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Lausanne – Switzerland, July 5th-8th, 2006
Hosted by: University of Bern, University of Lausanne, École Polytechnique Fédérale de Lausanne & the Swiss Society of Sports Medicine

Sport injuries and beyond – a population perspective on the risks and benefits of physical activity

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Swiss Federal Institute of Sports Magglingen
Swiss Federal Office of Sports

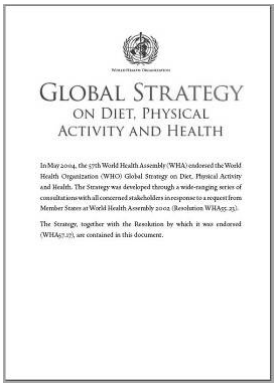
With contributions from Othmar Brügger, MSc
Swiss Council for Accident Prevention

- **Are physical activity and sports good for a population's health?**
- **Are sport injuries a risk to a population's health?**
- **Physical activity promotion and injury prevention – adversaries or allies?**

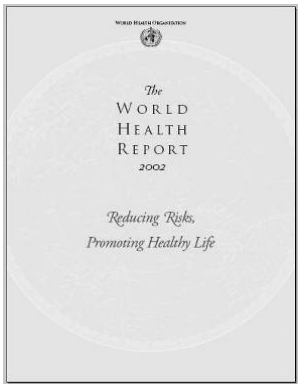
- **Are physical activity and sports good for a population's health?**
  - **Is physical activity good for health?**
  - **Where does the population perspective come in?**
  - **Are sports important for overall physical activity?**

CDC. Physical activity and health: a report of the Surgeon General. Atlanta (GA), US Department of Health and Human Services, Centers for Disease Control and Prevention, 1996.

"Yes"



World Health Assembly 2004



WHO. World Health Report 2002: Reducing risks, promoting healthy lifestyle. Geneva , World Health Organisation, 2002 pp 61, 218-219, 226-227.

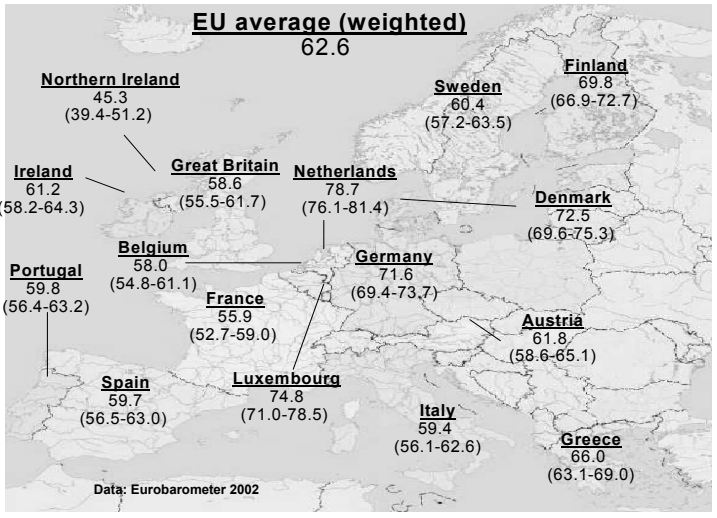
The great challenge in the epidemiology of physical activity:

- **Standardisation of methods**

Craig CL, Marshall AL, Sjostrom M, Bauman AE, Booth ML, Ainsworth BE, Pratt M, Ekelund U, Yngve A, Sallis JF, Oja P. International physical activity questionnaire: 12-country reliability and validity. Med Sci Sports Exerc 2003: 35(8): 1381-95.

IPAQ Results from Eurobarometer 2002

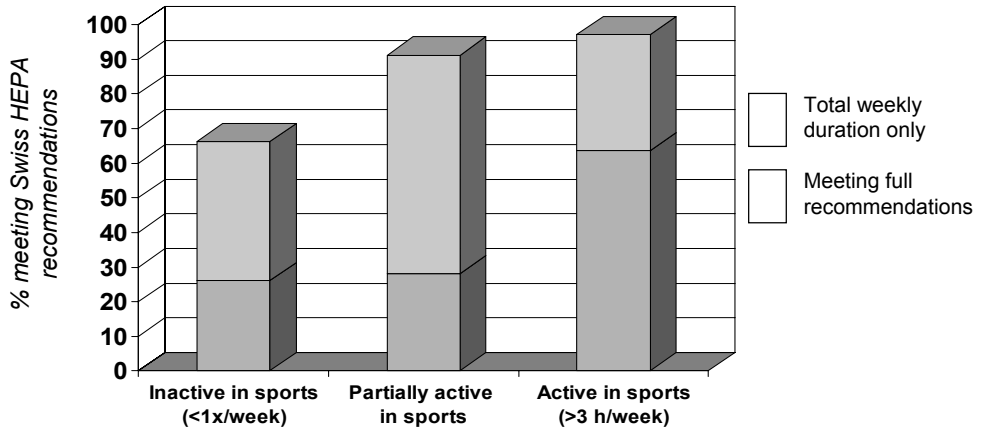
% who fullfill international recommendations for physical activity (14 or more MET-hours in the last 7 days; 95 % C.I.)



Rutten A, Abu-Omar K. Prevalence of physical activity in the European Union. Soz Praventivmed 2004; 49(4): 281-9.

Slide curtesy of Alfred Rütten and Karim Abu-Omar, Institute of Sport Science, University Erlangen-Nuremberg

Physical activity behaviour according to sport behaviour in the Swiss Health Survey 2002 (n=15'752)



Lamprecht M, Stamm HP. Observatorium Sport und Bewegung Schweiz. Bewegung, Sport und Gesundheit in der Schweiz. Auswertung der Schweizerischen Gesundheitsbefragung 2002. Zürich, L&S Sozialforschung und Beratung AG, 2005.

- **Are physical activity and sports good for a population's health?** ✓
- **Are sport injuries a risk to a population's health?**
- **Physical activity promotion and injury prevention – adversaries or allies?**

- **Are sport injuries a risk to a population's health?**
  - **How dangerous are sports?**
  - **What is the population risk for sport injuries?**
  - **Where is the trend going?**

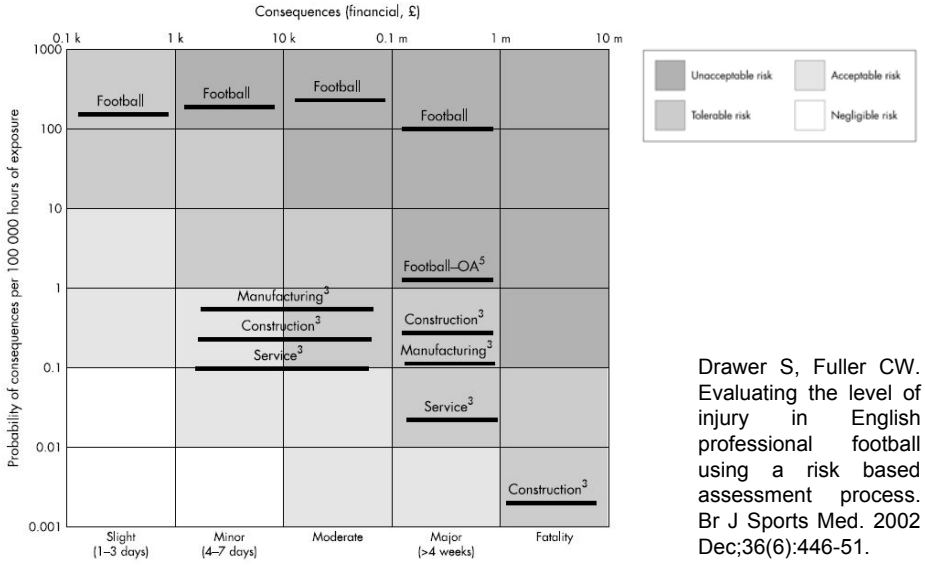
The great challenge in the epidemiology of sport injuries:

- **Standardisation of methods**

Brooks JH, Fuller CW. The influence of methodological issues on the results and conclusions from epidemiological studies of sports injuries : illustrative examples. Sports Med. 2006;36(6):459-72.

Fuller CW, Ekstrand J, Junge A, Andersen TE, Bahr R, Dvorak J, Hagglund M, McCrory P, Meeuwisse WH. Consensus statement on injury definitions and data collection procedures in studies of football (soccer) injuries. Br J Sports Med. 2006 Mar;40(3):193-201.

Risks of acute injury in professional football compared to risks in the industry



Drawer S, Fuller CW. Evaluating the level of injury in English professional football using a risk based assessment process. Br J Sports Med. 2002 Dec;36(6):446-51.

Sport injuries in the 2004 Olympic Games

377 injuries from 456 matches

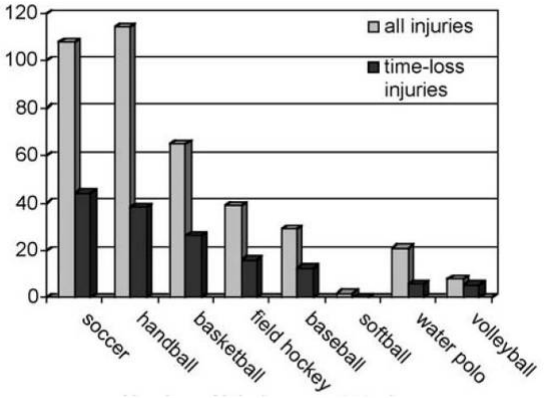
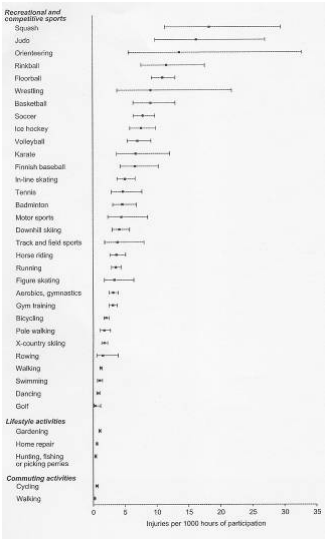


Figure 1. Number of injuries per 1000 player matches.

Junge A, Langevoort G, Pipe A, Peytavin A, Wong F, Mountjoy M, Beltrami G, Terrell R, Holzgraefe M, Charles R, Dvorak J. Injuries in team sport tournaments during the 2004 Olympic Games. Am J Sports Med. 2006 Apr;34(4):565-76.

Injuries in a Finnish cohort study

n=3362, randomly selected sample of 15-74 years



Parkkari J, Kannus P, Natri A, Lapinleimu I, Palvanen M, Heiskanen M, et al. Active living and injury risk. Int J Sports Med. 2004;25:209–216.

Injuries in a Finnish cohort study

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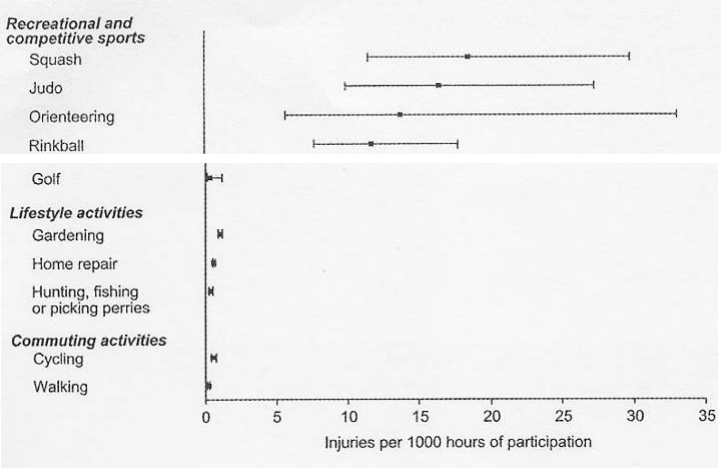


Parkkari J, Kannus P, Natri A, Lapinleimu I, Palvanen M, Heiskanen M, et al. Active living and injury risk. Int J Sports Med. 2004;25:209–216.

Injuries in a Finnish cohort study

n=3362, randomly selected sample of 15-74 years

	Injuries per 1000 h
Recreational and competitive sports	0.3-18.3
Lifestyle activity	0.33-1.01
Commuting activity	0.19-0.48

Parkkari J, Kannus P, Natri A, Lapinleimu I, Palvanen M, Heiskanen M, et al. Active living and injury risk. Int J Sports Med. 2004;25:209–216.

Injuries in a Finnish cohort study

n=3362, randomly selected sample of 15-74 years

	Injuries per 1000 h	% of all injuries
Recreational and competitive sports	0.3-18.3	73%
Lifestyle activity	0.33-1.01	22%
Commuting activity	0.19-0.48	5%

Parkkari J, Kannus P, Natri A, Lapinleimu I, Palvanen M, Heiskanen M, et al. Active living and injury risk. Int J Sports Med. 2004;25:209–216.

Monitoring of Sport injuries in Europe

European Home and Leisure Accident Surveillance System (EHLASS)

	Hospitalised sports injuries	% of all hospitalised injuries
Austria	24'000	11%
France	100'000	-
Germany	180'000	-
Greece	3'500	3%
Italy	105'000	-
The Netherlands	11'000	6%
UK	150'000	-
Denmark	-	-
Israel	-	5%

Petridou E. Sports Injuries in the EU countries in view of the 2004 Olympics: Harvesting the information from existing databases (Phase I). Final report. Athens, Center for Research and Prevention of Injuries among the Young (CE.RE.PR.I), Department of Hygiene and Epidemiology, Medical School of Athens University, 2001.

Home and leisure accidents in Europe

EU Injury Data Base IDB (currently 9 countries)

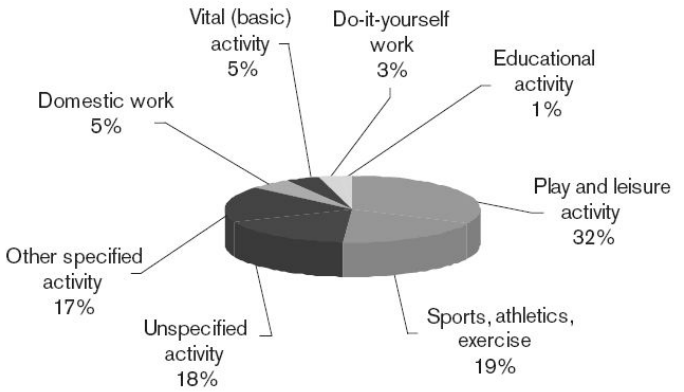


Figure 21: Activity at the time of injury

Source: IDB Hospital treated patients – Absolute numbers; Activity at the time of injury; AT, DK, FR, IT, IE, NL, PT, SE, UK; 2002 – 2004; (n=983.146).

Home and leisure accidents are about 50% of all registered accidents

Zimmermann N, Bauer R. Injuries in the European Union. Statistics summary 2002-2004. Featuring the EU Injury Database IDB. Vienna, Austrian Safety Board, 2006.

Sport injuries in Europe

EU Injury Data Base IDB (currently 9 countries)

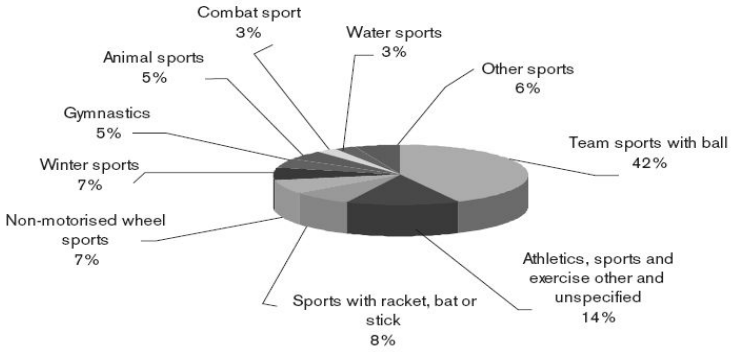
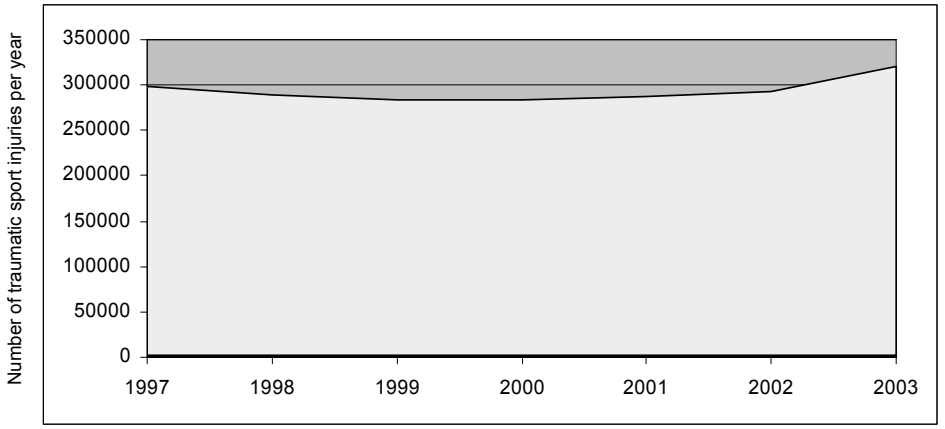


Figure 30: Sports practised at the time of injury

Source: IDB Hospital treated patients – Absolute numbers; Type of sports practised at the time of injury; AT, DK, FR, IT, IE, NL, PT, SE, UK; 2002 – 2004; (n=190.624).

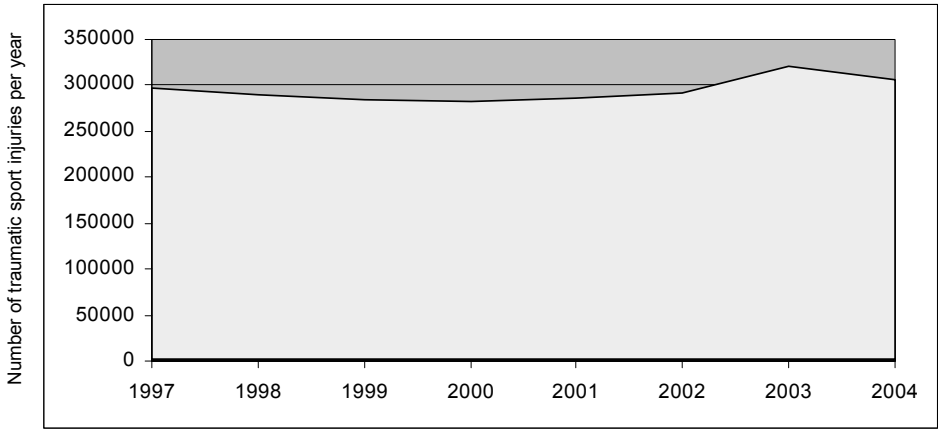
Zimmermann N, Bauer R. Injuries in the European Union. Statistics summary 2002-2004. Featuring the EU Injury Database IDB. Vienna, Austrian Safety Board, 2006.

Sport injuries in Switzerland 1997-2003



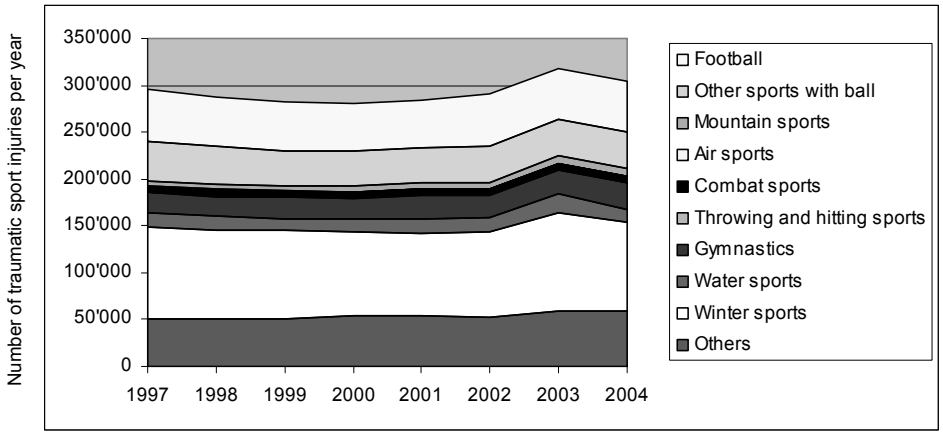
Swiss Council for Accident Prevention bfu, 2006

Sport injuries in Switzerland 1997-2004



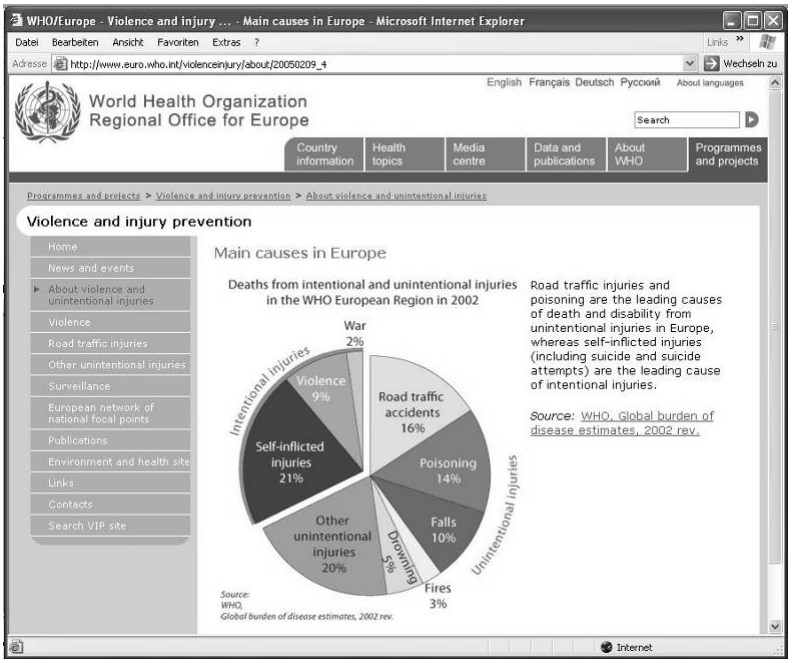
Swiss Council for Accident Prevention bfu, 2006

Sport injuries in Switzerland 1997-2004

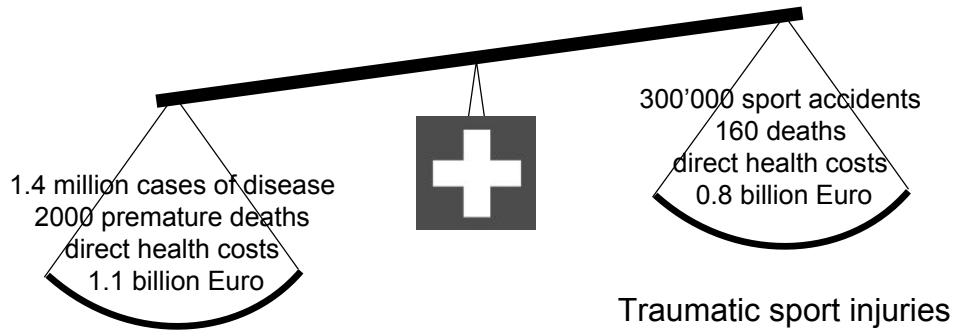


Swiss Council for Accident Prevention bfu, 2006

- **Are physical activity and sports good for a population's health?** ✓
- **Are sport injuries a risk to a population's health?** ✓
- **Physical activity promotion and injury prevention – adversaries or allies?**



Is this the correct model?

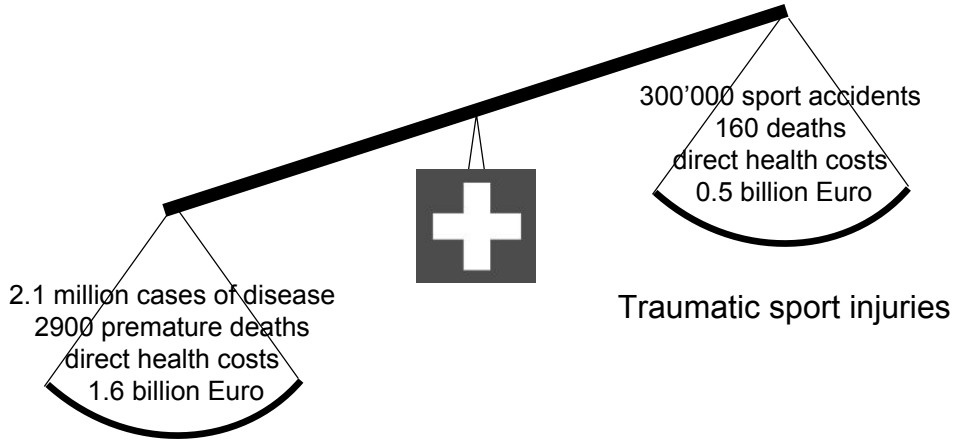


Traumatic sport injuries

Physical inactivity

Martin BW, Beeler I, Szucs T, Smala AM, Brügger O, Casparis C, Allenbach R, Raeber PA, Marti B. Economic benefits of the health-enhancing effects of physical activity: first estimates for Switzerland. Schweiz. Schweiz Z Sportmed Sporttraumatol, 2001; 49 (3): 131-133.

Is this the correct model?



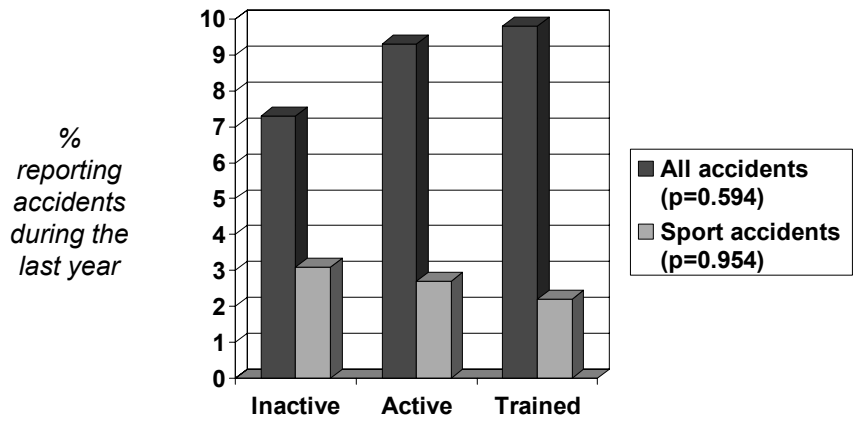
Traumatic sport injuries

Physical inactivity

Updated estimates, as of 2006

- **Physical activity promotion and injury prevention – adversaries or allies?**
  - **Do physically active people really have more injuries?**
  - **Can training reduce injuries?**
  - **Does fear from injury keep people from being active?**

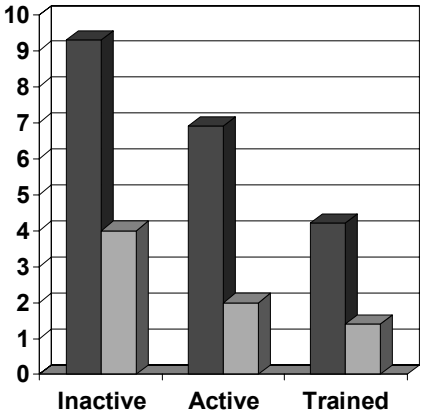
Cumulative incidence of accidents by habitual activity level in the Swiss HEPA Survey 2001 (n=1535)



Martin BW. Physical activity related attitudes, knowledge and behaviour in the Swiss population: comparison of the HEPA Surveys 2001 and 1999. Schweiz. Schweiz Z Sportmed Sporttraumatol 2002: 50 (4): 164-168.

Incidence of accidents by habitual activity level in the Swiss HEPA Survey 2001 (n=1535)

accidents/ 10'000 hours of vigorous intensity activity



active vs. trained: $p<0.05$/ $p>0.05$

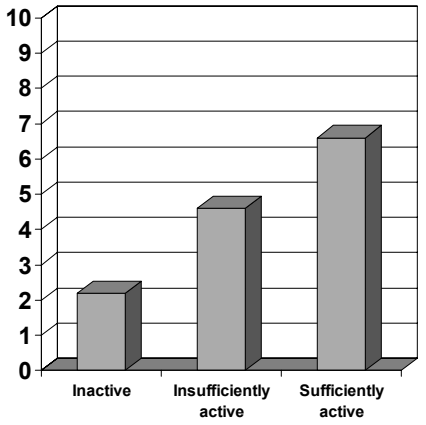
inactive vs. trained: $p<0.01$

inactive vs. active : $p>0.05$

Martin BW. Physical activity related attitudes, knowledge and behaviour in the Swiss population: comparison of the HEPA Surveys 2001 and 1999. Schweiz. Schweiz Z Sportmed Sporttraumatol 2002: 50 (4): 164-168.

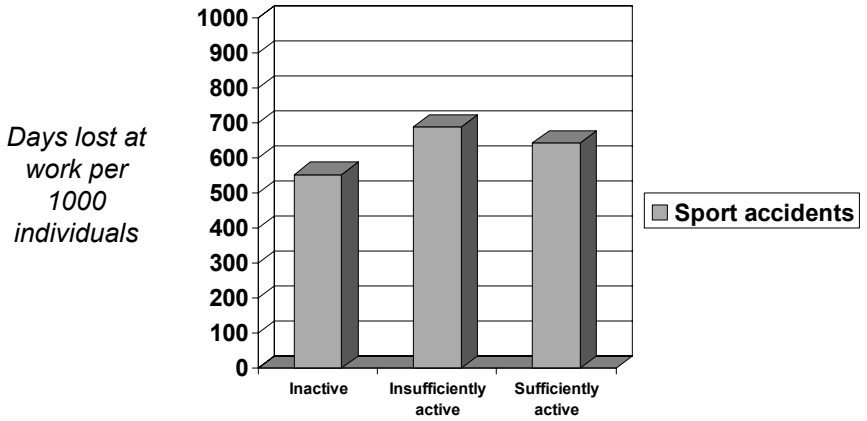
Cumulative incidence of sport accidents by activity level in the Swiss Health Survey 2002 (n=15'752)

% reporting accidents during the last year



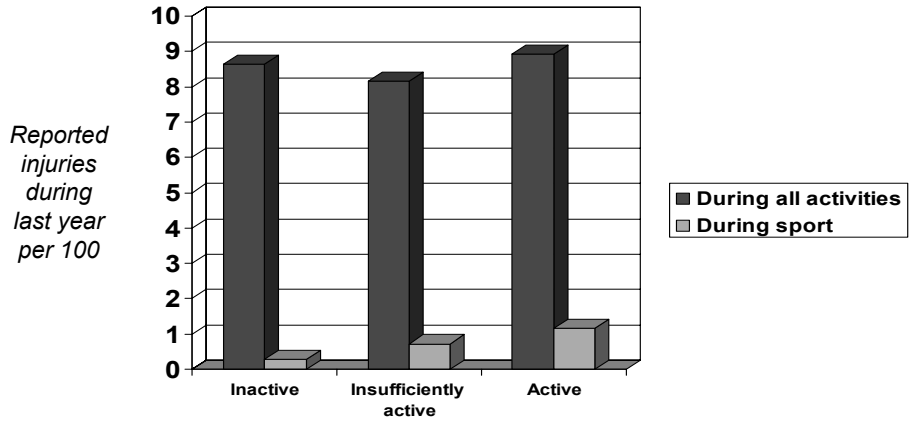
Lamprecht M, Stamm HP. Bewegung, Sport, Gesundheit. Fakten und Trends aus den Schweizerischen Gesundheitsbefragungen 1992, 1997, 2002. StatSanté, Resultate zu den Gesundheitsstatistiken in der Schweiz, 1/2006. Neuchâtel und Magglingen, Bundesamt für Statistik und Bundesamt für Sport, 2006.

Time loss due to sport accidents by habitual activity level in the Swiss Health Survey 2002 (n=15'752)



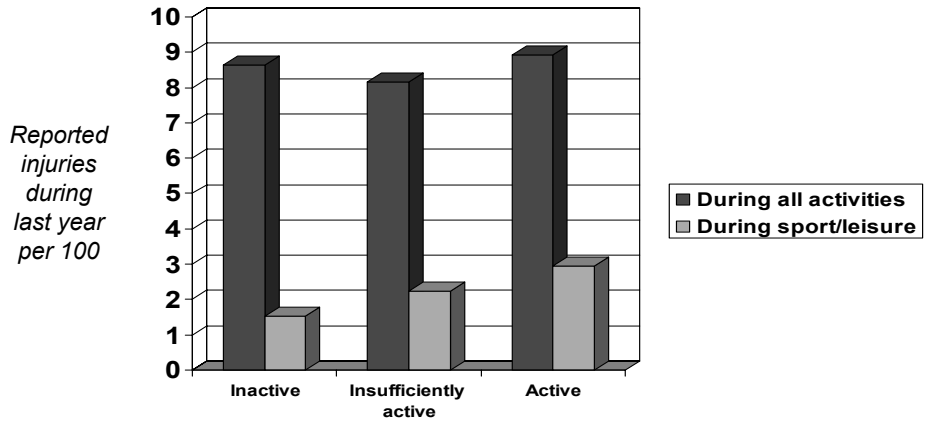
Lamprecht M, Stamm HP. Bewegung, Sport, Gesundheit. Fakten und Trends aus den Schweizerischen Gesundheitsbefragungen 1992, 1997, 2002. StatSanté, Resultate zu den Gesundheitsstatistiken in der Schweiz, 1/2006. Neuchâtel und Magglingen, Bundesamt für Statistik und Bundesamt für Sport, 2006.

Cumulative incidence of accidents by leisure-time activity level in the US National Health Interview Survey 2000 to 2002 (n=93'159)



Carlson SA, Hootman JM, Powell KE, Macera CA, Heath GW, Gilchrist J, Kimsey CD Jr, Kohl HW 3rd. Self-reported Injury and Physical Activity Levels: United States 2000 to 2002. Ann Epidemiol. 2006 Apr 18;

Cumulative incidence of accidents by leisure-time activity level in the US National Health Interview Survey 2000 to 2002 (n=93'159)



Carlson SA, Hootman JM, Powell KE, Macera CA, Heath GW, Gilchrist J, Kimsey CD Jr, Kohl HW 3rd. Self-reported Injury and Physical Activity Levels: United States 2000 to 2002. Ann Epidemiol. 2006 Apr 18;

Successful prevention of knee and ankle injuries in youth handball clubs in Norway (n=1837)

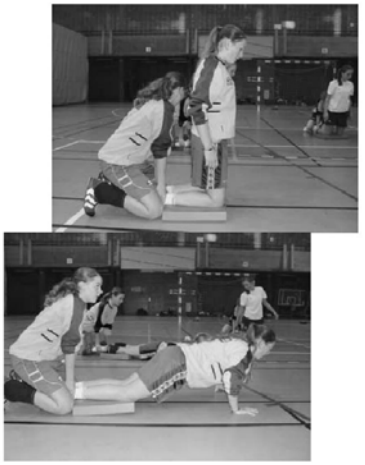


Fig 2 Example of a strength exercise ("Nordic hamstring lowers"). Top: start position; a partner holds around the player's ankles. Bottom: The player falls slowly forwards, using hamstrings to resist the fall against the floor as long as possible

*"**Results:** Relative risk intervention group v control group 0.53, 95% confidence interval 0.35 to 0.81."*

Olsen OE, Myklebust G, Engebretsen L, Holme I, Bahr R. Exercises to prevent lower limb injuries in youth sports: cluster randomised controlled trial. BMJ 2005;330;449-455.

Fitness and overuse injury risk in the Danish Army

TABLE 4. *Overuse Injury Incidence in the 4 Study Groups*

	Overuse injury				
	Well Trained, n (%)	Trained, n (%)	Less Trained, n (%)	Untrained, n (%)	Total, n
Injury	3 (4.5)	22 (14.4)	24 (27.3)	10 (43.5)	59
No injury	63 (95.5)	131 (85.6)	64 (72.7)	13 (56.5)	271
Total	66 (100.0)	153 (100.0)	88 (100.0)	23 (100.0)	330

There was a highly significant association between fitness groups and overuse injury ($P < 0.0001$; χ^2 test for trend), meaning that a low level of fitness is associated with an increased risk of overuse injury.

Rosendal L, Langberg H, Skov-Jensen A, Kjaer M. Incidence of injury and physical performance adaptations during military training. Clin J Sport Med. 2003 May;13(3):157-63.

Reductions in overuse and traumatic injury in the US Army

between multiple intervention group (n = 1283) and historical control group (n = 2559)

Table 4 Crude and adjusted risk ratios (95% confidence intervals) for the three types of injuries comparing multiple intervention (MI) and historical control (HC) cohorts (risk ratios are HC/MI from Cox regression)

Analysis	Any time loss injury	Time loss overuse injury	Time loss traumatic injury
Men			
Crude	1.13 (0.98 to 1.30)	1.18 (1.00 to 1.40)	1.38 (1.06 to 1.81)
Adjusted	1.46 (1.21 to 1.77)	1.58 (1.26 to 1.99)	1.50 (1.06 to 2.12)
Women			
Crude	1.31 (0.96 to 1.79)	1.65 (1.14 to 2.38)	1.40 (0.75 to 2.62)
Adjusted	1.77 (1.10 to 2.83)	2.52 (1.47 to 4.31)	1.37 (0.57 to 3.29)

Knapik JJ, Bullock SH, Canada S, Toney E, Wells JD, Hoedebecke E, Jones BH. Influence of an injury reduction program on injury and fitness outcomes among soldiers. Inj Prev. 2004 Feb;10(1):37-42.

Perceived risk as a determinant of walking to school

in a cross-sectional survey of London school children (n = 2001)

"89% (of parents) were very or quite worried about traffic."

Odds Ratio for car travel vs. walking = 1.6 (95% CI 1.0 to 2.5)

DiGuiseppi C, Roberts I, Li L, Allen D. Determinants of car travel on daily journeys to school: cross sectional survey of primary school children. BMJ 1998;316:1426-1428

Jacobsen PL, Racioppi F, Rutter H. Safety and Physical Activity: explaining the links. Executive summary. 21st Meeting of the WHO European Environment and health Committee, 15 May 2006, Oslo, Norway.

- **Are physical activity and sports good for a population's health?** ✓
- **Are sport injuries a risk to a population's health?** ✓
- **Physical activity promotion and injury prevention – adversaries or allies?** (✓)

Where do we go from here?

➔ **Recognition of public health relevance of physical activity as well as sport injuries**

Where do we go from here?

- ➔ **Recognition of public health relevance of physical activity as well as sport injuries**
- ➔ **Standardisation of methods and establishment of monitoring systems**
  - **For the quantification of the situation**
  - **For the identification of trends**
  - **For the evaluation of interventions**
  - **For international comparison**

Where do we go from here?

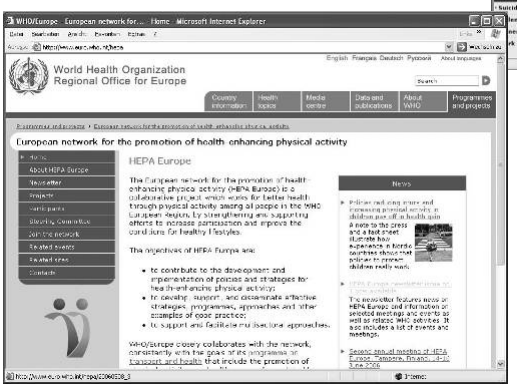
- ➔ **Recognition of public health relevance of physical activity as well as sport injuries**
- ➔ **Standardisation of methods and establishment of monitoring systems**
- ➔ **Effectiveness of interventions**
  - **Physical activity and sport promotion**
  - **Injury prevention**
  - **Training/PA promotion → injury prevention**
  - **Risk reduction → physical activity promotion**

Where do we go from here?

- ➔ **Recognition of public health relevance of physical activity as well as sport injuries**
- ➔ **Standardisation of methods and establishment of monitoring systems**
- ➔ **Effectiveness of interventions**
- ➔ **Learn from each other and find a common voice**

EuroSafe

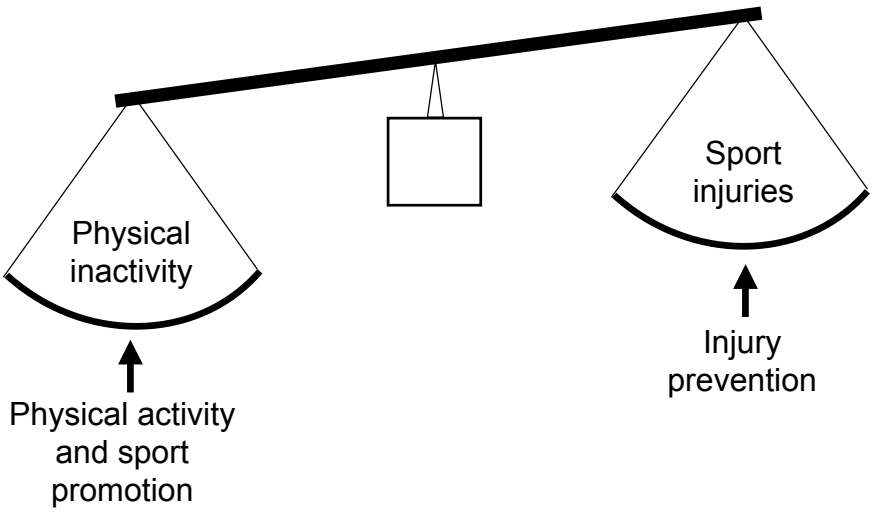
Task Force Sport Safety
www.eurosafe.eu.com



HEPA Europe,

the European Network for the Promotion of Health-Enhancing Physical Activity
www.euro.who.int/hepa

This is not the correct model



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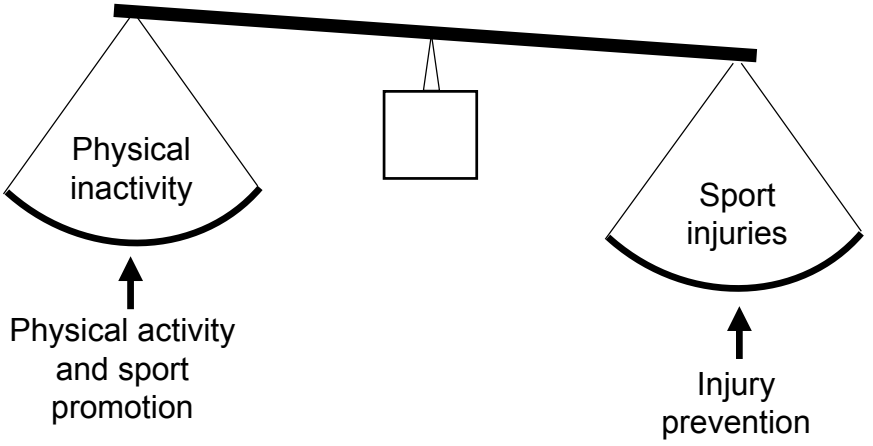
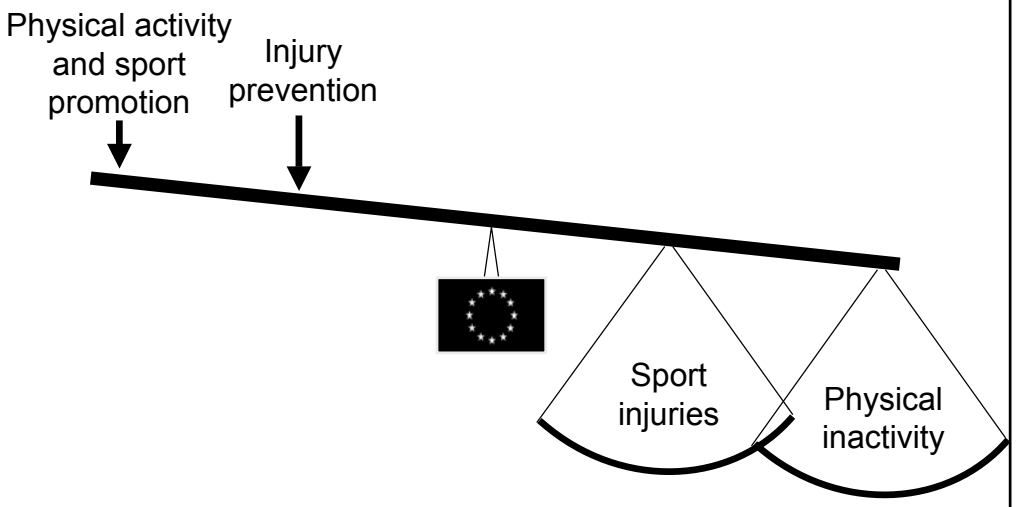
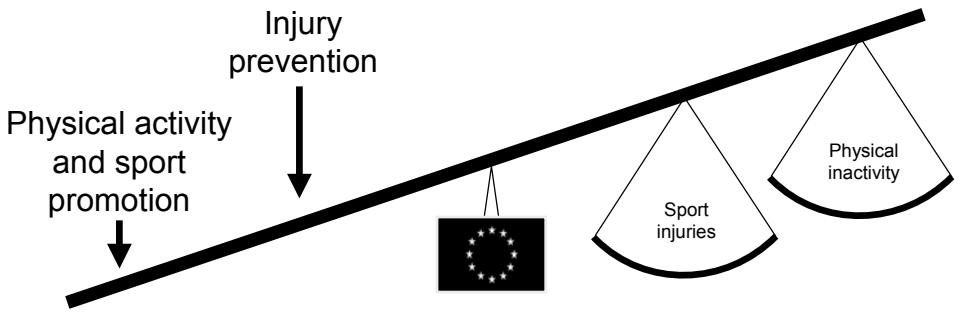


A model for the future



A model for the future



Thank you for your attention!

Handout at www.hepa.ch/gf/ecss