

Original article

Costs resulting from nonprofessional soccer injuries in Switzerland: A detailed analysis

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Abstract

Background: Soccer injuries constitute an important public health problem and cause a high economic burden. Nevertheless, comprehensive data regarding injury costs in nonprofessional soccer are missing. The aim of this study was to determine which groups of nonprofessional soccer athletes, injury types, and injury situations caused high injury costs.

Methods: A cross-sectional, retrospective telephone survey was carried out with a random sample of persons who had sustained a soccer injury between July 2013 and June 2014 and who had reported this accident to the Swiss National Accident Insurance Fund (Suva). One year after the corresponding accident, every injury was linked to its costs and to the answers obtained in the interview about injury setting, injury characteristics, and injury causes. Finally, the costs of 702 injuries were analyzed.

Results: The average cost of an injury in nonprofessional soccer amounted to €4030 (bias-corrected and accelerated 95% confidence interval (BCa 95%CI): 3427–4719). Persons aged 30 years and older experienced 35% of soccer injuries but accounted for 49% of all costs. A total of 58% of all costs were the result of injuries that occurred during amateur games. In particular, game injuries sustained by players in separate leagues for players aged 30+/40+ years led to high average costs of €8190 (BCa 95%CI: 5036–11,645). Knee injuries accounted for 25% of all injuries and were responsible for 53% of all costs. Although contact and foul play did not lead to above-average costs, twisting or turning situations were highly cost relevant, leading to an average sum of €7710 (BCa 95%CI: 5376–10,466) per injury.

Conclusion: Nonprofessional soccer players aged 30 years and older and particularly players in 30+/40+ leagues had above-average injury costs. Furthermore, the prevention of knee injuries, noncontact and nonfoul play injuries, and injuries caused by twisting and turning should be of highest priority in decreasing health care costs.

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Keywords: Amateur soccer; Cost analysis; Injury causes; Injury characteristics; Injury costs

1. Introduction

Although epidemiologic research shows that a physically active lifestyle is beneficial to health,^{1–4} sport participation is also associated with a high risk for injuries.^{5,6} In Switzerland, 35% of all leisure time accidents in the working population occur in the sports sector.⁷ This results in 186,000 registered injuries annually and an associated cost (including treatment and costs related to income replacement) of Swiss franc (CHF) 931 million

(≈€791 million). Of all sport accidents, 40% occur during ball games, 27% during winter sport, and 9% during gymnastics or running. Soccer accidents account for 64% of all ball game injuries, whereas floor ball (including field and roller hockey) and volleyball account for 7% each.⁷ Hence, soccer injuries constitute a high economic burden on society. Annually, 45,000 soccer-related injuries are sustained by the Swiss working population, associated with a financial burden of approximately CHF 180 million (≈€153 million).⁷ It can be assumed that the final costs of soccer accidents are much greater when the entire Swiss population is considered, because it has been estimated that annually 80,000 soccer-related injuries occur in

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Switzerland.⁸ A detailed cost model including the whole spectrum of minor and severe injuries in the Netherlands found soccer injuries sustained by young men to be particularly cost intensive.⁹

Nevertheless, previous research about the costs of soccer-related injuries is scarce. Pritchett¹⁰ highlighted that knee injuries accounted for 11.7% of injuries and led to 28.2% of all soccer-related costs in 1981. To the best of our knowledge, no data regarding the costs of specific soccer injuries have been published in the scientific literature since then.

Certain studies have provided data on injury costs in various other sports.^{11–14} Cumps et al.¹¹ surveyed 72 of 82 Flemish sports federations and found that the highest medical costs resulted from anterior cruciate ligament injuries, followed by other knee injuries. Injuries affecting the knee frequently occur in amateur or recreational soccer, as shown in a number of recent studies.^{15–18} Based on these insights, it can be expected that knee injuries are responsible for the high injury costs in soccer. This finding was also highlighted by Krist et al.,¹⁹ who found that preventive exercises have the potential to reduce injury-related costs among male soccer players and they suggested that this cost reduction would be mainly due to the lower proportion of knee injuries.

However, comprehensive and detailed information about the financial repercussions of soccer accidents and related injuries is missing. Specifically, there is a lack of knowledge concerning groups of nonprofessional soccer athletes, injury types and locations, and injury situations causing high health care and income replacement costs. Nevertheless, more accurate knowledge about the cost of nonprofessional soccer injuries can influence policymaking with regard to the implementation of preventive strategies. Accordingly, the aim of the present study was to explore a wide variety of information on the costs of soccer injuries that could potentially decrease the economic burden of these accidents by supporting the development of cost-effective prevention strategies. Accordingly, in the present article we examine (1) which groups of nonprofessional soccer athletes, (2) which types of injuries, and (3) which injury situations are associated with a high financial burden.

2. Methods

2.1. Procedures

In the present study, a cross-sectional, retrospective survey design was used. The Swiss National Accident Insurance Fund (Suva) is responsible for compulsory accident insurance of the working population in Switzerland and insures approximately one-half of all employees. Persons who had sustained a soccer injury between July 2013 and June 2014 and who had consulted a physician were interviewed by telephone about their accident. Because insured persons often report injuries to Suva after some delay, the interviews were carried out, on average, 6.1 months (SD, 2.1 months) after the accident occurred. The standardized questionnaire consisted of 86 questions (about the injury setting, injury characteristics, injury causes, and preventive behavior) and had been newly developed in

collaboration with experts from Suva and taking into account previous surveys. An interview took 16 min on average. For the recruitment process, the data protection regulations of Suva were followed. In referring to Art. 2 Human Research Act (HRA) and to Art. 25 Human Research Ordinance (HRO), an ethical committee's approval was not required for this anonymized survey.

2.2. Recruitment

Suva records 30,000 soccer injuries annually.⁷ With the aim of interviewing at least 800 nonprofessional soccer athletes about their soccer accident, a random sample of 2835 injuries was drawn. After having linked these injuries to a policy holder, the selected persons were contacted by an information letter via mail, which included a prewritten declaration of consent. Candidates who did not respond in written form were recruited by telephone. When a sufficient number of respondents ($n = 1055$ (37.2%)) had given their written or oral consent to participate in the study, the telephone-based recruitment was terminated. On the basis of this sample, 822 interviews (77.9% response rate) were conducted.

2.3. Final sample

A data screening was carried out. First, 3 respondents were excluded because their injuries had not been directly caused by playing soccer. Second, the information provided during the telephone interviews was compared with the official Suva record. When the type of injury described in the interview did not correspond with the Suva medical record, we assumed that the respondent provided information about another soccer accident. More precisely, 69 participants referred to another registered soccer accident and 42 to an unregistered accident. These participants were excluded from all further analyses. Finally, 702 injuries could be linked to their costs (determined 1 year after the accident), whereas 6 additional cases did not enter the analyses because their costs were not borne by Suva.

2.4. Assessment of injury and injury costs

Given that this study relates to insurance records, only injuries requiring medical attention are considered. The cost of an injury consists of treatment costs and income replacement costs and is presented in Euros. The costs were recorded in CHF and converted to Euros using the average exchange rate from 2013, 2014, and 2015, when the costs were incurred (CHF 1 = €0.85 according to the Swiss National Bank). For the analysis, different leagues were aggregated into the following groups: first to third amateur leagues (male), fourth to fifth amateur leagues (male), 30+/40+ leagues (male), juniors (male), women's leagues, and other. Additionally, a distinction was made between severe and nonsevere injuries. Following Hägglund et al.,²⁰ injuries that resulted in more than 28 days of absence from sport participation were classified as severe. A reinjury was defined as an injury of the same type affecting the same body site as a previously sustained injury.²¹ Furthermore, respondents were asked to describe the situation in

which the injury occurred. Based on this information, a classification of 19 different injury situations was used, referring to the work of Hawkins et al.²² With respect to the classification, both intrarater ($\kappa = 0.85$, $p < 0.001$, 95% confidence interval (CI): 0.78–0.92) and interrater ($\kappa = 0.79$, $p < 0.001$, 95%CI: 0.72–0.90) reliability were satisfactory. Moreover, the respondents were asked if their injury was caused by contact with an opponent. If so, they indicated whether the injury occurred owing to foul play and whether the foul play was penalized by the referee.

2.5. Statistical analysis

Statistical analyses were performed with SPSS software (Version 23.0; IBM Corp., Armonk, NY, USA). The Kolmogorov-Smirnov test was used to examine whether the distribution of injury costs significantly differed from a normal distribution. Total costs ($p < 0.001$), treatment costs ($p < 0.001$), and income replacement costs ($p < 0.001$) were all significantly non-normal. However, for cost data highly skewed distributions are usual.²³ Nevertheless, Thompson and Barber²³ recommended providing the arithmetic mean as the most informative measure because it allows extrapolations to support health care policy decisions. As a consequence, in the text, tables, and figures, the arithmetic mean is listed in the present study. Additionally, the median is provided in the tables since this value is less sensitive to skewed data. A t test was used to examine whether the mean costs of 2 independent groups were significantly different from each other, and the differences between several independent groups were

examined by an analyses of variance. A p value of < 0.05 was considered significant. Because robust methods are recommended for non-normally distributed data, bias-corrected and accelerated 95%CIs were calculated using nonparametric bootstrapping with 1000 replications (BCa 95%CI).^{23,24} Furthermore, the subgroups consisted of ≥ 25 respondents so that the central limit theorem guaranteed approximate normality.^{24,25}

3. Results

The 702 injuries included in our analysis incurred a total cost of €2,829,205, of which €1,467,539 were treatment-related costs and €1,361,666 were income replacement-related costs. An injury led to average total costs of €4030 (BCa 95%CI: 3427–4719), of which €2090 (BCa 95%CI: 1814–2413) were associated with treatment and €1940 (BCa 95%CI: 1614–2287) were associated with income replacement. However, the total median costs were considerably lower (€792; interquartile range, 280–2815). As expected, a severe injury caused much higher average total costs (€6014; BCa 95%CI: 5170–6892) than milder injuries (€1020; BCa 95%CI: 666–1536; $t(651.8) = -8.975$, $p < 0.001$).

3.1. What groups account for high injury costs?

With respect to injury costs, age and gender were significant factors (Table 1). Although they experienced 35.3% of soccer injuries, persons aged ≥ 30 years accounted for nearly half of all injury costs. Their average income replacement costs (€3074; BCa 95%CI: 2328–3820) were twice as high as

Table 1
Injury costs depending on selected age groups, gender, previous injury, soccer club membership, and setting (in Euros).

	n (%)	Costs per injury				Total costs	Percent of total costs (%)
		Median	Mean	BCa 95%CI [†]	p		
Age (year)							
15–24	328 (46.7)	609	3054	2371–3833	0.014	1,001,701	35.4
25–34	202 (28.8)	924	4767	3597–6007		962,886	34.0
35–44	97 (13.8)	1108	5891	4224–7733		571,472	20.2
≥ 45	75 (10.7)	606	3909	2338–5701		293,146	10.4
15–29	454 (64.7)	657	3198	2635–3872	0.002	1,451,744	51.3
≥ 30	248 (35.3)	1024	5554	4423–6842		1,377,461	48.7
Gender					<0.001		
Male	659 (93.9)	808	4179	3557–4880	NS	2,754,271	97.4
Female	43 (6.1)	362	1743	882–2663		74,934	2.6
Previous injury					NS		
≤ 12 months ago	45 (6.5)	685	2473	1161–4010	NS	111,268	3.9
> 12 months ago	136 (19.6)	568	3479	2480–4583		473,166	16.8
None	513 (73.9)	876	4362	3701–5085		2,237,913	79.3
Soccer club membership*					NS		
Member	528 (75.2)	848	4273	3589–4936	NS	2,256,377	79.8
Nonmember	174 (24.8)	626	3292	2203–4556		572,828	20.2
Setting					0.020		
Amateur games	342 (48.9)	881	4784	3866–5881	0.020	1,636,057	58.2
Training/informal soccer	357 (51.1)	710	3293	2562–4122		1,175,655	41.8

Note: The sum of respondents did not always add to 702 because individual questions were not answered by all respondents.

* Regardless of the setting in which the injury occurred.

[†] BCa 95%CI calculated by using nonparametric bootstrapping with 1000 replications.

Abbreviations: BCa 95%CI = bias-corrected and accelerated 95% confidence interval; NS = not significant.

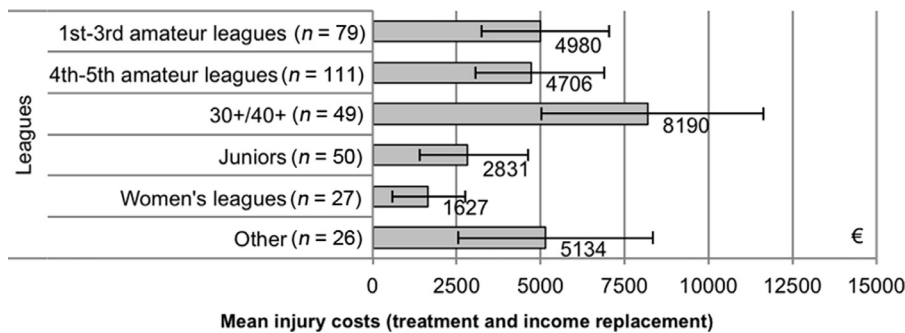


Fig. 1. Mean injury costs and bias-corrected and accelerated 95% confidence intervals by leagues (only game injuries, in Euros).

those of the younger age group (€1320; BCa 95%CI: 1044–1645; $t(335.3) = -3.962$; $p < 0.001$), whereas the treatment costs did not differ significantly (15–29 years, €1878 (BCa 95%CI: 1557–2239); ≥ 30 years, €2480 (BCa 95%CI: 1916–3053)). Injuries to male respondents accounted for almost all costs; and, owing to their higher income replacement costs, their injuries led to significantly higher average costs. The average income replacement costs of male respondents (€2045; BCa 95%CI: 1711–2410) were significantly higher than those of female respondents (€316; BCa 95%CI: 164–496; $t(574.0) = 8.052$; $p < 0.001$), whereas treatment costs were comparable for both groups (male, €2134 (BCa 95%CI: 1846–2435); female, €1427 (BCa 95%CI: 713–2187)). Previous injury and membership in a soccer club did not significantly influence the injury costs.

Injuries that happened during amateur games accounted for a substantial proportion of all costs. With regard to average injury costs, significant differences were observed between different levels of leagues ($F(5,336) = 2.483$, $p = 0.032$; Fig. 1). In particular, players in 30+/40+ leagues, which are composed as a function of age, caused higher average total costs (€8190; BCa 95%CI: 5036–11,645) than players in the other leagues (€4214; BCa 95%CI: 3313–5140; $t(55.6) = -2.150$; $p = 0.036$). Players in 30+/40+ leagues were responsible for 14.3% of all injuries during amateur games and accounted for 24.5% of the corresponding costs. Other groups that incurred a high proportion of injury costs during amateur games were players of the fourth to fifth amateur leagues (31.9%) and players of the first to third amateur leagues (24.0%).

3.2. Which injuries are most costly?

Injury costs differed significantly by injured body region ($F(9,692) = 13.309$, $p < 0.001$; Fig. 2). The highest average costs were associated with injuries that affected the lower leg/Achilles tendon or the knee. Although injuries to the lower leg or Achilles tendon represented only 11.3% of all costs, knee injuries were extremely costly and accounted for 24.8% of all injuries and for 53.2% of all costs. Ankle injuries accounted for 15.3% of all costs. Regarding injuries to the lower extremities, the average total costs for injuries affecting the dominant leg (€4173; BCa 95%CI: 3317–5093) did not differ

significantly from injuries to the standing leg (€4566; BCa 95%CI: 3608–5637). The total costs were also influenced by the injury type ($F(6,695) = 10.637$, $p < 0.001$; Fig. 2). Ligament sprain or rupture was the most frequent injury type (44.6%) and represented 48.4% of all injury costs. Additionally, cartilage and meniscal damage led to high average costs per injury and were responsible for 17.2% of all injury costs, whereas bone fractures accounted for 15.8% of all costs. Tendon injuries were relatively rare and, therefore, accounted for only 6.9% of all injury costs.

3.3. Which injury situations lead to high costs?

As Table 2 shows, contact injuries led to lower mean costs than noncontact injuries. Foul play did not influence injury costs significantly, although there was a tendency toward higher mean costs of game injuries that were not caused by foul play ($t(256.1) = -1.944$, $p = 0.053$). Additionally, foul play injuries accounted for a lower proportion of total costs. Concerning injury situations, twisting and turning injuries were responsible for higher average costs than all other injury situations combined ($t(62.1) = -2.997$, $p < 0.004$). Taken together, collisions, twisting and turning, and being tackled by an opponent accounted for 49.2% of all costs.

4. Discussion

In the present study, soccer-related injuries led to mean total costs (treatment and income replacement) of €4030 and median costs of €792. This difference can be explained by the very skewed distribution that is typical for injury cost data.²³ Dividing the annual costs of €153 million by the number of soccer-related injuries suffered by working people in Switzerland (45,000),⁷ mean costs of about €3400 per soccer injury could be expected. Therefore, the sample of the present study included slightly more cost-intensive injuries and extrapolations tend to marginally overestimate the real costs. It is possible that those who sustained a severe injury were more willing to participate in the survey. Nevertheless, the data record allowed for separate analyses for different groups of nonprofessional soccer athletes, injury situations, and injury types and locations, some of which accounted for high costs related to health care and income replacement.

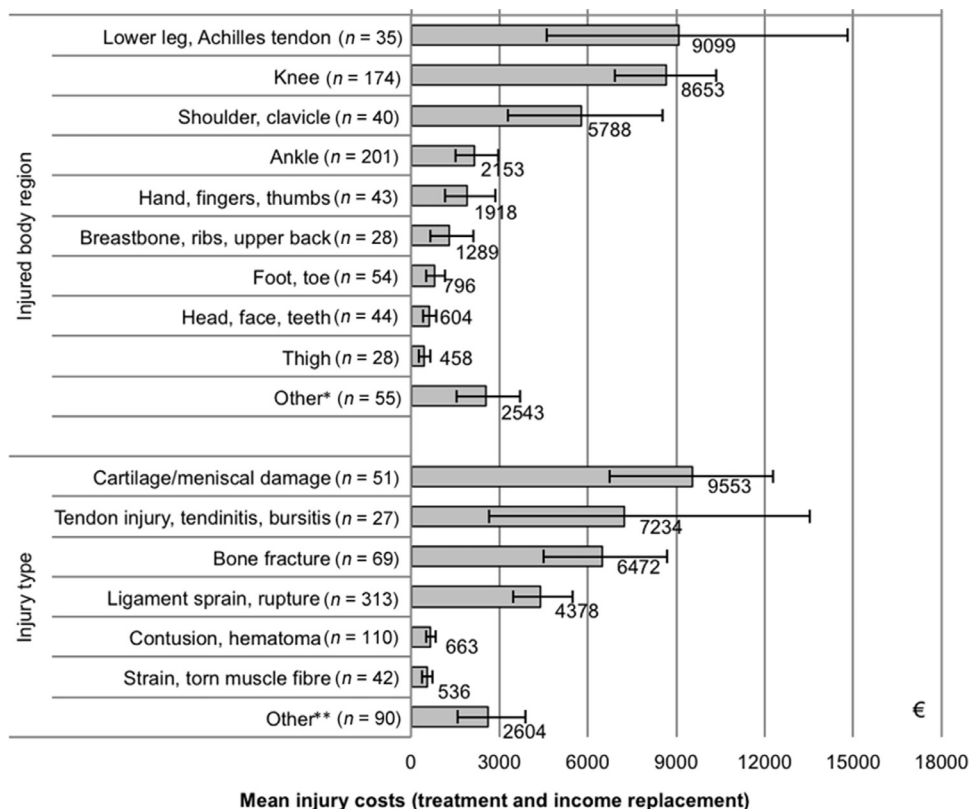


Fig. 2. Mean injury costs and bias-corrected and accelerated 95% confidence intervals by injured body region and injury type (in Euros). * Body regions with less than 25 cases: wrist; upper arm, elbow, forearm; hip, groin; lower back, sacrum, pelvis; neck, cervical spine; abdomen. ** Injury types with less than 25 cases: dislocation, luxation; other bone injury; concussion; abrasion, laceration; axonal injury; dental injury; other.

One main finding of the present study was that soccer-related injuries of people aged ≥ 30 years were highly cost relevant. A study focusing on netball also confirmed high total and mean costs for this age group.²⁶ However, an increased risk of sustaining a severe injury for older nonprofessional soccer players has only partially been confirmed by previous research.^{15,27} Because treatment costs did not differ between players ≥ 30 years and < 30 years of age in the present data record, increased average income replacement costs are the explanation for the high average injury costs of the older age group.

Based on previous research indicating that female amateur players are more frequently affected by severe injuries than men, higher average injury costs could be expected for women compared with men.^{28–30} Nevertheless, in the present study, 97.4% of all costs were associated with injuries to men.⁹ Although gender was unrelated to injury severity in the present sample, male soccer players were responsible for higher average costs because they generated substantially higher average income replacement costs than females. Higher income replacement costs among male athletes are attributable to the fact that on average, female players were 4 years younger than male players, which in turn is due to the fact that women stop playing soccer at a younger age than men.³¹ Additionally, in Switzerland, men have slightly higher salaries than women.³²

Cost-effective injury prevention should generally focus on soccer club members, who accounted for 80% of all costs. In addition, participants of amateur games accounted for 58% of

injury costs. Several previous studies have shown that injury incidence is higher during games than during training in amateur and professional soccer.^{27,29,33} Additionally, previous research shows that a higher proportion of severe injuries occur during competition,^{27,34,35} which might explain the high average costs of game injuries in the present study. With respect to amateur games, competition in the 30+/40+ leagues are of particular interest because injuries sustained by these players caused substantial costs. An increased injury risk in competitions involving veteran soccer players has been reported previously by Herrero et al.¹⁵ and another study³⁶ identified players in veteran teams aged ≥ 32 years as a target group for injury prevention.

Knee injuries not only caused high average costs of nearly €9000 per injury, but also accounted for 53% of all injury costs, which makes this injury type a priority regarding injury prevention. Previous research^{10,11} has also highlighted that knee injuries, beyond being cost relevant, have serious health-related consequences for individuals, such as prolonged absence from physical activity.^{18,27} In their research on netball injuries, Otago and Peake²⁶ found that knee injuries accounted for 57% of the total costs, Achilles/calf injuries accounted for 12% of the total costs, and ankle injuries accounted for 13% of the total costs. These findings correspond remarkably well with the results of the present study in which lower leg and Achilles tendon injuries accounted for 11% of the total costs and ankle injuries accounted for 15%. This finding confirms

Table 2
Injury costs depending on injury cause and situation (in Euros).

	n (%)	Costs per injury				Total costs	Percent of total costs (%)
		Median	Mean	BCa 95%CI*	p		
Contact with an opponent [†]					0.026		
Yes	369 (52.9)	626	3345	2612–4101		1,234,317	44.0
No	328 (47.1)	910	4796	3776–5916		1,572,930	56.0
Foul play (self-reporting) [†]					NS		
Yes	204 (29.6)	653	3529	2672–4371		719,898	25.9
No	486 (70.4)	846	4243	5584–9709		2,062,048	74.1
Foul play (referee's decision) ^{†,‡}					NS		
Yes	90 (27.4)	804	3548	2423–4848		319,348	19.9
No	239 (72.6)	901	5380	4199–6662		1,285,890	80.1
Injury situation					0.004		
Twisting/turning	56 (8.0)	1375	7710	5376–10,466		431,741	15.3
Running	50 (7.1)	814	5569	2646–9126		278,471	9.8
Collision	103 (14.7)	1171	5272	3504–7116		543,033	19.2
Falling	39 (5.6)	1005	4861	2354–8429		189,562	6.7
Heading	54 (7.7)	609	4421	2119–7118		238,729	8.4
Tackled	115 (16.4)	873	3627	2531–4806		417,060	14.7
Other noncontact	34 (4.8)	528	2792	1244–5024		94,935	3.4
Other contact	71 (10.1)	796	2,246	1254–3483		159,484	5.6
Shooting	29 (4.1)	505	2234	874–3830		64,791	2.3
Hit by the ball	38 (5.4)	557	1299	752–2075		49,345	1.8
Other [§]	113 (16.1)	595	3204	1945–4893		362,052	12.8

Note: The sum of respondents did not always add to 702 because individual questions were not answered by all respondents.

* BCa 95%CI calculated by using nonparametric bootstrapping with 1000 replications.

[†] A distinction was made between contact/noncontact injuries and foul play/nonfoul play injuries. Although foul play injuries always include a contact with an opponent, nonfoul play injuries can occur with or without contact with an opponent.

[‡] Only game injuries.

[§] Injury situations with <25 cases: kicking the ball simultaneously, tackling, kicked, dribbling, landing, use of elbow, passing, jumping, stretching, not specified.

Abbreviations: BCa 95%CI= bias-corrected and accelerated 95% confidence interval; NS = not significant.

that preventive measures should also focus on these 2 body regions. Because of their high probability of occurrence, even relatively minor injuries causing low average costs per claim, such as ankle injuries, result in significant costs to society.^{11,14,26}

The present study highlights the fact that contact and foul play injuries did not result in high average costs. On the contrary, noncontact injuries were more cost intensive and non-foul play injuries caused 74% of total costs. This finding is in line with recent research showing that most foul play injuries do not result in an absence from playing and that they are less likely to be severe.³⁷

Remarkably, in the present study, 3 injury situations (twisting/turning, collision, and being tackled) accounted for nearly half of the total costs. According to van Beijsterveldt et al.,¹⁸ contact with another player (which includes collisions and tackling) and twisting/turning are important contributing factors leading to injury. With respect to cost-effective prevention strategies, the decrease of twisting/turning injuries should be of great interest because such injuries led to average costs of nearly €8000 in the present study. It seems likely that this kind of injury is associated with knee injuries. In line with this notion, de Loës et al.¹² identified high speed and quick changes of direction as being responsible for knee injuries in females.

From the perspective of cost-effective injury prevention, there is some evidence that the implementation of

neuromuscular training programs can lead to a decrease in injury costs.^{19,38} Because existing injury prevention programs (such as FIFA 11+, PEP, Harmonknee, etc.) already aim at decreasing knee injuries, noncontact injuries, and injuries in twisting situations, future injury prevention strategies should focus on the implementation of these programs in different recreational soccer settings. Players in 30+/40+ leagues especially need to be convinced of the effectiveness of preventive exercises, as do young players who have yet to internalize injury prevention as an essential part of training.

Although injury insurance data are a useful basis for defining priorities in the process of creating injury prevention strategies,²⁶ at least 3 limitations in the present study should be considered. First, treatment costs and income replacement costs were restricted to 1 year after the accident. As a result, costs for injuries with long-term consequences were likely underestimated. Second, the time period between the injury and the interview varied considerably in the present sample and may have caused recall bias. Nevertheless, retrospective data collection is considered to be a valid method for obtaining relevant information about an injury's context and characteristics.³⁹ In the present sample, for instance, 79% of the respondents stated that they remembered the accident very well or well. Moreover, a database check was carried out to improve the quality of our data. Thus, we thoroughly compared the information provided during the telephone interviews with the official Suva record. Third, we acknowledge

that our sample was not representative regarding the complete age range of soccer players in that data were only available for players aged 15–64 years. Thus, although we argue that players in 30+/40+ leagues constitute an important target group for injury intervention, one could also argue that injury prevention should start earlier (e.g., before the players reach the age where particularly costly injuries occur). Presumably, the best scenario would be that players become accustomed to injury prevention programs from an early age (e.g., from the time they begin playing children's soccer onward).

5. Conclusion

The results from the present study show that nonprofessional soccer players aged >30 years and older, and particularly players in 30+/40+ leagues, accounted for above-average injury costs. These players, therefore, constitute an interesting target group for future injury prevention programs. Injuries affecting the knee were responsible for more than one-half of all costs, whereas injuries caused by contact with an opponent and foul play injuries were not associated with high injury costs. Consequently, noncontact and nonfoul play injuries should be a key target for cost-effective injury prevention and a special emphasis should be placed on twisting/turning situations.

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Authors' contributions

AG conceptualized and designed the study, conducted the statistical analysis, interpreted the data, and drafted the manuscript; MG supervised the study, interpreted the data, and critically revised the manuscript; UP conceptualized and supervised the study; PG organized the recruitment of participants and provided injury costs; HS advised on the analysis and critically revised the manuscript; ML conceptualized and designed the study, interpreted the data, and critically revised the manuscript. All authors contributed to the interpretation of findings. All authors have read and approved the final version of the manuscript, and agree with the order of presentation of the authors.

Competing interests

The authors declare that they have no competing interests.

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