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ORIGINAL ARTICLE

Unintentional injuries and associated factors among children and adolescents. An analysis of the Spanish National Health Survey

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Abstract
Objectives To describe the prevalence of unintentional injuries in children and adolescents aged 6–18 years and to identify factors associated with a greater risk of suffering accidents.
Methods A cross-sectional study conducted with data collected from three consecutive Spanish National Health Surveys. Data were analyzed using multivariate logistic models.
Results The reported prevalence of unintentional injuries in children and adolescents decreased from 12.8% in 2003 to 8.7% in 2011. Most of these injuries occurred at the "workplace or place of study" and "on the street". Boys suffered unintentional injuries 1.64 more times than girls (OR = 1.64; 95% CI 1.48–1.82). Children aged 11–14 years (OR = 1.22; 95% CI 1.09–1.37) and adolescents aged 15–18 years (OR = 1.24; 95% CI 1.07–1.42) had a higher probability of reporting an unintentional injury when compared to children aged 6–10 years. Multivariate analysis showed that the adjusted odds of injuries decreased in 2006 (OR = 0.87; 95% CI 0.77–0.97) and in 2011 (OR = 0.66; 95% CI 0.57–0.76).
Conclusions The odds of overall UI are being gradually reduced over the years. Prevention policies are effective and it is necessary to continue promoting and motivating prevention actions aimed at the family, the school, and the community.

Keywords Adolescent health · Child health · Epidemiology · Injury prevention · Prevalence · Risk factors

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Introduction

A large number of children and young people die globally as a result of unintentional injuries (UI). This has a major impact on public health both on individual and at population levels (World Health Organization 2008a, b). The World Health Organization (WHO) defines "unintentional injury" as being: "...the physical damage that results when a human body is briefly or suddenly subjected to intolerant energy levels" (Holder et al. 2001; Salam et al. 2016).

It is estimated that 90% of the 950,000 annual deaths in children and adolescents aged 10–19 years are due to UI, with this type of injuries representing the leading cause of death throughout the world (World Health Organization 2008a, b). Recent research studies have revealed that in the year 2013, UI accounted for 15.4% of 2.6 million deaths on a global level, recorded among children aged 1–14 years

(Alonge et al. 2016). Furthermore, UI are the second leading cause of years lost, worldwide, due to disabilities for 10- to 24-year olds, accounting for 12% of the total years lost as a result of disabilities in children and adolescents (Salam et al. 2016). In Europe, over 40,000 children die annually due to UI (Sethi et al. 2008), and for every child who dies, there are several thousand victims of injuries who live with different degrees of disability or sequella (Göpfert et al. 2015; World Health Organization 2008a). Moreover, in Germany, the KiGGS Wave 1 study revealed that 15.5% of all children and adolescents aged 1–17 years, from a sample of 11,665, were medically treated for UI (Saß et al. 2014). In contrast, Göpfert et al. (2015) described how mortality data for injuries in children aged <15 years in the WHO European region have decreased overall. However, previous studies (Göpfert et al. 2015; Sengoelge et al. 2013) reported that mortality rates among different European countries show an increase in relative inequalities for childhood deaths from UI. Finally, in the year 2011 in Spain, more than 1.7 million people (i.e., 4% of the population), suffered an injury at home or during leisure activities (de Sanidad, Servicios Sociales e Igualdad 2011).

Globally, every day, approximately 2300 children and adolescents die from injuries sustained from motor vehicle injuries, drowning, poisoning, falls, and burns, while the former alone are responsible for 10.2 deaths per 100,000 adolescents (Salam et al. 2016). At present, the five leading causes of UI are road traffic injuries, drowning, burns, falls and poisoning (Harvey et al. 2009; Salam et al. 2016; Theurer and Bhavsar 2013). Other injuries, such as fractures, muscle and joint injuries, open wounds and injuries affecting internal organs are also recorded. Road traffic injuries and drowning are the causes behind nearly half of all unintentional injuries suffered by children (Harvey et al. 2009). Such injuries are influenced by the respective economic situation, as well as the cultural status and demographics, with higher such injury rates in countries with low family incomes (World Health Organization 2008a). In high-income countries, injuries account for more than 40% of all deaths among children and adolescents (World Health Organization 2015). In addition, many of those who do not die due to these injuries are at an increased risk of lifelong disabling health consequences (World Health Organization 2015). Furthermore, the impact of these injuries is not limited to physical consequences, such as pain or disability, but also encompasses psychosocial and financial consequences that extend beyond the injury victim (i.e., to the family, etc.) as well as the loss of the enjoyment of daily activities (Centers for Disease Control and Prevention 2012; Kendrick et al. 2012; Salam et al. 2016). In the United States, UI were the leading cause of deaths among people aged between 0 and 19 years. The Centers for Disease Control and Prevention (2012) reported that an average of 890 years of potential life were lost each year because of UI for every 100,000 persons aged 0–19 years. The impact of home and leisure UI in the media and social networks is much lower in comparison to traffic accidents despite their great impact on society, when considering both direct and indirect costs and psychological sequella (de Sanidad, Servicios Sociales e Igualdad 2011; World Health Organization 2008b).

Previous European and worldwide studies (Alonge et al. 2016; Göpfert et al. 2015; Saß et al. 2014; Sengoelge et al. 2013) describe an increasing vulnerability in children and youth between 5 and 19 years old, and widening disparities between countries and social groups, resulting in an increase in UI and their consequences. Unintentional injuries are a major health threat for children and adolescents (Saß et al. 2014), as well as a major cause of death and disability across the world with the greatest burden falling on those who are the most disadvantaged (Mytton et al. 2012). This growing vulnerability and inequality in UI is a major public health concern (Göpfert et al. 2015; Sengoelge et al. 2013). Finding a solution to this problem is one of the greatest challenges in the field of public health. According to the WHO (2008a, b), "awareness of the problem and its preventability, as well as the political commitment to take action to avoid injuries in children, is still unacceptably low". Hence, it is important to understand the epidemiology, prevalence (Saß et al. 2014) and risk factors faced by children and adolescents on a local level. Furthermore, steps should be taken towards improved surveillance and analysis of UI when these occur, to help prioritize community prevention measures (Centers for Disease Control 2012; He et al. 2014; Theurer and Bhavsar 2013).

In Spain, there are very few studies on this subject, and those available focus on specific UI such as drowning by immersion (Panzino et al. 2013), and bicycle-related UI (González et al. 2014). This study was developed as, to the best of our knowledge, no previous studies have investigated prevalence trends of UI in Spanish children and adolescents compared to the total population in Spain over the previous decade.

The objectives of this study were: (1) to describe the prevalence of UI, (2) to analyze the factors that are associated with having suffered an UI among the Spanish population aged 6–18 years during the period between 2003 and 2011 and (3) to describe the evolution of the UI in time during the period between 2003 and 2011.

Methods

We conducted a cross-sectional study of the prevalence and characteristics of UI in children and adolescents using individualized data obtained from the Spanish National Health Surveys (SNHS) performed in 2003, 2006 and 2011

and conducted by the Spanish Ministry of Health, Social Services and Equality, and the Spanish National Statistics Institute (INE). Several reasons led us to use the SNHS conducted in the years 2003, 2006 and 2011: all of these used the same design and method, and the same survey question and variables. They were also undertaken by the same entity (Spanish National Statistics Institute 2003, 2006, 2011). Thus, we avoided the use of other surveys which could bias or confound the results using different variables and collection methods.

Data source

The SNHS are carried out on a representative sample of the non-institutionalized Spanish population. The sampling method consisted of a multistage cluster where primary units were towns and sections, secondary units were main household units and tertiary units were selected from the description of household members at the time of the interview. Within each household, a child and an adolescent was randomly selected to complete the questionnaire. In the SNHS 2003 and 2006, this was specified as a child aged 0–15 years and an adolescent aged 16-years-old or more, whereas in the case of the SNHS 2011 this was a child between 0 and 14 years and an adolescent aged 15-years-old or more. In this study, children were defined as participants aged between 6–10 and 11–14 years old, whereas adolescents were considered as those between 15 and 18 years of age.

Interviews were conducted by a qualified interviewer and supplemented in some cases by a further telephone interview. More details concerning the methodology can be found elsewhere (Spanish National Statistics Institute 2003, 2006, 2011).

Study participants

Spanish children and adolescents aged between 6–14, and 15–18 years, respectively.

Study variables

The variables were created based on questions included in the questionnaires that were identical in all the surveys. In the case of children under 16 years of age, in the SNHS 2003 and 2006 and in the case of under 15-year-olds in the SNHS 2011, the parent or guardian answered on behalf of the selected child, while in the case of adolescents older than 14 or 15 and depending on the SNHS, the adolescents themselves provided the corresponding information. The main variable in this study were UI (falls, traffic accidents, burns, and intoxication) which was assessed using the following question: during the past 12 months has the child or yourself had any UI of any kind, including intoxications or burns? Yes/No. Please note, in this study an UI resulting from intoxication is defined as the alteration of the health status of a person produced by the ingestion of drugs (including alcohol intoxication), the ingestion of corrosive paints, varnishes and other toxic substances, whether solid, liquid or gaseous (Spanish National Statistics Institute 2003, 2006, 2011).

The independent variables were classified into four groups: (1) Socio-demographic variables, (2) Self-rated health status (in the case of children, ratings were provided by the parent or guardian, (3) physical exercise, and (4) characteristics of the UI.

Socio-demographic variables, including age, sex, nationality (Spanish or foreign), town size (less than or equal to 50,000 inhabitants and greater than 50,000 inhabitants), social status (I–II: executives and professionals with second-cycle degrees, third-cycle degrees, first-cycle university degrees, senior technicians, artists and athletes, III: administrative employees, self-employed individuals, supervisors and workers in personnel and security services and IV–V–VI: skilled, semiskilled and unskilled manual workers) and parent/guardian educational level (no college education or undergraduate and graduate university studies).

The self-rated health status was evaluated using the following question: “would you rate your child’s health status over the previous 12 months as: very good, good, fair, poor or very poor?” This variable was recoded as being in good or poor health. Regarding physical exercise, we took into account: “whether they did some physical or sports activity occasionally or several times a week/month” or “whether they did not do any exercise” together with the individual’s BMI. This index was calculated from the body weight and height of the individual concerned, categorizing the BMI of children and adolescents as: normal weight, overweight or obese according to recommendations by Cole et al. (2000). In this study, the BMI was considered a categorical variable.

Characteristics of the UI including: (1) the place where it took place (at home or on stairs, via a traffic accident, on the street, at work or at the place of study and at other locations), (2) the health service attended (GP or registered nurse, emergency center, hospital admission and no consultation or operation) and (3) the resulting effects or damage (contusions, fractures, poisonings, burns and other injuries).

Statistical analysis

We described the population of children and adolescents who participated in the SNHS from 2003, 2006 and 2011, according to the study variables. A bivariate analysis was

performed, analyzing the relationship between the independent and dependent variable. The Chi-squared test was used to compare proportions. Subsequently, a multivariate logistic regression analysis was performed to find the factors associated with the dependent variable (UI), adjusting all possible confounding factors. We obtained different models for each survey and a combined one to assess the time trend from 2003 to 2011. The measure of estimated association was the adjusted odds ratio (OR) with confidence intervals (CI) set at 95%. For the multivariate models, we only included those variables whose bivariate tests were significant and/or those found to be relevant in the literature. All estimates were made using the 'svy' (survey command) functions of the STATA 11.0 program. Statistical significance was established at $\alpha = 0.05$.

Ethical considerations

As this study was conducted with a de-identified, public-use database, the approval of an Ethics Committee was deemed unnecessary according to Spanish legislation.

Results

The total number of children and adolescents aged 6–18 years included in the study was 5054 in the 2003 SNHS, 6437 in the 2006 SNHS and 3831 in the 2011 SNHS.

Table 1 shows the distribution of variables for each of the SNHS. Up to 40.3% of the subjects were 6–10-years old with a small predominance of boys (51.5% boys and

Table 1 Distribution of children and adolescents included in the Spanish National Health Surveys (SNHS) conducted in 2003, 2006 and 2011 according to study variables

	2003		2006		2011		Total	
	N	%	*N*	%	*N*	%	*N*	%
Gender*								
Boy	2602	51.5	3254	50.6	2038	53.2	7894	51.5
Girl	2452	48.5	3183	49.4	1793	46.8	7428	48.5
Age group (years)								
6–10	1861	36.8	2576	40.0	1737	45.3	6174	40.3
11–14	2053	40.6	2532	39.3	1528	39.9	6113	39.9
15–18	1140	22.6	1329	20.6	566	14.8	3035	19.8
Health status								
Good	4581	90.6	5819	90.4	3595	93.8	13,995	91.3
Poor	473	9.4	618	9.6	236	6.2	1327	8.7
BMI*								
Normal weight/underweight	3579	74.7	3669	71.9	2284	71.8	9532	72.9
Overweight/obesity	1209	25.3	1434	28.1	897	28.2	3540	27.1
Physical activity*								
None	1233	24.4	910	14.1	589	15.4	2732	17.8
Some	3821	75.6	5527	85.9	3242	84.6	12,590	82.2
Parents' educational level*								
No studies/primary education	2972	58.8	3238	53.8	2204	57.7	8414	56.5
Secondary education	1274	25.2	1911	31.8	1085	28.4	4270	28.7
University studies	808	16.0	868	14.4	534	14.0	2210	14.8
Social class*								
I–II	997	19.8	1,355	21.3	714	19.8	3066	20.5
III	1192	23.7	1562	24.6	707	19.6	3461	23.1
IV–VI	2849	56.6	3432	54.1	2184	60.6	8465	56.5
Nationality*								
Spanish	4884	96.6	5970	93.1	3559	92.9	14413	94.2
Immigrant	170	3.4	445	6.9	272	7.1	887	5.8
Town size*								
<50,000 inhabitants	2617	51.8	3694	57.4	1915	50.0	8226	53.7
≥50,000 inhabitants	2437	48.2	2743	42.6	1916	50.0	7096	46.3

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*Significant association ($p < 0.05$) for the time trend (Chi-squared test)

48.5% girls). Notably, 91.3% of the study population had a good perception of their health, most (82.2%) did some physical activity and 72.9% were of normal weight. Most subjects included belonged to families of a lower social class (56.5%), who had no formal education or with low educational levels (82.2%) and living in towns of less than 50,000 inhabitants (53.7%). Only 7.8% of the population were immigrants.

Table 2 shows the prevalence of UI for each of the SNHS according to age and gender. Total values were 12.8%, 11.4% and 11.2% in 2003, 2006 and 2011, respectively. In 2003, age and gender were significantly associated with suffering an UI, boys were more likely to suffer UI than girls among all age groups. Girls had more UI between the age of 11–14 years (9.3%), while boys suffered from them when older (15–18 years, 16.7%).

In 2006, we observed the same pattern of behavior as in 2003. However, in 2011 the prevalence was similar among boys and girls in all age groups, except for subjects aged 11–14 years, where the prevalence of UI in boys was still higher than in girls. Overall, we have observed a decrease in the prevalence over the years and a tendency to gender equality, except in the 11–14 years age range, with this decrease only being significant in boys.

The distribution of UI according to the independent variables is shown in Table 3. In the last 12 months, the prevalence of UI in 2003 was significantly higher in subjects who had a poor perception of their health status (19.5%) and among children who performed some physical activity in their free time (13.6%). In 2006 and 2011, children with a poor perception of their health were those who significantly suffered more UI (18.4% in 2006 and 11% in 2011). We observed a decrease in the prevalence over the years for all categories of the variables, except for children who did not exercise, who belonged to the third social class and in the case of immigrants, among whom the prevalence was stable throughout the period of study.

As Table 4 shows, the majority of UI occurred at the "workplace or place of study" and "on the street" 34 and 23.9% in 2003, 26.2 and 24.6% in 2006, respectively, and in 2011 the corresponding frequencies were 26 and 26.6%. Throughout the period under study, an important reduction in prevalence due to traffic accidents was registered (13% in 2003 to 7.8% in 2011). In the case of UI, the health services most frequently attended were emergency centers (63.3% in 2003, 64.2% in 2006 and 71.6% in 2011), followed by GP consultations or registered nurses in 2003 and 2006 (21.5 and 16.6%). The percentage of injured who were admitted to hospital in 2011 (13.7%) is worth highlighting, as well as the drastic decrease in GP or registered nurse attendance, who only revealed a value of 3.9% in 2011.

The most common damages were bruises and fractures, respectively, (68.4 and 25.2% in 2003; 59.7 and 28.6% in 2006; and 71.4 and 24.3% in 2011) for all the years analyzed.

The results of the multivariate analysis used to identify the variables independently associated with the report of an UI are shown in Table 5.

Table 2 Prevalence of unintentional injuries according to age groups and gender among Spanish children and adolescents

Age group	Gender	2003		2006		2011		Total	
		N	%	*N*	%	*N*	%	*N*	%
6–10 years[a/b]	Boy*	125	13.0	156	12. 3	67	7. 3	348	11.0
	Girl	87	9.7	115	8.8	63	7.7	265	8.8
	Total*	212	11.4	271	10.5	130	7.5	613	9.9
11–14 years[a/b/c]	Boy*	174	16.4	188	14.5	97	12.1	459	14.5
	Girl	107	10.8	110	8.8	58	8.0	275	9.3
	Total*	281	13.7	298	11.8	155	10.1	734	12.0
15–18 years[a/b]	Boy*	109	18.7	123	14.5	31	9.9	263	16.7
	Girl	46	8.3	41	6.3	19	7.5	106	7. 3
	Total*	155	13.6	164	12. 3	50	8.8	369	12.2
Total[a/b]	Boy*	408	15.7	467	14.4	195	9.6	1070	13.6
	Girl	240	9.8	266	8.4	140	7.8	646	8.7
	Total*	648	12.8	733	11.4	335	8.7	1716	11.2

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*Significant association ($p < 0.05$) for the time trend (Chi-squared test)

[a]Significant association SNHS 2003

[b]Significant association SNHS 2006

[c]Significant association SNHS 2011

Table 3 Prevalence of unintentional injuries according to health status, lifestyle and socio-demographic variables among Spanish children and adolescents

	2003		2006		2011		Total	
	N	%	*N*	%	*N*	%	*N*	%
Health status[a/b/c]								
Good*	556	12.1	619	10.6	309	8.6	1484	10.6
Poor*	92	19.5	114	18.4	26	11.0	232	17.5
BMI								
Normal weight/underweight*	465	13.0	424	11.5	196	8.6	1085	11.4
Overweight/obesity	159	13.1	189	13.2	89	9.9	437	12.3
Physical activity[a]								
None	130	10.5	90	9.9	52	8.8	272	10.0
Some*	518	13.6	643	11.6	283	8.7	1444	11.5
Parents' educational level								
No studies/primary education	367	12.3	372	11.5	180	8.2	919	10.9
Secondary education	175	13.7	212	11.1	108	10.0	495	11.6
University studies	106	13.1	96	11.1	47	8.8	249	11.3
Social class								
I–II*	133	13.3	147	10.8	67	9.4	347	11.3
III	147	12.3	188	12.0	76	10.7	411	11.9
IV–VI*	367	12.8	390	11.3	180	8.2	937	11.1
Nationality								
Spanish*	625	12.8	683	11.4	314	8.8	1622	11.3
Immigrant	23	13.5	45	10.1	21	7.7	89	10.0
Town size								
<50,000 inhabitants*	339	12.9	419	11.3	156	8.1	914	11.1
≥50,000 inhabitants*	309	12.7	314	11.4	179	9.3	802	11.3

Results of 2003, 2006 and 2011 Spanish National Health Surveys (SNHS). Unintentional injuries in Spanish children and adolescents and associated factors. Analysis of Spanish National Health Surveys conducted in 2003, 2006 and 2011. Spain. 2016

*Significant association ($p < 0.05$) for the time trend (Chi-squared test)

[a]Significant association SNHS 2003

[b]Significant association SNHS 2006

[c]Significant association SNHS 2011

Both age and gender are significantly associated with having an UI. Boys suffered 1.64 times more UI than girls (OR = 1.64; 95% CI 1.48–1.82). Children aged 11–14 years (OR = 1.22; 95% CI 1.09–1.37) and adolescents between 15 and 18 years (OR = 1.24; 95% CI 1.07–1.42) had a higher probability of reporting an UI when compared to those aged between 6 and 10 years. The health status in 2003 is significantly associated to UI: children and adolescents with a poor perception of their health suffered more UI than those who had a positive perception (OR = 1.82; 95% CI 1.42–2.33). Another surprising finding, only for this year, was that physical exercise practiced in their free time was a risk factor for UI (OR 2003 = 1.27; 95% CI 1.03–1.57). In 2006, boys suffered 1.85 more UI than girls (OR = 1.85; 95% CI 1.58–2.17) and children with a poor perception of their health had more UI than those who had a positive perception (OR 2006 = 1.94; 95% CI 1.55–2.42). Regarding 2011, children between 11 and 14 years old were those who suffered more UI (OR 2011 = 1.4; 95% CI 1.09–1.78), compared to those aged 6–10 years.

The multivariate analysis showed that from the year 2003 the risk of UI decreased significantly with an adjusted OR of 0.87 (95% CI 0.77–0.97) for 2006 and an OR of 0.66 (95% CI 0.57–0.76) for 2011.

Discussion

The most significant result of this research study is that we observed that the prevalence of self-reported UI among children and adolescents decreased from 2003 to 2011. According to Phelan et al. (2005), the rates of injuries at home for US citizens aged <20 decreased by 28% over time ($p < 0.02$). Likewise, Ekman et al. (2005) reported that the overall incidence of fatal injuries showed a decrease

Table 4 Frequency of unintentional injuries reported by Spanish children and adolescents according to the place of accident, health services attended and effect

	2003		2006		2011		Total	
	N	%	*N*	%	*N*	%	*N*	%
Place of unintentional injury*								
Home/stairs	82	12.7	96	13.3	50	15.0	228	13.4
Traffic accidents	84	13.0	70	9.7	26	7.8	180	10.6
Street	155	23.9	178	24.6	89	26.6	422	24.7
Work/school	220	34.0	190	26.2	87	26.0	497	29.1
Other	107	16.5	190	26.2	82	24.6	379	22.2
Health services attended*								
GP/registered nurse	139	21.5	121	16.6	13	3.9	273	15.9
Emergency service	410	63.3	469	64.2	240	71.6	1119	65.3
Hospitalization	21	3.2	29	4.0	46	13.7	96	5.6
No consultation or medical care	78	12.0	111	15.2	36	10.7	225	13.1
Type of injury*								
Contusions	443	68.4	386	59.7	232	71.4	1061	65.5
Fractures	163	25.2	185	28.6	79	24.3	427	26.4
Poisoning	14	2.2	11	1.7	6	1.8	31	1.9
Burns	19	2.9	44	6.8	9	2.8	72	4.4
Other	29	4.5	43	6.6	9	2.8	81	5.0

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*Significant association ($p < 0.05$) for the time trend (Chi-squared test)

Table 5 Multivariate analysis of the variables associated to reporting unintentional injuries among Spanish children and adolescents

	OR (95% CI)			
	2003	2006	2011	Total
Gender				
Girl	1	1	1	1
Boy	1.67* (1.41–1.98)	1.85* (1.58–2.17)	1.25 (0.99–1.57)	1.64* (1.48–1.82)
Age group				
6–10 years	1	1	1	1
11–14 years	1.24* (1.02–1.50)	1.12 (0.94–1.34)	1.40* (1.09–1.78)	1.22* (1.09–1.37)
15–18 years	1.28* (1.02–1.60)	1.18 (0.96–1.45)	1.39 (0.85–1.67)	1.24* (1.07–1.42)
Health status				
Good	1	1	1	1
Poor	1.82* (1.42–2.33)	1.94* (1.55–2.42)	1.19 (0.85–1.67)	1.80* (1.55–2.10)
Physical activity				
None	1	NS	NS	1
Some	1.27* (1.03–1.57)	NS	NS	1.18* (1.02–1.36)
SNHS				
2003	NA	NA	NA	1
2006	NA	NA	NA	0.87* (0.77–0.97)
2011	NA	NA	NA	0.66* (0.57–0.76)

Results for 2003, 2006, and 2011 Spanish National Health Surveys (SNHS)

NS no significance, *NA* not applicable

*Significance $p < 0.05$

over time which was similar in both genders and both age groups (0–12 and 13–20 years).

Regarding gender, our results indicate that boys suffered more UI than girls both for the entire sample and for each age group analyzed between 2003 and 2011. These results are consistent with other studies (Borse et al. 2009; Borse and Sleet 2009; Centers for Disease Control and Prevention 2012; He et al. 2014; Hu et al. 2012; Peltzer and Pengpid 2012; Saß et al. 2014; Towner and Mytton 2009; Zoni et al. 2014). This may be because boys are physically more active than girls, and show more interest in competitive and physical activities and games (de Sanidad, Servicios Sociales e Igualdad 2011; Towner and Mytton 2009; Zoni et al. 2014).

We observed a significant association between older ages (11–14, and 15–18 years) and the UI odds ratio in the years under study. Haynes et al. (2003) observed that the risk of UI increased with age, 7% each year, producing an odds ratio of 1.83 for 14 year olds compared with 5 year olds. Also, Centers for Disease Control and Prevention (2012) showed that UI were higher among those aged between 15 and 19 years when compared with the other 5-year span age groups.

The most common injuries in our study were bruises and fractures, whereas falls were the main cause of injuries in many previous studies (Birgul et al. 2013; Borse et al. 2009; Borse and Sleet 2009; Haynes et al. 2003; He et al. 2014; Peltzer and Pengpid 2012).

As for the place where the most UI occurred in children and adolescents, previous studies reported that the home, educational institutions, and sports facilities/playgrounds were the predominant locations for injuries (Haynes et al. 2003; Hu et al. 2012; Molcho et al. 2006; Saß et al. 2014). Home injuries were more common among younger children (He et al. 2014), while among older age groups, injuries occurred most commonly in sports facilities (Molcho et al. 2006). A hypothesis that justifies the high number of home injuries is that children spend more time at home at a younger age, and are therefore, are exposed to a greater number of risks (Zia et al. 2012).

The most common health services attended by injured children were emergency centers, followed by consultations with their GP or registered nurse. Phelan et al. (2005) reported that UI accounted for 35% of all emergency visits. Also, there were 74,000 hospital admissions for home injuries each year in American citizens aged <20, accounting for 27% of all admissions for UI in this age group. Furthermore, Saß et al. (2014) showed that one in eight children and adolescents who suffered UI stayed in hospital (12.3%) for inpatient treatment for at least one night. In our study, the percentage of injured children and adolescents requiring hospital admission (13.7%) in 2011 is significant, together with the drastic decrease in consultations with a GP or registered nurse (3.9%) in 2011.

The strengths of our work include the large sample size, the fact that information was collected using a homogeneous methodology over time, and the large number of sociodemographic characteristics and health variables collected. However, we should also recognize some limitations of our study: (1) the questions concerning the UI have not been validated, neither were medical records requested; (2) the information obtained through an interview may be subject to memory bias, or socially conditioned responses; (3) the rates of participation in the SNHS for 2003, 2006 and 2011 were 67, 65 and 61%, respectively, therefore a selection bias cannot be ruled out. Finally, we would like to point out that as this is a descriptive study, the causality in the associations found cannot be established.

In conclusion, our results showed that the odds ratio of unintentional injuries in children and adolescents is gradually decreasing over the years. However, boys and children over the age of 11 are more likely to suffer from UI. Unintentional injuries, their effects on children and adolescents over time, and the analysis of gender differences require further study. The implementation of effective public health interventions focused on the family, the school, and the community are also important to help reduce the number of UI (Salam et al. 2016; Theurer and Bhavsar 2013).

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical aspects As this study was conducted with a de-identified, public-use dataset it was not necessary to have the approval of an Ethics Committee according to Spanish legislation.

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