-depth domains of healthcare assess beyond measures available at a national level. From clinical and public health perspectives, decision-makers at national and international levels need to recognise the potential that healthcare access issues may act as an etiological factor that drives the reporting of injury events, and that barriers to access may contribute to under-reporting of serious injury events in some contexts. On a methodological level, some thought may be needed around constructing questions which can assess injury levels, without injury definition resting on access to services. Our findings indicate that cross-national variations in adolescent serious injury rates are, in part, attributable to national differences in access to health services within population-based epidemiological surveys.

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Table 4 Linear regression models examining country-level associations between each indicator of access and the prevalence of any medically treated injury and injuries requiring more serious medical treatment

		Any injury											
		Unadjusted						Adjusted*					
n	Indicator	beta	SE	t	P value	β†	Partial R^2	beta	SE	t	P value	β†	Partial R^2
39	Constant	11.7	15.2	0.77	0.45			33.4	39.6	0.84	0.41		
	HAQ Index	0.37	0.18	2.06	0.05	0.32	0.102	0.36	0.20	1.84	0.07	0.31	0.091
37	Constant	20.4	12.7	1.61	0.11			43.1	37.7	1.14	0.26		
	UHC Index	0.29	0.16	1.79	0.08	0.29	0.084	0.29	0.17	1.69	0.10	0.29	0.082
30	Constant	43.9	4.27	10.3	<0.001			61.2	50.8	1.21	0.24		
	Hospitals/100 000	−0.12	1.41	−0.08	0.94	−0.02	0.0002	−0.15	1.54	−0.10	0.92	−0.02	0.0004
36	Constant	38.3	5.5	6.91	<0.001			63.0	39.3	1.60	0.12		
	Physicians/100 000	0.01	0.02	0.91	0.37	0.15	0.024	0.01	0.02	0.88	0.38	0.16	0.025
		Serious Injury											
		Unadjusted						Adjusted*					
		beta	SE	t	P value	β†	Partial R2	beta	SE	t	P value	β†	Partial R2
35	Constant	19.7	8.03	2.45	0.02			12.2	19.8	0.62	0.54		
	HAQ Index	−0.01	0.10	−0.09	0.93	−0.01	0.0002	0.01	0.10	0.08	0.94	0.01	0.0002
34	Constant	19.1	6.3	3.01	0.01			14.1	18.7	0.76	0.46		
	UHC Index	−0.00	0.08	−0.00	0.99	−0.00	<0.0001	0.003	0.09	0.03	0.98	0.01	0.00003
27	Constant	14.6	1.8	7.94	<0.001			5.76	22.9	0.25	0.80		
	Hospitals/100 000	1.57	0.60	2.63	0.01	0.46	0.216	1.75	0.65	2.68	0.01	0.52	0.246
34	Constant	16.0	2.6	6.2	<0.001			8.27	18.1	0.46	0.65		
	Physicians/100 000	0.01	0.01	1.19	0.24	0.21	0.042	0.01	0.01	1.19	0.24	0.22	0.047

n = number of countries used in the model
*Adjusted for gender (% male/female), average age and average physical activity (frequency in days/week).
†β=standardised beta.
HAQ, Healthcare Access and Quality Index; UHC, Universal Health Service Coverage Index.

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Contributors Building on previous conceptual work by SDW, MM, and PDD, authors VFP, NK, WP, WT, KN, and MM-C collaborated with SDW, MM, and PDD on the conceptualisation and planning of the study. NK and VFP conducted statistical analyses. All authors offered feedback and interpretation of the results. VFP, NK, WP and SDW drafted the manuscript. All authors critically reviewed the article and approved the final manuscript. As senior author, WP takes full responsibility as guarantor.

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Patient consent for publication Consent obtained from parent(s)/guardian(s)

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