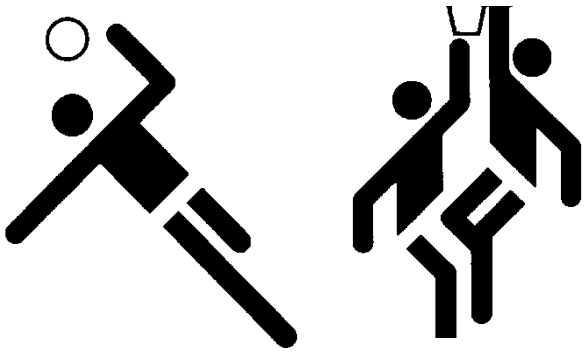


Safety in Sports

Best Injury Prevention Measures and Implementation Strategies in Handball and Basketball (D5)



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Table of Contents

		Page
1.	**Introduction**	**4**
2.	**Methodical Steps in Developing Practical Guidelines**	**6**
2.1	Structured Compilation of Existing Knowledge on Sports Injury Prevention	6
2.1.1	Search Strategy	6
2.1.2	Classification of Preventive Fields	6
2.1.3	Results	7
2.2	Perception of and Knowledge on Sports Injuries and their Prevention in Sports Federations	8
2.2.1	Standardised Survey of Coaches on Sports Injury Prevention	8
2.2.2	Results	10
2.2.2.1	Basketball	10
2.2.2.2	Handball	13
2.3	Consensus Building on Best Prevention Measures and Implementation Strategies	16
2.3.1	Evaluation of Identified Knowledge on Sports Injury Prevention	16
2.3.1.1	Descriptive Summaries (Contents & Preventive Recommendation)	17
2.3.1.2	Evaluation Criteria & Online tool	19
2.3.1.3	Experts Involved	20
2.3.2	Results of Evaluation	20
2.3.2.1	Basketball	20
2.3.2.2	Handball	35
2.3.3	Expert Consultation Meetings & Conclusions for WP6	49
2.3.3.1	Basketball	50
2.3.3.2	Handball	51
3.	**References**	**54**
	Appendix	**55**
	A. FIBA Questionnaire	**56**
	B. EHF Questionnaire	**59**
	C. SBA Questionnaire	**62**
	D. SBF Questionnaire	**66**
	E. CHF Questionnaire	**71**
	F. NHF Questionnaire	**74**
	G. Online Evaluation Tool Screenshot	**77**

Index of Figures

		Page
Fig. 1.	Fields of injury prevention	7
Fig. 2.	Structured template for comprehensive summaries of findings	17
Fig. 3.	Rating tool	19
Fig. 4.	Evaluation results of preventive measures depending on category in basketball	21
Fig. 5.	Evaluation results of preventive measures depending on validation level in basketball	22
Fig. 6.	Evaluation results of preventive measures depending on category in handball	37
Fig. 7	Evaluation results of preventive measures depending on validation level in handball	38

Index of Tables

		Page
Tab. 1.	Overview of survey results in basketball	11
Tab. 2.	Overview of survey results in handball	14
Tab. 3.	Distribution of preventive measures depending on category and validation level in basketball	20
Tab. 4.	Participants in basketball evaluation	21
Tab. 5.	Evaluation results of preventive measures depending on category in basketball	22
Tab. 6.	Evaluation results of preventive measures depending on validation level in basketball	23
Tab. 7.	Distribution of preventive measures depending on category and validation level in handball	35
Tab. 8.	Participants in handball evaluation	36
Tab. 9.	Evaluation results of preventive measures depending on category in handball	37
Tab. 10.	Evaluation results of preventive measures depending on validation level in handball	38
Tab. 11.	Prevention matrix in basketball	51
Tab. 12.	Prevention matrix in handball	53

1. Introduction

Handball and basketball are two of the most widespread team sports in the European area. Their popularity is unquestionable. Far more than 4 million European citizens regularly participate in organised handball and basketball training and competition – not considering recreational and scholar activities. However, both sports induce altogether almost 1 million injuries per year. Numbers of this magnitude diminish the positive aspects of health and well-being that accompany the physical activity and the socio-cultural value of team sports like handball and basketball. According to conservative estimates annual medical treatment costs practically mount up to 1 billion Euros (€) (cf. Luig & Henke, 2010 a, b).

On the one hand, fortunately, science, health care professionals as well as the sports communities themselves offer a wide range of prevention measures and strategies that are aimed at reducing the number and the extent of sports injuries. On the other hand, unfortunately, the pure existence of preventive contents does not guarantee success in fighting sports injuries even if there is clear scientific proof. Sports injury prevention is a complex issue. The fact that an intervention works fine in a clinical setting does not consequently allow the conclusion that it is perfectly suited for the demands of real-world sports communities.

To bridge the evidence-to-practice translation gap and thus to define the best injury prevention measures in handball and basketball, it is obligatory to involve the respective community into the process of identification and to acknowledge the individual and exclusive demands and settings of the handball and basketball communities. It is important, therefore, not to neglect the sports communities' perception and knowledge of the injury problem itself as well as their perspectives of handling the problem within their own organisational structures and with regard to their capacities. The most effective practices will not prevent any injuries if they are not accepted and furthermore not applied. Thus, it is of utmost importance to comprise the factors that affect athletes, coaches and sports functionaries to accept, apply and sustain prevention measures (Soligard et al. 2010, Finch, 2006).

In this regard the RE-AIM framework (Glasgow et al., 1999) basically offers a well-recognised concept for evaluating public health impacts considering **r**each, **e**ffectivity, **a**doption, **i**mplementation and **m**aintenance as crucial steps of successful health promotion interventions. As Finch (2009) outlines, each dimension of the RE-AIM framework has to be carefully translated into the setting where it is intended to become applied i.e. in the framework of sports injury prevention. Following this, Saunders et al. (2010) highlight that in team sports in particular coaches can play a decisive role in translating the prevention evidence into practice as they are probably the most promising delivery platform for training and physical preparation programmes and further safety aspects from other fields of sports injury prevention.

Prior to discussing implementation details in the light of the aforesaid strategic approaches, it is inevitable to assess the appropriate contents that have a capability to

prevent injuries, that are somehow feasible in the community-based settings of handball and basketball, and that have finally a chance to become generally accepted among athletes, coaches and sports functionaries.

Hence, this report attempts to establish a methodical approach to select the most promising prevention measures and implementation strategies for handball and basketball respectively. Furthermore, outcomes are designated as prerequisites for the following pilot implementation in two national handball and basketball respectively i.e. Norwegian and Czech Handball Federation, and Swedish and Slovak Basketball Federation.

The respective European sports federations (EHF, FIBA-Europe) act as collaborating, supervising and supporting partners for the above mentioned project activities.

2. Methodical Steps in Developing Practical Guidelines

This chapter illustrates the applied three-step methodology in a comprehensible manner. Basically, a structured compilation of the current state-of-the-art knowledge in injury prevention is evaluated by means of a consensus-based evaluation process among sports injury prevention experts. These results will be discussed in the light of coaches' perception and awareness of injuries as well as demands for application and acceptance of existing countermeasures, which, finally, will lead to consensus-based recommendations towards best prevention measures and most promising promotion strategies for both sports. It is **not** intended to carry out a new study to prove the effectivity of specific prevention measures but to show ways how to select effective, applicable and acceptable ideas and how to promote them best possible within their target group.

2.1 Structured Compilation of Existing Knowledge on Sports Injury Prevention

2.1.1 Search Strategy

For each sport, two reviewers independently performed a structured database and literature search for relevant publications. As of September 2009, PubMed, the Cochrane library, SportDiscus, BISp-databases and EMIP were browsed, using multiple combinations of the keywords INJUR*, PREVENT* and BASKETBALL / HANDBALL. A total of 4079 (basketball), 566 (handball) articles were identified for the defined publication period of 1990 to 2009. After title and abstract review and removal of duplicates 48 (basketball) and 39 (handball) publications were considered for detailed review. In addition to the database research a multi-lingual web search using the internet search engine Google.com was conducted in 12 languages to identify "grey literature" and expert knowledge. This query compiled another 33 (basketball) and 43 (handball) references for the advanced reviewing process. Following these two initial literature searches, the reference lists of the retrieved articles were manually scanned for further information. Additionally, available authors, co-authors and sport-specific experts had been contacted for complementing the findings with articles or programmes from their personal archives, gathering further 34 (basketball) and 21 (handball) references. Thus, 112 (basketball) and 103 (handball) articles were regarded for the full text review. Finally, 70 (basketball) and 75 (handball) documents met the inclusion criteria in accordance with both reviewers and were considered for further processing.

2.1.2 Classification of Prevention Measures

Prevention measures aim to address the predominant risk factors in the respective sport, which are basically either of intrinsic or extrinsic nature. With regard to further evaluation and to allow an objective comparison of the documented preventive recommendations, it was essential to subdivide the compiled findings into specific fields of injury prevention (Fig. 1).

Training & Physical Preparation e.g. balancing exercises, stabilisation, strengthening, agility, coordination, stretching
Technical & Political Approaches e.g. fairplay campaigns, coaches education, behaviour and rules modification refereeing
Equipment & Facilities e.g. taping, orthoses, mouthguards, protectors, floor conditions, venues, shoes
Medical & Non-medical Support e.g. physiotherapy, pre-participation-examinations, medical screenings, massage
Multifaceted Approaches Picking up aspects of at least two different subgroups that are mentioned above

Fig. 1. Fields of injury prevention

“Training & Physical Preparation” as well as “Medical and Non-medical Support” are those fields of prevention that are primarily concerned with intrinsic risk factors i.e. the predisposition of the athlete. In contrast “Technical and Political Approaches” predominantly focuses on extrinsic risk factors i.e. the general framework affecting basketball activities on all levels whereas the field of “Equipment & Facilities” addresses extrinsic and intrinsic factors. Some of the compiled documents have multiple or composite recommendations, e.g. the combination of external ankle bracing and ankle stabilisation training and hence belong to the group of “Multifaceted Approaches”. However, even if sources belong to the last mentioned group of “Multifaceted Approaches”, it is important to say that all single recommendations can strictly be assigned to one of the four aforesaid main fields of injury prevention.

2.1.3 Results

The compilations of sources on sports injury prevention in handball and basketball are available as separated “Inventory Reports (D2)” (cf. Luig & Henke, 2010 a, b).

2.2 Perception of and Knowledge on Sports Injuries and their Prevention in Sports Federations

For effective sports injury prevention, it is necessary to find an effective way how scientific knowledge can be translated into practice. The available / existing prevention measures can only be successful, if they are accepted by coaches and players. Therefore, it is important to involve the perception of and knowledge on injuries of sports communities into the process. In this process coaches play a key role to reach the players. A survey of coaches should shed light on how the awareness of injuries is in the respective sports communities and which further education about injuries is needed. Only by involving coaches it is possible that most promising prevention measures are adapted, implemented and maintained over a longer period.

2.2.1 Standardised Survey of Coaches on Sports Injury Prevention

The questionnaire consists of three different parts which focus on:

1. Background information about the person:

The questionnaire starts with questions concerning the age, gender, nationality and coaching education. Moreover, the respondents are asked to give information about their team / teams (gender, age group, league, session/week).

2. Personal Perception of injuries:

As it has been mentioned before, it is from great importance to involve the perception of and knowledge on coaches to develop prevention measures and to find acceptance in respective sports communities. This part consists of four questions focusing on the injury awareness, causes and prevention.

3. Knowledge on and application of preventive interventions:

This part revolves around the knowledge on and application of preventive interventions. It consists of nine questions which broach the issue of injury prevention. The respondents are invited to give particulars about:

- How the number of injuries can be reduced
- Which preventive measures they carry out with their teams
- When and how they apply these preventive training measures
- How the players like it
- Whether they as a coach feel familiar and comfortable with applying these preventive training measures
- Whether their players use any other preventive measures
- Whether they know any specific programmes

- Whether injury prevention should be integral part of coaches' education
- Whether they need further information about specific injuries and their prevention

At the end every federation / association is allowed to add own questions (cf. appendix A-F).

Most answers are coded as multiple choices capturing the intended range of responses and are replenished with free miscellaneous answer opportunities (short answer text boxes).

Considering questions which focus on coaches' self-assessment, for example, if injuries are a major issue, if their players like preventive measures and if they feel familiar and comfortable with applying these measures, the Likert-scale, going from one point to five points, is used. In this way the respondents can express their direction and strength of their position towards the issue.

To reach coaches of various levels the questionnaire can be frequently spread out by coaches' seminars. Best opportunity to pass around the questionnaire is before the theoretical and practical lecture starts. Thus it is secured that the respondents are not influenced by filling in the questionnaire.

2.2.2 Results

2.2.2.1 Basketball

The first baseline survey in basketball was carried out in Slovakia (Bratislava) in 2010 followed by the second in Sweden 2010.

111 coaches filled in the survey (Slovakia n=84; Sweden n=27). Only one quarter of participating coaches is female. As opposed to this more than three quarters are male coaches. Considering the coaching education 24% of Slovakian coaches and 59% of Swedish coaches have a high coaching education. For more than 80% of Slovakian coaches injuries are an issue, but the awareness of injuries in the Swedish federation is in low gear. More than one third recognizes injuries either as not important or less important issue. The most mentioned causes for injuries in basketball are lack of regeneration / rehabilitation and poor physical condition.

The survey also shows that almost all Slovakian coaches carry out stretching (98%) as a preventive measure. In comparison to that Sweden coaches mainly carry out strengthening (69%). Stretching was here much less ticked (39%). Similar answers appeared by the question how injuries can be reduced. Slovakian and Sweden coaches believe that injuries can be reduced through better athletic preparation and longer regeneration / rehabilitation.

On a five-point-rating scale coaches assess whether prevention measures enjoy popularity by their players. One third of Slovakian coaches believe their players like the prevention measures they carry out. This opinion differs from Sweden coaches. More than the half of Sweden coaches think their players do not like the carried out prevention measures. This leaves here room for improvement. Frequently used prevention measures by players are taping, orthoses and protectors.

Both, Slovakian and Sweden coaches, need more information about knee, ankle, shoulder, wrist and finger injuries.

The following table sums up and gives an overview of the results of the Slovakian and Sweden survey. The fields highlighted in grey are the most given answer.

Tab. 1.Overview of survey results in basketball

	Sweden		**Slovakia**	
Number of questionnaires		27	84	
Number of Countries		1	1	
Age (average)		--	39	
Gender	Male	74%	Male	84%
	Female	26%	Female	16%
Coaching Education	None	--	None	--
	Low	--	Low	41%
	Medium	4 %	Medium	35%
	High	59 %	High	24%
Awareness (Injuries as a problem?)	Not important	33 %	Not important	1%
	Less important	33 %	Less important	--
	Medium	30 %	Medium	16%
	Important	4 %	Important	37%
	Very Important	--	Very Important	46%
Causes	Fouls / unfair play	4%	Fouls / unfair play	19%
	Collisions / body contact	19%	Collisions / body contact	42%
	Too many matches	11%	Too many matches	5%
	Lack of regeneration	33%	Lack of regeneration	87%
	Insufficient warm-up	--	Insufficient warm-up	49%
	Bad luck	--	Bad luck	20%
	Poor physical condition	93%	Poor physical condition	62%
Reduction	Better athletic preparation	54%	Better athletic preparation	87%
	Longer regeneration	50%	Longer regeneration	87%
	Less matches	8%	Less matches	6%
	Modification of rules	--	Modification of rules	6%
	Protective equipment	8%	Protective equipment	13%
	Prevention program	--	Prevention program	61%

Prevention (training measures)	Strengthening	69%	Strengthening	59%
	Stretching	39%	Stretching	98%
	Physiotherapy	4	Physiotherapy	12%
	Warming-up	46%	Warming-up	79%
	Balance exercises	4%	Balance exercises	28%
	Athletic Drills	8%	Athletic Drills	46%
	Coordination exercises	--	Coordination exercises	49%
Popularity	Not at all	4%	Not at all	3%
	Low	52%	Low	11%
	Medium	41%	Medium	53%
	High	4%	High	24%
	Very high	--	Very high	10%
Additional prevention measures	Physiotherapy	11%	Physiotherapy	15%
	Orthoses	--	Orthoses	60%
	Mouthguards	4%	Mouthguards	22%
	Protectors	70%	Protectors	31%
	Tape	37%	Tape	65%
	Supplementation	7%	Supplementation	39%
	Massage	7%	Massage	34%

2.2.2.2 Handball

The first survey in handball was organized in December 2008, in conjunction with the EHF International Top Coaches Seminar in Skopje. On account of the gained results of that survey the questionnaire was further modified. Less open-ended but more multiple choice questions appeared in the new modified questionnaire. The International Top Coaches Seminar in Skopje was followed by two EHF (International Elite Youth Coaches 2009; International Top Level Coaches 2010) and baseline surveys in the two pilot associations Norway (2009 / 2010) and Czech Republic (2010).

407 coaches and officials (Czech Republic n=68; EHF Seminars n=169; Norway n=170) from 24 different countries participate in the survey. More than three quarters of the participating coaches and officials are male and barely one quarter female.

The evaluation of the questionnaires shows that nearly 75% of handball coaches regard injuries as a major issue. Main causes for injuries are poor physical preparation, lack of regeneration / rehabilitation and insufficient warm-up as well. According to the coaches' statements a better athletic preparation and prevention programs would lead to a reduction of injuries in handball. Essential part of current carried out prevention measures are stretching and strengthening, partly coordination and balance exercises. Additionally the equipment also plays an important role. Here, tapes and orthoses are considered as meaningful to avoid injuries. There is also a demand for further information about knee, ankle, shoulder as well as wrist and finger injuries. The willingness to accept preventive measures can be regarded problematically because every second respondent did not even answer that the players like the prevention measures very much.

Detailed results of each question can be taken from the table below. Fields highlighted in grey are the most given answers.

Tab. 2. Overview of survey results in handball

	Czech Republic		EHF Seminars		Norway	
Number of questionnaires		68	169		170	
Number of Countries		1	32		1	
Age (average)		--	42		36	
Gender	Male	81%	Male	85%	Male	62%
	Female	19%	Female	15%	Female	38%
Coaching Education	None	38%	None	2%	None	22%
	Low	--	Low	22%	Low	50%
	Medium	24%	Medium	2%	Medium	17%
	High	38%	High	7%	High	11%
Awareness (Injuries as a problem?)	Not important	--	Not important	--	Not important	3%
	Less important	--	Less important	11%	Less important	5%
	Medium	7%	Medium	9%	Medium	41%
	Important	36%	Important	55%	Important	43%
	Very Important	57%	Very Important	25%	Very Important	8%
Causes	Fouls / unfair play	49%	Fouls / unfair play	47%	Fouls / unfair play	25%
	Collisions / body contact	--	Collisions / body contact	44%	Collisions / body contact	39%
	Too many matches	4%	Too many matches	47%	Too many matches	27%
	Lack of regeneration	54%	Lack of regeneration	55%	Lack of regeneration	43%
	Insufficient warm-up	82%	Insufficient warm-up	46%	Insufficient warm-up	63%
	Bad luck	28%	Bad luck	21%	Bad luck	36%
	Poor physical condition	62%	Poor physical condition	74%	Poor physical condition	70%
Reduction	Better athletic preparation	71%	Better athletic preparation	82%	Better athletic preparation	81%
	Longer regeneration	72%	Longer regeneration	43%	Longer regeneration	41%
	Less matches	--	Less matches	9%	Less matches	15%
	Modification of rules	9%	Modification of rules	12%	Modification of rules	2%
	Equipment	54%	Equipment	9%	Equipment	15%
	Prevention program	59%	Prevention program	20%	Prevention program	85%
Prevention	Strengthening	44%	Strengthening	55%	Strengthening	80%

(training measures)	Stretching	88%	Stretching	80%	Stretching	64%
	Physiotherapy	--	Physiotherapy	46%	Physiotherapy	12%
	Warming-up	97%	Warming-up	75%	Warming-up	85%
	Balance exercises	25%	Balance exercises	64%	Balance exercises	68%
	Athletic Drills	40%	Athletic Drills	66%	Athletic Drills	18%
	Coordination exercises	51%	Coordination exercises	57%	Coordination exercises	63%
Popularity	Not at all	1%	Not at all	1%	Not at all	1%
	Low	19%	Low	19%	Low	7%
	Medium	57%	Medium	27%	Medium	37%
	High	16%	High	39%	High	47%
	Very high	6%	Very high	14%	Very high	9%
Additional prevention measures	Physiotherapy	23%	Physiotherapy	59%	Physiotherapy	28%
	Orthoses	60%	Orthoses	11%	Orthoses	35%
	Mouthguards	--	Mouthguards	10%	Mouthguards	4%
	Protectors	--	Protectors	47%	Protectors	41%
	Tape	85%	Tape	64%	Tape	80%
	Supplementation	17%	Supplementation	22%	Supplementation	9%
	Massage	23%	Massage	43%	Massage	10%

2.3 Consensus Building on Best Prevention Measures and Implementation Strategies

Following the first two methodical steps, in fact the compilation of the current state-of-the-art knowledge in injury prevention and the questionnaire-based survey of coaches' perception and awareness of injuries as well as demands for application and acceptance of existing countermeasures, it is necessary to proceed with a critical evaluation of the achieved findings. The advanced methodical steps that are described here mainly focus on consensus building processes to finally pick out the most valuable information and most promising implementation strategies.

The consensus building process is therefore mainly separated into two concerted actions:

1. Evaluation of identified prevention measures in basketball and handball respectively
2. Advanced expert consultation meetings reflecting the results of the evaluation in the light of the envisaged implementation and in particular with regard to the specific demands and capacities of the target group

2.3.1 Evaluation of Identified Knowledge on Sports Injury Prevention

Typically, the evaluation of scientific knowledge is done by means of reviews and meta-analyses, which follow strict methodical guidelines to aggregate and evaluate the relevant information. This is, on the one hand, quite advantageous as in the end there is a clear evidence statement towards the effectivity of the analysed measure or intervention i.e. effectivity of prevention measures in reducing the frequency or severity of injuries. On the other hand the fact that an intervention works fine in a clinical setting does not consequently allow the conclusion that it is perfectly suited for the demands of the real world i.e. basketball and handball communities. Indeed, a lot of scientifically proven prevention interventions are hardly applicable and thus lack in acceptance and compliance within the target groups (e.g. Steffen et al., 2008).

Additionally, the sports sector appears different from other areas of public health with regard to the availability and nature of preventive contents. Preventive measures and safety recommendations are predominantly published in the so called "grey literature" or in the internet. Scientific publications are only a quite small share. Beyond that, there is a lot of sport-specific expert knowledge that is not officially published at all. The scientific evidence level of "grey literature" and – roughly speaking – "Expert Opinions" is in general too low for the realisation of meta-analyses or scientific reviews, even though the promoted information is commonly based on scientific findings or results from long-term experience of (sport-specific) experts. Nevertheless, this information should not be neglected, as – despite lower evidence levels – these recommendations eventually have a high relevance for practicable prevention work in sports communities. Beside these restrictions, the compiled findings are laid down in various media e.g. scientific articles, sports publications, websites, DVDs etc.

The heterogeneity in scientific evidence, publication forms, level of sport-specific background etc. precludes performing a meta-analysis or a systematic review. For this reason a consensus based process with the help of experts from various fields of sports injury prevention was chosen as methodical approach for the evaluation of the identified prevention measures.

The following methodical steps were taken:

1. Preparation of structured summaries of the original sources
2. Subdivision of the original sources into fields of prevention
3. Classification of the original sources into levels of validation
4. Definition of evaluation criteria
5. Development of a web-based evaluation tool
6. Nomination of an expert panel for the online evaluation

2.3.1.1 Descriptive summaries (Contents & preventive recommendation)

Due to copyright protection it was not possible to provide complete original and full-text references. Additionally, the evaluation effort for each expert would have been inappropriately high when providing the original documents. Combined with the intention to condense the gathered information it seemed practicable to produce comprehensive summaries of all findings, giving a clear description of the respective contents with special regard to the final preventive recommendation of each paper.

As structure for the descriptive summaries a one-paged template was chosen. If available in the original documents, optional pages for auxiliary graphics, photos, etc. of practice-related contents were attached. Fig. 2 shows the applied template.

Title		Author / Editor		
English Title		Year	Country	Doc. No
Source	Category	Validation		
	☐ Training & Physical Preparation	☐ Multiple scientific validation		
	☐ Technical & Political Approaches	☐ Single scientific validation		
Form / Dissemination	☐ Equipment & Facilities	☐ Science-based		
	☐ Medical & Non-medical Support	☐ Multiple expert recommendation		
	☐ Multifaceted Approaches	☐ Single expert recommendation		
Description				
Summary				
Preventive recommendation				

Fig. 2. Structured template for comprehensive summaries of findings

A short description of the relevant fields within the template may help:

Title:	Original title of the source
English title:	Original title in English
Author / Editor:	First author
Year:	Year of first publication
Country:	Country of origin
Doc. No:	Internal coding
Source:	Place of publication / finding
Form / Dissemination:	Subject-matter + presentation and promotion
Summary:	Brief summary of the context, contents, main findings and statements
Preventive recommendation:	Autonomous, comprehensive and conclusive statements of the source towards prevention in the specific sport
Category:	Main subject(s) of the final preventive recommendation:

- *Training & Physical Preparation* (e.g. proprioception, balance, agility, strength, flexibility)
- *Technical & Political Approaches* (e.g. Fair play campaigns, changes or modification of rules, refereeing and penalisation, psychological and behavioural aspects)
- *Equipment & Facilities* (e.g. orthoses, mouthguards, shoes, protectors, surface conditions, safety standards)
- *Medical & Non-medical Support* (e.g. PPE, medical screening, physiotherapy, return to play guidelines)
- *Multifaceted Approaches* (multisided recommendation referring to more than one of the above mentioned categories)

As mentioned above the compilation on prevention measures does not only exclusively focus on scientifically proven contents but also includes “grey literature” and expert recommendations, at least a short evidence statement is necessary to comprehend the complete background of the source. The validation levels that are depicted in the template substantially stick to evidence levels that have been defined by the CEBM (University of Oxford). Considering the above mentioned restrictions of the findings it was necessary to merge the high quality classification (level 1-3) to two comprehensive grades i.e. multiple scientific validation and single scientific validation. In return, the lower level of evidence has been differentiated more detailed.

Validation: Validity of the final preventive recommendation:

- *Multiple scientific validation* (e.g. review, meta-analysis)
- *Single scientific validation* (e.g. single RCT, intervention study)
- *Science-based* (with reference to scientific data, studies)
- *Multiple expert recommendation* (by more than one expert from the fields of coaching, [sport] science, medicine, etc.)
- *Single expert recommendation* (from the fields of coaching, [sport] science, medicine, etc.)

2.3.1.2 Evaluation Criteria & Online tool

As previously discussed, a large share of the identified sources does not meet the criteria of highest scientific evidence. Thus, it was not feasible to apply CEBM or Cochrane level graduation standards for the evaluation of the documents. Even if high evidence is on hand i.e. proved effectivity of a measure to reduce the frequency of injuries, the grade of applicability and acceptance are still not measureable.

It was therefore decided, that – for this specific evaluation process – the invited experts should grade the clearly depicted preventive recommendations of each source from their individual point of view and with regard to the following definitions of the evaluation criteria:

→ **potential EFFECTIVITY** in terms of reducing injuries (i.e. injuries become less frequent or less severe)
→ **potential APPLICABILITY** in terms of required effort for realisation (i.e. low time, financial, material and personnel expenditures)
→ **potential ACCEPTANCE** within the community (i.e. execution in compliance with athletes, coaches and associations e.g. adoption into curricula of trainer education; becoming well known integral part of training, becoming a mandatory rule)

To reduce the efforts of the participating experts a web-based evaluation tool was installed. After log-in on the bulletin board of the project website www.safetyinsports.eu the invited experts were able to start the evaluation of either basketball or handball prevention measures. The summaries were displayed in random order to reduce selection bias and to allow experts to stop and restart the evaluation at any time. A fivefold scale [*Excellent (5) –Good (4) –Moderate (3) –Poor (2) –Very Poor (1)]* was employed for all three criteria to allow a simple grading of each preventive recommendation. In addition, experts were encouraged to post auxiliary comments for each presented document.

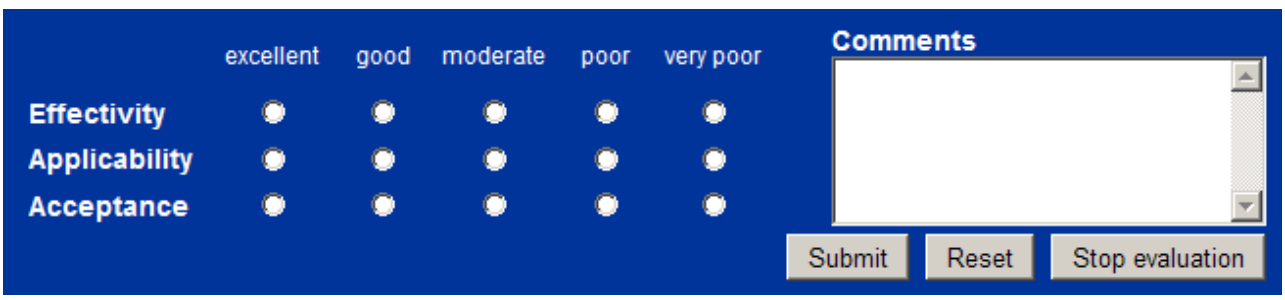


Fig. 3. Rating tool

2.3.1.3 Experts Involved

In general two groups of experts can be distinguished:

1. Generalists which are interested in sport injury prevention mostly from a scientific point of view.
2. Specialists which are mainly interested in sports specific injury prevention from a more practical point of view.

To get the most objective impression of this issue it is essential to involve both groups. Meeting these demands it was attempted to contact all authors and co-authors that had contributed to the respective compilation of prevention measures.

Furthermore, sport specific experts from the designated target implementation communities were also invited to join the expert panel e.g. trainers, trainer educators or officials from respective basketball and handball associations.

2.3.2 Results of Evaluation

The following chapter separately describes the results of the applied methodology in basketball and handball.

2.3.2.1 Basketball

Not all sources have just one single recommendation and therewith solely address just one of the four defined prevention fields (“Training & Physical Preparation”, “Technical & Political Approaches”, “Equipment & Facilities”, “Medical & Non-medical Support”). The compilation of identified prevention measures also contains “Multifaceted Approaches” that hold several recommendations. All in all the identified 70 sources include 108 recommendations that can be allocated to one of the four main prevention fields.

Table 3 gives an overview of the frequencies of recommendations in relation to the addressed prevention field and their validity.

Tab. 3. Distribution of preventive measures depending on category and validation level in basketball

	Training & Physical Preparation	Technical & Political Approaches	Equipment & Facilities	Medical & Non-medical Support	
Multiple scientific validation	15	2	9	0	**26 (24%)**
Single scientific validation	15	3	11	3	**32 (30%)**
Science-based	10	6	9	2	**27 (25%)**
Multiple expert recommendation	4	2	4	1	**11 (10%)**
Single expert recommendation	7	1	4	0	**12 (11%)**
	51 (47%)	**14 (13%)**	**37 (34%)**	**6 (6%)**	**108**

Nearly half of all recommendations address the field of “Training & Physical Preparation” (47%), followed by “Equipment & Facilities” (34%). Recommendations on “Technical & Political Approaches” (13%) and “Medical & Non-medical Support” (6%) are less common. It is striking that only 58 out of 108 recommendations (53%) meet the requirements of strong scientific demands. This trend is independent from the respective field of prevention.

Overall, 214 authors and co-authors have contributed to the inventory of prevention measures in basketball. 122 experts could be identified and were asked for participation in the evaluation process. Finally, 20 of them joined the expert panel leading to 984 evaluations (49.2 documents / expert).

Tab. 4. Participants in basketball evaluation

Basketball Evaluation	N
Authors, Co-Author contributed to the inventory	214
Author, Co-Authors and project collaborators have been asked for participation into the evaluation process	122
have agreed to participate in the evaluation process	67
have evaluated documents	20

With regard to all three criteria figure 4 shows a trend towards “Training & Physical Preparation” as most promising field of injury prevention scoring highest in effectivity, applicability, acceptance and consequently in total.
“Equipment & Facilities” is seen quite effective but misses good scores in acceptance. Recommendations from “Technical & Political Approaches” have the lowest effectivity, “Medical & Non-Medical Support” hold the lowest scores in applicability and acceptance,

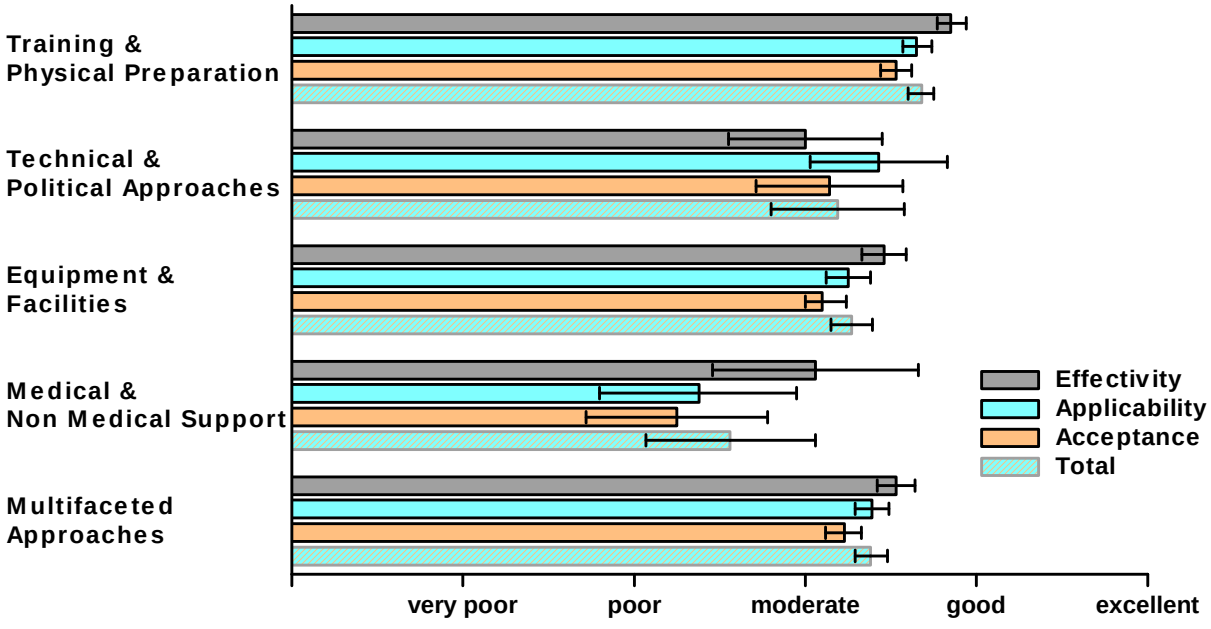


Fig. 4. Evaluation results of preventive measures depending on category in basketball

Tab. 5. Evaluation results of preventive measures depending on category in basketball

Total Points (Sum)

Category	Mean	N	SD
Training & Physical Preparation	11.0379	422	2.34819
Technical & Political Approaches	9.5714	28	2.98674
Equipment & Facilities	9.8109	201	2.51676
Medical & Non Medical Support	7.6875	16	2.79806
Multifaceted Approach	10.1483	317	2.53459
Total	10.4045	984	2.54662

The results of “Multifaceted Approaches” have to be interpreted carefully. Despite second highest scores in all three criteria and total, one can only assume which aspects are pivotal. In general, recommendations from the field of “Training & Physical Preparation” are inherent parts of “Multifaceted Approaches”, mostly combined with recommendations towards “Equipment & Facilities”. However, it stays unclear which parts of those complex recommendations are decisive for the final judgement of the experts.

Contrary to general expectations figure 5 and table 6 document only minor variations between validation levels irrespective from evaluation criteria. At first sight this result may appear less revealing but in earnest these narrow differences only mask the conclusion that the judging experts do not solely see preventive potentials in sources with highest validation level. Nevertheless, recommendations that somehow meet scientific requirements suggest to be most effective, applicable and acceptable.

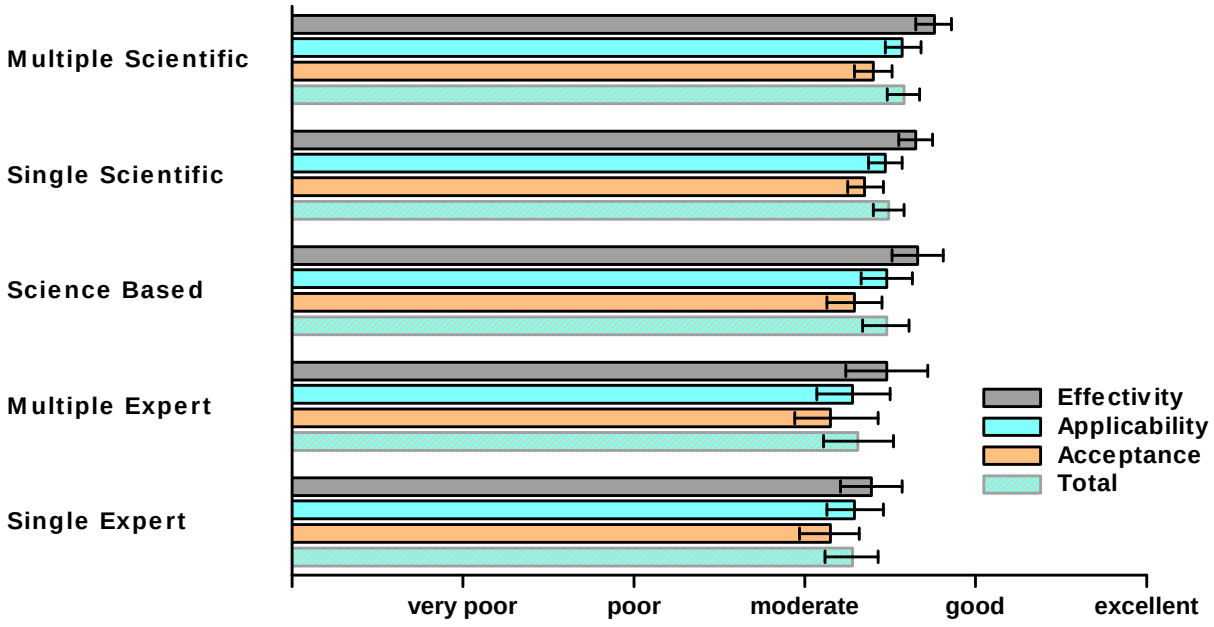


Fig. 5. Evaluation results of preventive measures depending on validation level in basketball

Tab. 6. Evaluation results of preventive measures depending on validation level in basketball

Total Points (Sum)

Category	Mean	N	SD
Multiple scientific validation	10.7296	270	2.34185
Single scientific validation	10.4741	348	2.53890
Science based	10.4305	151	2.52589
Multiple expert recommendation	9.9437	71	2.60158
Single expert recommendation	9.8264	144	2.82182
Total	10.4045	984	2,54662

The following pages present the individual evaluation results of each assessed document / prevention measure. The reported scores for effectivity, applicability, acceptance and total are mean values. The top five ranked documents for each criterion are marked in red.

Basketball Total (all sources)

#	Author	Year	Country	Title	Source	Validation	Effect	Applic	Accept	Total
1	Svensk Basketball Förbundet	2010	Sweden	Basketsmart	Svensk Basketballförbundet www.basket.se www.svenskbaskettelevision.se	Science-based	4.4	4.4	4.2	12.9
2	Svensk Basketballförbundet	2007	Sweden	knäkontroll förebygg skador - prestera bättre	Svensk Basketballförbundet www.basket.se	Science-based	4.2	4.2	4.1	12.6
3	Cumps	2007	Belgium	Efficacy of a sports specific balance training programme on the incidence of ankle sprains in basketball	Journal of Sports Science and Medicine (2007) 6. 212-219; http://www.jssm.org	Single Scientific	4.4	3.9	4.1	12.4
4	Olsen	2005	Norway	Exercises to prevent lower limb injuries in youth sports: cluster randomized controlled trial	British Medical Journal 2005;330;449 http://bmj.com	Single Scientific	4.6	3.9	3.7	12.2
5	Renstrom	2008	Sweden	Non-contact ACL injuries in female athletes: an International Olympic Committee current concepts statement	British Journal of Sports Medicine 2008; 42: 394–412; http://bjsm.bmj.com	Multiple Scientific	4.4	4.1	3.6	12.2
6	Lim	2009	Korea	Effects of Sports Injury Prevention Training on the Biomechanical Risk Factors of Anterior Cruciate Ligament Injury in High School Female Basketball Players	The American Journal of Sports Medicine 37. (9) 2009: 1728-1734; www.ajs.sagepub.com	Single Scientific	4.3	4.1	3.8	12.1
7	Hewett	2006	USA	Anterior Cruciate Ligament Injuries in Female Athletes - Part 2: A Meta-analysis of Neuromuscular Interventions Aimed at Injury Prevention	American Journal of Sports Medicine 2006 34: 490; http://ajs.sagepub.com	Multiple Scientific	4.2	4.0	3.8	12.1
8	Myrick	2007	USA	Injury Prevention and Performance Enhancement: A training program for basketball	Connecticut Medicine 71.(1) 2007: 5-8 https://www.csms.org	Single Scientific	3.9	3.9	4.0	11.8
9	Hewett	1999	USA	The Effect of Neuromuscular Training on the Incidence of Knee Injury in Female Athletes	American Journal of Sports Medicine 27. (6)1999: 699-706; www.ajs.sagepub.com	Single Scientific	4.1	3.7	3.9	11.6
10	Silvers	2007	USA	Prevention of anterior cruciate ligament injury in the female athlete	British Journal of Sports Medicine 2007; 41; i52-i59 http://bjsm.bmj.com	Multiple Scientific	4.3	3.7	3.5	11.5
11	Cuzzolin	2005	Italy	Injury Prevention: Drills on the Court	FIBA Assist Magazin. 15. 2005: 59-62 www.fiba.com	Single Expert	3.8	3.9	3.8	11.5
12	Dick	2007	USA	Descriptive Epidemiology of Collegiate Men's Basketball Injuries: National Collegiate Athletic Association Injury Surveillance System. 1988–1989 Through 2003–2004	Journal of Athletic Training 2007. 42(2): 194–201; www.journalofathletictraining.org	Science-based	3.8	3.8	3.8	11.4
13	Fröhlich	2008	Germany	Prävention von Sprunggelenksverletzungen	Deutsche Basketballärzte e.V. www.basketdocs.de	Science-based	4.0	3.8	3.5	11.3
14	McLeod	2008	USA	The Effectiveness of Balance Training Programs on Reducing the Incidence of Ankle Sprains in Adolescent Athletes	Journal of Sport Rehabilitation. 2008. 17. 316-323; www.humankinetics.com/JSR	Multiple Scientific	4.1	3.8	3.5	11.3
15	Henke	2008	Germany	Sports Injuries in Basketball – Epidemiology and Prevention Strategies	Poster presentation at 13th annual Congress of the ECSS "Sport Science by the Sea". 09.-12.07.2008. Estoril - Portugal	Multiple Expert	3.8	3.8	3.7	11.2
16	Ward	2005	Australia	Reducing the risks of re-injury	FIBA Assist Magazin (12) 2005: 62-63 www.fiba.com	Single Scientific	4.0	3.8	3.4	11.2
17	McGuine	2006	USA	The Effect of a Balance Training Program on the Risk of Ankle Sprains in High School Athletes	The American Journal of Sports Medicine. 34. 2006: 1103-1111; www.ajs.sagepub.com	Single Scientific	3.9	3.7	3.5	11.1

18	Leetun	2004	USA	Core Stability Measures as Risk Factors for Lower Extremity Injury in Athletes	Medicine & Science in Sports & Exercise 2004: 926-934 http://www.acsm-msse.org	Single Scientific	3.6	3.8	3.6	11.0
19	Eils	2006	Germany	Prävention von Sprunggelenksverletzungen beim Basketball	Sicherheit im Sport. Ein Leben mit Sport – aber sicher.. Köln 2006. 279-285	Single Scientific	3.8	3.7	3.4	10.9
20	Petersen	2005	Germany	Rupturen des vorderen Kreuzbandes bei weiblichen Athleten. Teil 1: Epidemiologie. Verletzungsmechanismen und Ursachen Teil 2: Präventionsstrategien und Präventionsprogramme	Deutsche Zeitschrift für Sportmedizin 56. 6 (2005): 150-164 http://www.zeitschrift-sportmedizin.de/	Multiple Scientific	3.8	3.7	3.4	10.9
21	Kreische	2007	Germany	Stabilisierung zur Verletzungsprävention am Sprunggelenk – eine Metaanalyse	University of Würzburg Department of Orthopaedy	Multiple Scientific	3.8	3.8	3.3	10.9
22	Petersen	2003	Germany	Prävention von Rupturen des vorderen Kreuzbandes im Ballsport: eine Literaturübersicht	Sportorthopädie / Sporttraumatologie 19. 105–109 (2003); http://www.sciencedirect.com/science/journal/0949328X	Multiple Scientific	3.7	3.7	3.5	10.9
23	Emery	2007	Canada	A Prevention Strategy to Reduce the Incidence of Injury in High School Basketball: A Cluster Randomized Controlled Trial	Clinical Journal of Sport Medicine 2007. 17:17–24; http://www.cjsportsmed.com	Single Scientific	4.0	3.5	3.2	10.7
24	Agel	2007	USA	Descriptive Epidemiology of Collegiate Women's Basketball Injuries: National Collegiate Athletic Association Injury Surveillance System. 1988–1989 Through 2003–2004	Journal of Athletic Training 42(2): 202-210 http://www.journalofathletictraining.org	Science-based	3.6	3.7	3.4	10.7
25	Abernethy	2007	Ireland	Strategies to prevent injury in adolescent sport: a systematic review	British Journal of Sports Medicine. 41. 627-638 www.bjsportmed.com	Multiple Scientific	3.6	3.6	3.4	10.6
26	Hepp	2004	Hungary	Prevention of anterior cruciate ligament injuries	Fiba Assisst Magazine. (11) 2004: 57-58 http://www.fiba.com/	Single Expert	3.7	3.4	3.5	10.6
27	Iversen	2009	USA	Pilot study of female high school basketball players' anterior cruciate ligament injury knowledge. attitudes. and practices	Scandinavian Journal of Medicine & Science in Sports. 2009.19(4): 595-602 http://www3.interscience.wiley.com/journal/118521374/home	Single Scientific	3.4	3.8	3.5	10.6
28	Deakin University	2002	Australia	Shooting for basketball injury prevention	Deakin University. Victoria. Autralia http://www.sport.vic.gov.au/web9/rwpgslib.nsf/GraphicFiles/Shooting_for_basketball_injury_prevention.pdf/$file/Shooting_for_basketball_injury_prevention.pdf	Science-based	3.8	3.5	3.3	10.6
29	Hrysomallis	2007	Australia	Relationship Between Balance Ability. Training and Sports Injury Risk	Sports Medicine 2007; 37 (6): 547-556 http://www.ingentaconnect.com/content/adis/smd	Multiple Scientific	3.7	3.3	3.6	10.6
30	Ardila	2007	Colombia	Evidencia del trabajo propioceptivo utilizado en la prevención de lesions deportivas	Universidad de Antioquia. Colombia: 2007. http://viref.udea.edu.co/contenido/pdf/062-evidencia.pdf	Science-based	3.8	3.4	3.4	10.6
31	Chapelle	2008	USA	Effect of a Neuromuscular Training Program on the Kinetics and Kinematics of Jumping Tasks	American Journal of Sports Medicine 2008. 36: 1081; http://ajs.sagepub.com/	Single Scientific	3.4	3.6	3.6	10.6
32	Aaltonen	2007	Finland	Prevention of Sports Injuries - Systematic Review of Randomized Controlled Trials	Archive of Internal Medicine 15 (167). 1585-1592; www.archinternmed.com	Multiple Scientific	3.6	3.5	3.5	10.5
33	Junsten	2008	Sweden	Vilka träningsmetoder förebygger skador i knä – och fotled inom idrott? – En litteraturstudie	Lulea University of Technology. Sweden http://epubl.ltu.se/1402-1773/2008/332/LTU-CUPP-08332-SE.pdf	Multiple Scientific	3.9	3.4	3.3	10.53
34	BCIRPU	2000	Canada	Basketball Injuries	The British Columbia Injury Research and Prevention Unit www.injuryresearch.bc.ca	Science-based	3.9	3.4	3.3	10.5

35	Curtis	2008	USA	The Role of Shoe Design in Ankle Sprain Rates Among Collegiate Basketball Players	Journal of Athletic Training 2008. 43(3): 230–233; www.journalofathletictraining.org	Single Scientific	3.6	3.5	3.4	10.5
36	McCormick	2005	USA	A Guide for Basketball Injury Prevention	http://www.associatedcontent.com	Single Expert	3.5	3.6	3.3	10.4
37	Callaghan	1997	Great Britain	Role of ankle taping and bracing in the athlete	British Journal of Sports Medicine 1997. 31: 102-108 http://bjsm.bmj.com/	Multiple Scientific	3.5	3.5	3.4	10.4
38	Gollhofer	2006	Germany	Bewegungskontrolle und Verletzungsprophylaxe	Deutsche Zeitschrift für Sportmedizin 57. 2006 (11/12): 266-270 www.zeitschrift-sportmedizin.de	Multiple Scientific	3.7	3.4	3.2	10.4
39	Stein		USA	Keeping Your Basketball Players on the Court	Coach like a pro http://www.coachlikeapro.com/injury-prevention.html	Single Expert	3.6	3.4	3.4	10.4
40	Allen	1993	USA	The effect of preventative drills on stability of the knee in female basketball players	SBS - Conference Proceedings Archive. 11th International Symposium on Biomechanics in Sports (1993) http://w4.ub.uni-konstanz.de/cpa/article/viewFile/1704/1606	Single Scientific	3.6	3.4	3.3	10.3
41	Blunschi	2005	Switzerland	Dänk a Glänk - Basketball-Manual für Trainerinnen und Trainer	Suva - Schweizerische Unfallversicherungsanstalt https://wwwsapp1.suva.ch/sap/public/bc/its/mimes/zwaswo/99/pdf/88137_d.pdf	Multiple Expert	3.4	3.5	3.5	10.3
42	Kofotolis	2007	Greece	Ankle Sprain Injuries: A 2-Year Prospective Cohort Study in Female Greek Professional Basketball Players	Journal of Athletic Training. 42(3) 2007: 388-394 http://www.nata.org/jat/readers/archives	Single Scientific	3.4	3.4	3.5	10.3
43	Scanlan	2001	Canada	Sports and Recreation Injury Prevention Strategies: Systematic Review and Best Practices	The British Columbia Injury Research and Prevention Unit http://www.injuryresearch.bc.ca	Multiple Scientific	3.5	3.3	3.4	10.3
44	Jenkins	2006	USA	Lower-Extremity Overuse Injury and Use of Foot Orthotic Devices in Women's Basketball	Journal of the American Podiatric Medical Association. 96 (5) 2006: 408-412 www.japmaonline.org/	Single Scientific	3.3	3.5	3.4	10.2
45	McKay	2001	Australia	Ankle injuries in basketball: injury rate and risk factors	British Journal of Sports Medicine 35. 2001: 103–108 http://bjsm.bmj.com	Single Scientific	3.4	3.5	3.3	10.1
46	Barret	1993	USA	High- versus low-top shoes for the prevention of ankle sprains in basketballplayers : A prospective randomized study	The American Journal of Sports Medicine 21. (4)1993: 582-585 www.ajs.sagepub.com	Single Scientific	3.4	3.4	3.4	10.1
47	Knobloch	2005	Germany	Basketballverletzungen im Schulsport	Deutsche Zeitschrift für Sportmedizin 56. (4) 2005: 96-99 www.zeitschrift-sportmedizin.de	Science-based	3.5	3.3	3.2	10.0
48	Siebert	2009	Germany	Basketball	Basketball. In: Engelhardt (ed.) Sportverletzungen (515-522). München: Urban & Fischer.	Multiple Scientific	3.6	3.2	3.1	9.9
49	Hatzimanouil	2007	Greece	Πρόληψη Κακώσεων στα Ομαδικά Αθλήματα Επαφής της Ποδοσφαίρισης. της Καλαθοσφαίρισης. της Υδατοσφαίρισης και της Χειροσφαίρισης	Inquiries in Sport & Physical Education Volume 5 (1). 143 – 155 http://www.hape.gr/emag/vol5_1/hape172.pdf	Multiple Scientific	3.4	3.4	3.1	9.9
50	Badel	2007	Croatia	Dental / orofacial trauma in contact sports and intraoral mouthguard programmes	Kinesiology 39 (2007) 1:97-105 http://hrcak.srce.hr/kineziologija	Science-based	3.7	3.3	2.8	9.8
51	Sarabon	2004	Slovenia	Meaning of proprioceptive training in professional basketball	University of Ljubljana. Faculty of Sports. Slovenia http://www.tone-si.com/clanki/sportEN.pdf	Single Scientific	3.3	3.3	3.2	9.8

52	bfu	2004	Switzerland	Unterrichtsblätter zur Sicherheitsförderung an Schulen - Ballspiele	bfu – Beratungsstelle für Unfallverhütung http://www.bfu.ch/PDFLib/255_76.pdf	Multiple Expert	3.2	3.3	3.2	9.7
53	Sitler	1994	USA	The Efficacy of a Semirigid Ankle Stabilizer to Reduce Acute Ankle Injuries in Basketball	The American Journal of Sports Medicine 22. (4)1994: 454-461 www.ajs.sagepub.com	Single Scientific	3.5	3.1	3.2	9.7
54	Edwards	2005	Switzerland	Prevention is better than cure	FIBA Assisst Magazine (13) 2005: 58-59 http://www.fiba.com/	Multiple Expert	3.7	3.1	2.9	9.6
55	Faverio	2003	Italy	La Propriocettività e la Pallacanestro	Associazione Preparatori Fisici Italiani Pallacanestro http://www.preparazioneatletica.it/prevenzione/prevenzione1	Single Expert	3.3	3.2	3.1	9.6
56	Labella	2002	USA	Effect of mouthguards on dental injuries and concussions in college basketball	Medicine & Science in Sports & Exercise 2002: 41-44 http://www.acsm-msse.org	Single Scientific	3.7	3.3	2.6	9.6
57	Amy	2004	Puerto Rico	Dental Injuries – Facial Injuries	FIBA Assisst Magazine http://www.fiba.com/asp_includes/download.asp?file_id=376 http://www.fiba.com/asp_includes/download.asp?file_id=411	Single Expert	3.5	3.2	2.8	9.5
58	Siebert	2001	Germany	Orthopädische Checkliste: Basketball	Sportorthopädie · Sporttraumatologie 17. 2001: 262–263 http://elsevier.isoftmedia.de/index.php?lan=ger&site=journalo&journal=1	Single Expert	3.3	3.2	3.0	9.5
59	Moiler	2006	Australia	The Role of Fibular Tape in the Prevention of Ankle Injury in Basketball: A Pilot Study	Journal of Orthopadic & Sports Physical Therapy 36. (9)2006: 661-668 www.jospt.org	Single Scientific	3.5	3.1	2.9	9.4
60	Parkkari	2001	Finland	Is it Possible to Prevent Sports Injuries? Review of Controlled Clinical Trials and Recommendations for Future Work	Sports Medicine 2001; 31 (14): 985-995 http://www.ingentaconnect.com/content/adis/smd	Multiple Scientific	3.1	3.1	3.1	9.4
61	Huguet	2003	France	Ocular Traumas in Basketball	Fiba Asisst Magazine. (1) 2003: 57-58 http://www.fiba.com/	Single Expert	3.2	3.1	3.	9.3
62	Graumann	2007	Germany	Sportverletzungen der unteren Extremität im Basketball in Abhängigkeit der Torsionssteifigkeit des Sportschuh	Sportorthopädie & Sporttraumatologie 23. 174–177 (2007) http://elsevier.isoftmedia.de/index.php?lan=ger&site=journalo&journal=1	Single Scientific	3.4	2.7	3.1	9.3
63	Knapik	2007	USA	Mouthguards in Sport Activities History. Physical Properties and Injury Prevention Effectiveness	Sports Medicine 2007; 37 (2): 117-144 http://www.ingentaconnect.com/content/adis/smd	Multiple Scientific	3.3	3.1	2.7	9.1
64	AAOS	2009	USA	Basketball Injury Prevention	American Academy of Orthopaedic Surgeons http://orthoinfo.aaos.org/topic.cfm?topic=A00177	Multiple Expert	3.4	2.8	2.8	8.9
65	Cretu	2005	Romania	Studiu privind aVantajele utilizarii stretchingului in prevenirea accidentelor la jucatorii de baschet	Revista Stiinta Sportului (4) 47. 2005 http://www.sportscience.ro/html/revista.html	Single Scientific	2.8	3.1	3.0	8.9
66	Benazzo	2008	Italy	La prevenzione della patologia di piede e caviglia nello sport	Medicina dello sport 61. (1) 2008: 1-9 http://www.minervamedica.it/en/journals/medicina-dello-sport/index.php	Single Expert	3.3	2.7	2.7	8.8
67	Lieger	2006	Switzerland	Orofacial/cerebral injuries and the use of mouthguards by professional athletes in Switzerland	Dental Traumatology 2006; 22: 1–6 http://www3.interscience.wiley.com/journal/118537215/home	Science-based	3.2	3.0	2.5	8.6
68	Hakizimana	2005	South Africa	Epidemiology and Management of Basketball related injuries in Rwanda	Department of Physiotherapy. Faculty of Community and Health Sciences. University of the Western Cape. South Africa http://etd.uwc.ac.za/usrfiles/modules/etd/docs/etd_init_6540_1175070434.pdf	Science-based	2.9	2.8	2.8	8.5

69	SUVA		Switzerland	Basketball: SuvaLiv-Fairness-Preis	Suva – Swiss accident insurer http://www.suva.ch/home/suvaliv/kampagnen/kampagne_daenk_glaenk/basketballfairness-preis.htm	Single Expert	2.6	3.1	2.8	8.5
70	Major	2005	USA	Role of MRI in Prevention of Metatarsal Stress Fractures in Collegiate Basketball Players	American Journal of Roentgenology 186. 2006: 255-258 http://www.ajronline.org	Single Scientific	3.1	2.4	2.3	7.7

Training & Physical Preparation

#	Author	Year	Country	Title	Source	Validation	Effect	Apllic	Accept	Total
1	Svensk Basketball Förbundet	2010	Sweden	Basketsmart	Svensk Basketballförbundet www.basket.se www.svenskbaskettelevision.se	Science-based	4.4	4.4	4.2	12.9
2	Svensk Basketballförbundet	2007	Sweden	knäkontroll förebygg skador - prestera bättre	Svensk Basketballförbundet www.basket.se	Science-based	4.2	4.2	4.1	12.6
3	Cumps	2007	Belgium	Efficacy of a sports specific balance training programme on the incidence of ankle sprains in basketball	Journal of Sports Science and Medicine (2007) 6. 212-219 http://www.jssm.org	Single Scientific	4.4	3.9	4.1	12.4
4	Olsen	2005	Norway	Exercises to prevent lower limb injuries in youth sports: cluster randomised controlled trial	British Medical Journal 2005;330;449 http://bmj.com	Single Scientific	4.6	3.9	3.7	12.2
5	Renstrom	2008	Sweden	Non-contact ACL injuries in female athletes: an International Olympic Committee current concepts statement	British Journal of Sports Medicine 2008; 42: 394–412 http://bjsm.bmj.com	Multiple Scientific	4.4	4.1	3.6	12.2
6	Hewett	2006	USA	Anterior Cruciate Ligament Injuries in Female Athletes - Part 2: A Meta-analysis of Neuromuscular Interventions Aimed at Injury Prevention	American Journal of Sports Medicine 2006 34: 490 http://ajs.sagepub.com	Multiple Scientific	4.2	4.0	3.8	12.1
7	Lim	2009	Korea	Effects of Sports Injury Prevention Training on the Biomechanical Risk Factors of Anterior Cruciate Ligament Injury in High School Female Basketball Players	The American Journal of Sports Medicine 37. (9) 2009: 1728-1734 www.ajs.sagepub.com	Single Scientific	4.3	4.1	3.8	12.1
8	Myrick	2007	USA	Injury Prevention and Performance Enhancement: A training program for basketball	Connecticut Medicine 71.(1) 2007: 5-8 https://www.csms.org	Single Scientific	3.9	3.9	4.0	11.8
9	Hewett	1999	USA	The Effect of Neuromuscular Training on the Incidence of Knee Injury in Female Athletes	American Journal of Sports Medicine 27. (6)1999: 699-706 www.ajs.sagepub.com	Single Scientific	4.1	3.7	3.9	11.6
10	Cuzzolin	2005	Italy	Injury Prevention: Drills on the Court	FIBA Assist Magazin. 15. 2005: 59-62 www.fiba.com	Single Expert	3.8	3.9	3.8	11.5
11	Silvers	2007	USA	Prevention of anterior cruciate ligament injury in the female athlete	British Journal of Sports Medicine 2007; 41; i52-i59 http://bjsm.bmj.com Form	Multiple Scientific	4.3	3.7	3.5	11.5
12	McLeod	2008	USA	The Effectiveness of Balance Training Programs on Reducing the Incidence of Ankle Sprains in Adolescent Athletes	Journal of Sport Rehabilitation. 2008. 17. 316-323 www.humankinetics.com/JSR	Multiple Scientific	4.1	3.8	3.5	11.3
13	Henke	2008	Germany	Sports Injuries in Basketball – Epidemiology and Prevention Strategies	Poster presentation at 13th annual Congress of the ECSS "Sport Science by the Sea". 09.-12.07.2008. Estoril - Portugal	Multiple Expert	3.8	3.8	3.7	11.2
14	McGuine	2006	USA	The Effect of a Balance Training Program on the Risk of Ankle Sprains in High School Athletes	The American Journal of Sports Medicine. 34. 2006: 1103-1111 www.ajs.sagepub.com	Single Scientific	3.9	3.7	3.5	11.1
15	Leetun	2004	USA	Core Stability Measures as Risk Factors for Lower Extremity Injury in Athletes	Medicine & Science in Sports & Exercise 2004: 926-934 http://www.acsm-msse.org	Single Scientific	3.6	3.8	3.6	11.0

16	Petersen	2003	Germany	Prävention von Rupturen des vorderen Kreuzbandes im Ballsport: eine Literaturübersicht	Sportorthopädie / Sporttraumatologie 19. 105–109 (2003) http://www.sciencedirect.com/science/journal/0949328X	Multiple Scientific	3.7	3.7	3.5	10.9
17	Petersen	2005	Germany	Rupturen des vorderen Kreuzbandes bei weiblichen Athleten. Teil 1: Epidemiologie. Verletzungsmechanismen und Ursachen Teil 2: Präventionsstrategien und Präventionsprogramme	Deutsche Zeitschrift für Sportmedizin 56. 6 (2005): 150-164 http://www.zeitschrift-sportmedizin.de/	Multiple Scientific	3.8	3.7	3.4	10.9
18	Emery	2007	Canada	A Prevention Strategy to Reduce the Incidence of Injury in High School Basketball: A Cluster Randomized Controlled Trial	Clinical Journal of Sport Medicine 2007. 17:17–24 http://www.cjsportsmed.com	Single Scientific	4.0	3.5	3.2	10.7
19	Ardila	2007	Colombia	Evidencia del trabajo propioceptivo utilizado en la prevención de lesiones deportivas	Universidad de Antioquia. Colombia: 2007. http://viref.udea.edu.co/contenido/pdf/062-evidencia.pdf	Science-based	3.8	3.4	3.4	10.6
20	Chapelle	2008	USA	Effect of a Neuromuscular Training Program on the Kinetics and Kinematics of Jumping Tasks	American Journal of Sports Medicine 2008. 36: 1081 http://ajs.sagepub.com/	Single Scientific	3.4	3.6	3.6	10.6
21	Hepp	2004	Hungary	Prevention of anterior cruciate ligament injuries	Fiba Assisst Magazine. (11) 2004: 57-58 http://www.fiba.com/	Single Expert	3.7	3.4	3.5	10.6
22	Hrysomallis	2007	Australia	Relationship Between Balance Ability. Training and Sports Injury Risk	Sports Medicine 2007; 37 (6): 547-556 http://www.ingentaconnect.com/content/adis/smd	Multiple Scientific	3.7	3.3	3.6	10.6
23	Junsten	2008	Sweden	Vilka träningsmetoder förebygger skador i knä – och fotled inom idrott? – En litteraturstudie	Lulea University of Technology. Sweden http://epubl.ltu.se/1402-1773/2008/332/LTU-CUPP-08332-SE.pdf	Multiple Scientific	3.9	3.4	3.3	10.5
24	Gollhofer	2006	Germany	Bewegungskontrolle und Verletzungsprophylaxe	Deutsche Zeitschrift für Sportmedizin 57. 2006 (11/12): 266-270 www.zeitschrift-sportmedizin.de	Multiple Scientific	3.7	3.4	3.2	10.4
25	McCormick	2005	USA	A Guide for Basketball Injury Prevention	http://www.associatedcontent.com	Single Expert	3.5	3.6	3.3	10.4
26	Allen	1993	USA	The effect of preventative drills on stability of the knee in female basketball players	SBS - Conference Proceedings Archive. 11th International Symposium on Biomechanics in Sports (1993) http://w4.ub.uni-konstanz.de/cpa/article/viewFile/1704/1606	Single Scientific	3.6	3.4	3.3	10.3
27	Sarabon	2004	Slovenia	Meaning of proprioceptive training in professional basketball	University of Ljubljana. Faculty of Sports. Slovenia http://www.tone-si.com/clanki/sportEN.pdf	Single Scientific	3.3	3.3	3.2	9.8
28	Faverio	2003	Italy	La Propriocettività e la Pallacanestro	Associazione Preparatori Fisici Italiani Pallacanestro http://www.preparazioneatletica.it/prevenzione/prevenzione1	Single Expert	3.3	3.2	3.1	9.6
29	Cretu	2005	Romania	Studiu privind aVantajele utilizarii stretchingului in prevenirea accidentelor la jucatorii de baschet	Revista Stiinta Sportului (4) 47. 2005 http://www.sportscience.ro/html/revista.html	Single Scientific	2.8	3.1	3.0	8.9
30	Benazzo	2008	Italy	La prevenzione della patologia di piede e caviglia nello sport	Medicina dello sport 61. (1) 2008: 1-9 http://www.minervamedica.it/en/journals/medicina-dello-sport/index.php	Single Expert	3.3	2.7	2.7	8.8

Technical & Political Strategies

#	Author	Year	Country	Title	Source	Validation	Effect	Apllic	Accept	Total
1	Iversen	2009	USA	Pilot study of female high school basketball players' anterior cruciate ligament injury knowledge. attitudes. and practices	Scandinavian Journal of Medicine & Science in Sports. 2009.19(4): 595-602 http://www3.interscience.wiley.com/journal/118521374/home	Single Scientific	3.4	3.8	3.5	10.6
2	SUVA		Switzerland	Basketball: SuvaLiv-Fairness-Preis	Suva – Swiss accident insurer http://www.suva.ch/home/suvaliv/kampagnen/kampagne_daenk_glaenk/basketballfairness-preis.htm	Single Expert	2.6	3.1	2.8	8.5

Equipment & Facilities

#	Author	Year	Country	Title	Source	Validation	Effect	Apllic	Accept	Total
1	Curtis	2008	USA	The Role of Shoe Design in Ankle Sprain Rates Among Collegiate Basketball Players	Journal of Athletic Training 2008. 43(3): 230–233 www.journalofathletictraining.org	Single Scientific	3.6	3.5	3.4	10.5
2	Callaghan	1997	Great Britain	Role of ankle taping and bracing in the athlete	British Journal of Sports Medicine 1997. 31: 102-108 http://bjsm.bmj.com/	Multiple Scientific	3.5	3.5	3.4	10.4
3	Kofotolis	2007	Greece	Ankle Sprain Injuries: A 2-Year Prospective Cohort Study in Female Greek Professional Basketball Players	Journal of Athletic Training. 42(3) 2007: 388-394 http://www.nata.org/jat/readers/archives	Single Scientific	3.4	3.4	3.5	10.3
4	Scanlan	2001	Canada	Sports and Recreation Injury Prevention Strategies: Systematic Review and Best Practices	The British Columbia Injury Research and Prevention Unit http://www.injuryresearch.bc.ca	Multiple Scientific	3.5	3.3	3.4	10.3
5	Jenkins	2006	USA	Lower-Extremity Overuse Injury and Use of Foot Orthotic Devices in Women's Basketball	Journal of the American Podiatric Medical Association. 96 (5) 2006: 408-412 www.japmaonline.org/	Single Scientific	3.3	3.5	3.4	10.2
6	Barret	1993	USA	High- versus low-top shoes for the prevention of ankle sprains in basketball players : A prospective randomized study	The American Journal of Sports Medicine 21. (4)1993: 582-585 www.ajs.sagepub.com	Single Scientific	3.4	3.4	3.4	10.1
7	Badel	2007	Croatia	Dental / orofacial trauma in contact sports and intraoral mouthguard programmes	Kinesiology 39 (2007) 1:97-105 http://hrcak.srce.hr/kineziologija	Science-based	3.7	3.3	2.8	9.8
8	Sitler	1994	USA	The Efficacy of a Semirigid Ankle Stabilizer to Reduce Acute Ankle Injuries in Basketball	The American Journal of Sports Medicine 22. (4)1994: 454-461 www.ajs.sagepub.com	Single Scientific	3.5	3.1	3.2	9.7
9	Edwards	2005	Switzerland	Prevention is better than cure	FIBA Assisst Magazine (13) 2005: 58-59 http://www.fiba.com/	Multiple Expert	3.7	3.1	2.9	9.6
10	Labella	2002	USA	Effect of mouthguards on dental injuries and concussions in college basketball	Medicine & Science in Sports & Exercise 2002: 41-44 http://www.acsm-msse.org	Single Scientific	3.7	3.3	2.6	9.6
11	Amy	2004	Puerto Rico	Dental Injuries – Facial Injuries	FIBA Assisst Magazine http://www.fiba.com/asp_includes/download.asp?file_id=376 http://www.fiba.com/asp_includes/download.asp?file_id=411	Single Expert	3.5	3.2	2.8	9.5
12	Graumann	2007	Germany	Sportverletzungen der unteren Extremität im Basketball in Abhängigkeit der	Sportorthopädie & Sporttraumatologie 23. 174–177 (2007) http://elsevier.isoftmedia.de/index.php?lan=ger&site=journal	Single Scientific	3.4	2.7	3.1	9.3

				Torsionssteifigkeit des Sportschuh	o&journal=1					
13	Huguet	2003	France	Ocular Traumas in Basketball	Fiba Asisst Magazine. (1) 2003: 57-58 http://www.fiba.com/	Single Expert	3.2	3.1	3.	9.3
14	Knapik	2007	USA	Mouthguards in Sport Activities History. Physical Properties and Injury Prevention Effectiveness	Sports Medicine 2007; 37 (2): 117-144 http://www.ingentaconnect.com/content/adis/smd	Multiple Scientific	3.3	3.1	2.7	9.1

Medical & Non-medical Support

#	Author	Year	Country	Title	Source	Validation	Effect	Applic	Accept	Total
1	Major	2005	USA	Role of MRI in Prevention of Metatarsal Stress Fractures in Collegiate Basketball Players	American Journal of Roentgenology 186. 2006: 255-258 http://www.ajronline.org	Single Scientific	3.1	2.4	2.3	7.7

Multifaceted Approach

#	Author	Year	Country	Title	Source	Validation	Effect	Applic	Accept	Total
1	Dick	2007	USA	Descriptive Epidemiology of Collegiate Men's Basketball Injuries: National Collegiate Athletic Association Injury Surveillance System. 1988–1989 Through 2003–2004	Journal of Athletic Training 2007. 42(2): 194–201 www.journalofathletictraining.org	Science-based	3.8	3.8	3.8	11.4
2	Fröhlich	2008	Germany	Prävention von Sprunggelenksverletzungen	Deutsche Basketballärzte e.V. www.basketdocs.de	Science-based	4.0	3.8	3.5	11.3
3	Ward	2005	Australia	Reducing the risks of re-injury	FIBA Assist Magazin (12) 2005: 62-63 www.fiba.com	Single Scientific	4.0	3.8	3.4	11.2
4	Eils	2006	Germany	Prävention von Sprunggelenksverletzungen beim Basketball	Sicherheit im Sport. Ein Leben mit Sport – aber sicher.. Köln 2006. 279-285	Single Scientific	3.8	3.7	3.4	10.9
5	Kreische	2007	Germany	Stabilisierung zur Verletzungsprävention am Sprunggelenk – eine Metaanalyse	University of Würzburg Department of Orthopaedy	Multiple Scientific	3.8	3.8	3.3	10.9
6	Agel	2007	USA	Descriptive Epidemiology of Collegiate Women's Basketball Injuries: National Collegiate Athletic Association Injury Surveillance System. 1988–1989 Through 2003–2004	Journal of Athletic Training 42(2): 202-210 http://www.journalofathletictraining.org	Science-based	3.6	3.7	3.4	10.7
7	Abernethy	2007	Ireland	Strategies to prevent injury in adolescent sport: a systematic review	British Journal of Sports Medicine. 41. 627-638 www.bjsportmed.com	Multiple Scientific	3.6	3.6	3.4	10.6
8	Deakin University	2002	Australia	Shooting for basketball injury prevention	Deakin University. Victoria. Autralia http://www.sport.vic.gov.au/web9/rwpgslib.nsf/GraphicFiles/Shooting_for_basketball_injury_prevention.pdf/$file/Shooting_for_basketball_injury_prevention.pdf	Science-based	3.8	3.5	3.3	10.6

9	Aaltonen	2007	Finland	Prevention of Sports Injuries - Systematic Review of Randomized Controlled Trials	Archive of Internal Medicine 15 (167). 1585-1592 www.archinternmed.com	Multiple Scientific	3.6	3.5	3.5	10.5
10	BCIRPU	2000	Canada	Basketball Injuries	The British Columbia Injury Research and Prevention Unit www.injuryresearch.bc.ca	Science-based	3.9	3.4	3.3	10.5
11	Stein		USA	Keeping Your Basketball Players on the Court	Coach like a pro http://www.coachlikeapro.com/injury-prevention.html	Single Expert	3.6	3.4	3.4	10.4
12	Blunschi	2005	Switzerland	Dänk a Glänk - Basketball-Manual für Trainerinnen und Trainer	Suva - Schweizerische Unfallversicherungsanstalt https://wwwsapp1.suva.ch/sap/public/bc/its/mimes/zwaswo/99/pdf/88137_d.pdf	Multiple Expert	3.4	3.5	3.5	10.3
13	McKay	2001	Australia	Ankle injuries in basketball: injury rate and risk factors	British Journal of Sports Medicine 35. 2001: 103–108 http://bjsm.bmj.com	Single Scientific	3.4	3.5	3.3	10.1
14	Knobloch	2005	Germany	Basketballverletzungen im Schulsport	Deutsche Zeitschrift für Sportmedizin 56. (4) 2005: 96-99 www.zeitschrift-sportmedizin.de	Science-based	3.5	3.3	3.2	10.0
15	Hatzimanouil	2007	Greece	Πρόληψη Κακώσεων στα Ομαδικά Αθλήματα Επαφής της Ποδοσφαίρισης. της Καλαθοσφαίρισης. της Υδατοσφαίρισης και της Χειροσφαίρισης	Inquiries in Sport & Physical Education Volume 5 (1). 143 – 155 http://www.hape.gr/emag/vol5_1/hape172.pdf	Multiple Scientific	3.4	3.4	3.1	9.9
16	Siebert	2009	Germany	Basketball	Basketball. In: Engelhardt (ed.) Sportverletzungen (515-522). München: Urban & Fischer.	Multiple Scientific	3.6	3.2	3.1	9.9
17	bfu	2004	Switzerland	Unterrichtsblätter zur Sicherheitsförderung an Schulen - Ballspiele	bfu – Beratungsstelle für Unfallverhütung http://www.bfu.ch/PDFLib/255_76.pdf	Multiple Expert	3.2	3.3	3.2	9.7
18	Siebert	2001	Germany	Orthopädische Checkliste: Basketball	Sportorthopädie · Sporttraumatologie 17. 2001: 262–263 http://elsevier.isoftmedia.de/index.php?lan=ger&site=journalo&journal=1	Single Expert	3.3	3.2	3.0	9.5
19	Moiler	2006	Australia	The Role of Fibular Tape in the Prevention of Ankle Injury in Basketball: A Pilot Study	Journal of Orthopadic & Sports Physical Therapy 36. (9)2006: 661-668 www.jospt.org	Single Scientific	3.5	3.1	2.9	9.4
20	Parkkari	2001	Finland	Is it Possible to Prevent Sports Injuries? Review of Controlled Clinical Trials and Recommendations for Future Work	Sports Medicine 2001; 31 (14): 985-995 http://www.ingentaconnect.com/content/adis/smd	Multiple Scientific	3.1	3.1	3.1	9.4
21	AAOS	2009	USA	Basketball Injury Prevention	American Academy of Orthopaedic Surgeons http://orthoinfo.aaos.org/topic.cfm?topic=A00177	Multiple Expert	3.4	2.8	2.8	8.9
22	Lieger	2006	Switzerland	Orofacial/cerebral injuries and the use of mouthguards by professional athletes in Switzerland	Dental Traumatology 2006; 22: 1–6 http://www3.interscience.wiley.com/journal/118537215/home	Science-based	3.2	3.0	2.5	8.6
23	Hakizimana	2005	South Africa	Epidemiology and Management of Basketball related injuries in Rwanda	Department of Physiotherapy. Faculty of Community and Health Sciences. University of the Western Cape. South Africa http://etd.uwc.ac.za/usrfiles/modules/etd/docs/etd_init_6540_1175070434.pdf	Science-based	2.9	2.8	2.8	8.5

The online evaluation process among 20 experts resulted in the following top 12 recommendations for injury prevention in basketball:

1. Training programme consisting of very basic exercises dealing with stabilisation of the core, balancing and coordination practices and proper jumping and landing technique. Exercises are intended to be integral parts of the warm-up routine (10-15 min). Progressive intensification of exercises according to age and performance level.
2. The use of balance training is recommended as a routine during basketball activities for the prevention of ankle sprains.
3. A structured warm-up programme containing agility, balance, strength and playing technique exercises, designed to improve awareness and knee and ankle control during landing and pivoting movements prevents knee and ankle injuries among youth athletes. It is suggested that programmes focusing on technique (cutting and landing movements) and balance training (on wobble boards, mats or similar equipments) should already be implemented in players aged 10-12 years. Furthermore, preventive training should also be routine in Training & Physical Preparation for adolescents.
4. Preventive Training & Physical Preparation should include strength and power exercises, neuromuscular training, plyometrics and agility exercises: They should be integrated into warm-up routine of the regular training. When properly executed they can serve to enhance performance and prevent injuries. Focus should be on performance of the hip-knee-foot line and ‘‘kissing knees’’ should be avoided. Sustainability and compliance (e.g. acceptance among athletes and coaches) are essential criteria for a successful programme. Ideally, these prevention programmes should be introduced as early as possible in the training period. In some sports this would be at the age of 6 -10 years.
5. A 20 minutes prevention programme including warm up, stretching, strengthening, plyometrics, agility drills and cool down can improve flexibility, strength and biomechanical properties that are associated with ACL injuries. Thus it may support in preventing ACL injuries.
6. Neuromuscular training may assist in the reduction of ACL injuries in females athletes if (a) plyometrics, balance, and strengthening exercises are incorporated into a comprehensive training protocol; (b) the training sessions are performed more than 1 time per week; (c) the duration of the training programme is a minimum of 6 weeks in length.
7. With regard to decreasing injury chances and enhancing performance both male and female athletes playing a predominantely jumping sport such as basketball can benefit from a supervised athletic conditioning programme that includes dynamic warm-up, agility/quickness drills, sport-specific plyometrics, functional weight training, core training and an appropriate cool down with static stretching.
8. It is recommended that young female athletes in sports that entail jumping, pivoting, and cutting, such as basketball should participate in an effective preseason jump training programme that includes progressive resistance weight training for the lower extremities.

9. A prophylactic neuromuscular and proprioceptive training programme may have direct benefit in decreasing the number of ACL injuries in female athletes when emphasizing proper landing technique. Landing softly on the forefoot and rolling back to the rear foot, engaging knee and hip flexion on landing and with lateral (cutting) manoeuvres, avoiding excessive genu valgum at the knee on landing and squatting, strengthening of the core, hamstrings, gluteus medialis and hip abductor, increasing dynamic balance ability and addressing proper deceleration techniques by the means of agility drills.
10. Individualised season-attending athletic conditioning with regard to basic basketball-specific movement patterns.
11. Ligament sprains and knee internal derangements may be at least partially preventable with interventions such as taping, bracing and neuromuscular training. Officials need to assess the increased tolerance for physical contact in men's basketball seen over the past two decades.
12. External ankle support (e.g. orthoses, tape, high- top shoes), in particular for the prevention of recurring injuries; stabilisation training; sensorimotor training (e.g. balancing, jumping, landing on one or two legs, with or without unstable devices, with or without ball and partner.)

2.3.2.2 Handball

The compilation of handball prevention measures has 75 documents holding all in all 109 preventive recommendations. Table 7 gives an overview of the frequencies of recommendations in relation to the addressed prevention field and their validity.

Tab. 7. Distribution of preventive measures depending on category and validation level in handball

	Training & Physical Preparation	Technical & Political Approaches	Equipment & Facilities	Medical & Non-medical Support	
Multiple scientific validation	16	2	5	1	**24 (22%)**
Single scientific validation	13	0	1	2	**16 (15%)**
Science-based	14	7	5	0	**26 (24%)**
Multiple expert recommendation	13	6	5	1	**25 (23%)**
Single expert recommendation	9	3	4	2	**18 (16%)**
	65 (60%)	**18 (17%)**	**20 (18%)**	**6 (5%)**	**109**

By far the largest share of recommendations aims at "Training & Physical Preparation" (60%). "Equipment & Facilities" (18%) as well as "Technical & Political Appoaches" (17%) play minor roles. Recommendations towards "Medical & Non-Medical support" are quite seldom. Indeed they only appear as part of less specific "Multifaceted approaches". Only 40 recommendations have a high scientific evidence level (37%). This applies in particular for "Technical & Political Approaches" (11%).

Overall, 158 authors and co-authors have contributed to the inventory of prevention measures in basketball. 72 experts could be identified and were asked for participation in the evaluation process. Finally, 11 of them joined the expert panel leading to 705 evaluations (64.1 documents / expert).

Tab. 8. Participants in handball evaluation

Handball Evaluation	N
Authors, Co-Author contributed to the inventory	**158**
Author, Co-Authors and project collaborators have been asked for participation into the evaluation process	**72**
have agreed to participate in the evaluation process	**28**
have evaluated documents	**11**

Considering all three evaluation criteria prevention measures that belong to “Training & Physical Preparation” come off best. Experts acknowledge good chances for successful injury prevention and rate highest in effectivity, applicability and acceptance. “Equipment & Facilities” shows a large discrepancy between promising effectivity and poor acceptance. Recommendations from the field of “Technical and Political Approaches” get poor to moderate ratings in all criteria. Once again, the results of “Multifaceted Approaches” have to be handled with care. Although their total scores are second best, one can hardly identify which exact part of an multifaceted recommendation is decisive for the good score. “Medical & Non-medical support” does not appear as single recommendation – only as part of complex recommendations. So there are no results regarding this prevention field.

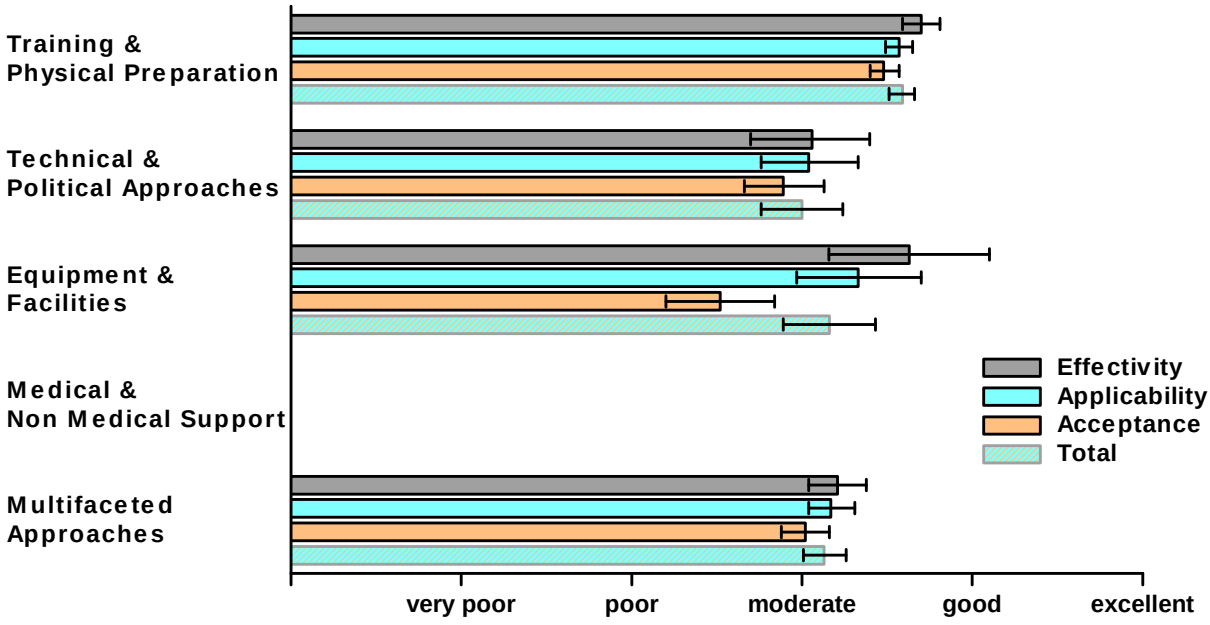


Fig. 6. Evaluation results of preventive measures depending on category in handball

Tab. 9. Evaluation results of preventive measures depending on category in handball

Total Points (Sum)

Category	Mean	N	SD
Training & Physical Preparation	10.7559	426	2.36773
Technical & Political Approaches	9.0000	46	2.38514
Equipment & Facilities	9.4815	27	2.04508
Medical & Non Medical Support	9.4029	206	2.75465
Multifaceted Approach	10.1972	705	2.56882
Total	10.7559	426	2.36773

High effectivity can be recognized for measures with multiple-, single scientific or at least science-based validation. However, science-based and multiple expert recommendations have best ratings in applicability and acceptance. Overall, experts see science-based programmes that are adapted to the specific demands of handball as most promising approaches which is reflected by the highest mean total scores (cf. fig.7 and tab.10). For all that, it appears obvious that single expert recommendations clearly lack in authority compared to the other groups.

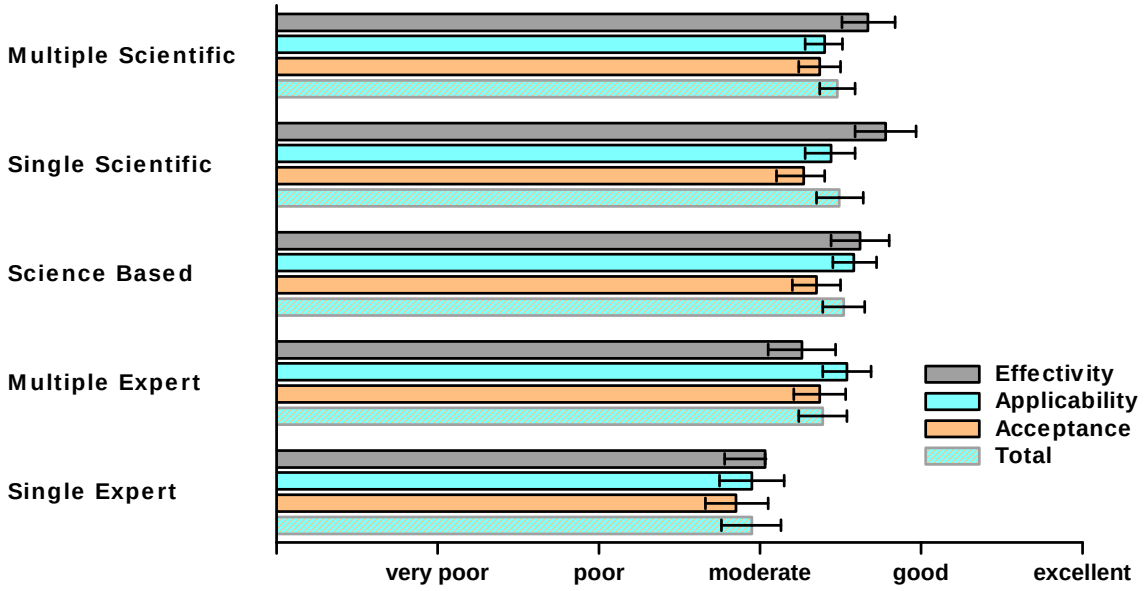


Fig. 7. Evaluation results of preventive measures depending on validation level in handball

Tab. 10. Evaluation results of preventive measures depending on validation level in handball

Total Points (Sum)

Category	Mean	N	SD
Multiple scientific validation	10.4438	169	2.19268
Single scientific validation	10.4809	131	2.51259
Science based	10.5618	178	2.58398
Multiple expert recommendation	10.1694	124	2.50762
Single expert recommendation	8.8350	103	2.84604
Total	10.1972	705	2.56882

The following pages present the individual evaluation results of each assessed document / prevention measure. The reported scores for effectivity, applicability, acceptance and total are mean values. The top five ranked documents for each criterion are marked in red.

Handball Total

	Author	Year	Country	Title	Source	Validation	Effect	Applic	Accept	Total
1	Olsen. O.E.	2003	Norway	bedre handball og uten skader	Scandinavian Journal of Medicine & Science in Sports 2003: 13: 299–304 http://www3.interscience.wiley.com/journal/118521374/home	Science-based	4.5	4.3	4.4	13.2
2	Olsen	2005	Norway	Exercises to prevent lower limb injuries in youth sports: cluster randomised controlled trial	British Medical Journal 2005;330;449 http://bmj.com/	Single Scientific	4.4	4.3	4.1	12.8
3	ARAG Allgemeine Versicherungs - AG	2003	Germany	Unfallverhütung im Handball – Teil 1: Maßnahmen zur Vermeidung von Knie- und Sprunggelenksverletzungen	ARAG Allgemeine Unfallversicherung. Duesseldorf: 2003 www.arag-sport.de	Science-based	4.1	4.2	4.2	12.6
4	Oslo Sports Trauma Research Centre	2007	Norway	Slik Unngår Du Skader i Håndball	Senter for idrettsskadeforskning. Norway www.skadefri.no	Science-based	4.3	4.2	4.0	12.6
5	Myklebust	2003	Norway	Prevention of Anterior Cruciate Ligament Injuries in Female Team Handball Players: A Prospective Intervention Study Over Three Seasons	Clinical Journal of Sport Medicine. 13: 71–78 http://www.cjsportsmed.com	Single Scientific	4.8	3.9	3.7	12.3
6	Svenska Handboll Forbundet	2007	Sweden	Knä och axelkontroll – Prestera bättre - Handbollsövningar	Svenska Handbollförbundet www.handboll.info	Science-based	3.9	4.3	4.0	12.2
7	Hewett	2006	USA	Cruciate Ligament Injuries in Female Athletes	American Journal of Sports Medicine 2006 34: 490 http://ajs.sagepub.com	Multiple Scientific	4.6	3.8	3.8	12.1
8	Renstrom	2008	Sweden	Non-contact ACL Injuries in Female Athletes: An International Olympic Committee Current Concepts Statement	British Journal of Sports Medicine 2008; 42: 394–412 http://bjsm.bmj.com/	Multiple Scientific	4.1	3.9	3.8	11.8
9	Henke	2005	Germany	Sportunfälle im Berufshandball – Epidemiologie und Prävention	Ruhr University Bochum. Germany	Science-based	4.0	3.9	3.8	11.7
10	Zebis	2008	Denmark	The Effects of Neuromuscular Training on Knee Joint Motor Control During Sidecutting in Female Elite Soccer and Handball Players	Clinical Journal of Sport Medicine 2008;18:329–337 http://www.cjsportsmed.com	Single Scientific	4.3	3.8	3.6	11.7
11	Dansk Håndbold Forbund	2006	Denmark	Knokl for dit knae	DHF Coaches Education framework www.dhf.dk	Multiple Expert	3.8	4.0	3.9	11.7
12	Rivilla. J.	2008	Spain	Programa Específico de Protección Total en Balonmano: PROTBAL	Polytechnic University of Madrid. Spain http://balonmanointeligente.blogspot.com/ http://www.youtube.com/watch?v=ZyBXXPJYeeQ	Science-based	4.2	3.9	3.6	11.7
13	Wedderkopp	2003	Denmark	Comparison of Two Intervention Programmes in Young Female Players in European Handball – with and without Ankle Disc	Scandinavian Journal of Medicine & Science in Sports 2003: 13: 371–375 http://www3.interscience.wiley.com/journal/118521374/home	Single Scientific	4.3	3.7	3.7	11.7
14	Olsen	2004	Norway	Injury Mechanisms for Anterior Cruciate Ligament Injuries in Team Handball: A Systematic Video Analysis	American Journal of Sports Medicine 2004; 32; 1002 http://ajs.sagepub.com/	Multiple Scientific	3.9	3.8	3.9	11.6
15	Wedderkopp	1999	Denmark	Prevention of Injuries in Young in European Team Handball. A Prospective Intervention Study Female Players	Scandinavian Journal of Medicine & Science in Sports 1999: 9: 41-47 http://www3.interscience.wiley.com/journal/118521374/home	Single Scientific	4.4	3.7	3.4	11.6
16	Aaltonen	2007	Finland	Prevention of Sports Injuries - Systematic Review of Randomized Controlled Trials	Archive of Internal Medicine 15 (167). 1585-1592 www.archinternmed.com	Multiple Scientific	4.0	3.6	3.8	11.4
17	Buchheit	2008	France	Préparation physique - Un programme simple et rapide pour la prévention des blessures en Handball: le 2 x 7 + 1	Approche(s) du handball 106. 2008: 10-33 http://www.martin-buchheit.net/Dossiers/M.%20Buchheit%20-%202%20x%207%20+1%20(App%20HB%20-%20106-08.2008)%205Mo.pdf	Science-based	3.7	4.0	3.7	11.4

18	ARAG Allgemeine Versicherungs - AG	2003	Germany	Unfallverhütung im Handball – Teil 2: Maßnahmen zur Vermeidung von Verletzungen und Schäden im Hand- und Schulterbereich	ARAG Allgemeine Unfallversicherung. Duesseldorf: 2003 www.arag-sport.de	Multiple Expert	3.5	3.8	3.8	11.1
19	Flack. M.	2007	Germany	Workshop „Prävention und Koordination	Handball-Verband Niedersachsen. Youth coaches' education workshophttp://www.hvn-online.com/hvn/Dokumentablage/Praev_Airex_07_04.pdf	Single Expert	3.7	3.7	3.8	11.1
20	Petersen	2004	Germany	A Controlled Prospective Case Control Study of a Prevention Training Program in Female Team Handball Players: the German Experience	Archives of Orthopaedic and Trauma Surgery (2005) 125: 614–621 http://www.springerlink.com/content/101491/?p=f2d9bf7816b14f7aa2c7e7fb321a5b28&pi=0	Single Scientific	4.0	3.6	3.5	11.1
21	Dansk Håndbold Forbund	2006	Denmark	Opvarmning og skadesforebyggende træning	DHF Coaches Education framework www.dhf.dk	Multiple Expert	3.8	3.8	3.4	11
22	Dansk Håndbold Forbund	2006	Denmark	Skudklar Skulder	DHF Coaches Education framework www.dhf.dk	Multiple Expert	3.5	3.8	3.6	11
23	Kolodziej. C	2009	Germany	Handballspezifisches Präventionsprogramm	Bavarian Handball Federation www.bhv-online.de	Multiple Expert	3.6	3.5	3.8	10.9
24	Petersen	2003	Germany	Prävention von Rupturen des vorderen Kreuzbandes im Ballsport: eine Literaturübersicht	Sportorthopädie / Sporttraumatologie 19. 105–109 (2003) http://www.sciencedirect.com/science/journal/0949328X	Multiple Scientific	3.6	3.7	3.5	10.8
25	Olsen	2003	Norway	Relationship between FloorType and Risk of ACL Injury in Team Handball	Scandinavian Journal of Medicine & Science in Sports 2003: 13: 299–304 http://www3.interscience.wiley.com/journal/118521374/home	Science-based	4.1	3.6	3.0	10.7
26	Silvers	2007	USA	Prevention of Anterior Cruciate Ligament Injury in the Female Athlete	British Journal of Sports Medicine 2007; 41; i52-i59 http://bjsm.bmj.com/	Multiple Scientific	3.8	3.6	3.3	10.7
27	Kvorning	2007	Denmark	Styrketraining	IDRÆTSSKADEBOGEN (2007) 137-158 http://sitecore.dif.rove.dk/asp/publikationer_pdf.asp?pdfid=741	Science-based	3.4	3.6	3.6	10.6
28	Muschol	2007	Germany	Verletzungsprophylaxe für Knie und Schultergelenke im Handball	Sportorthopädie / Sporttraumatologie 23 (2007): 11–18 http://www.sciencedirect.com/science/journal/0949328X	Science-based	4.0	2.9	3.7	10.6
29	Schnurrer-Luke	2007	Croatia	Balance Index Score as a Predictive Factor for Lower Sports Results or Anterior Cruciate Ligament Knee Injuries in Croatian Female Athletes – Preliminary Study	Collegium Antropologicum 31 (2007) 1: 253–258 http://www.collantropol.hr/	Single Scientific	3.7	3.6	3.2	10.4
30	Buholzer. O.	2003	Switzerland	Dänk a Glänk. Spielerisches Aufwärmen:Handball	Suva - Schweizerische Unfallversicherungsanstalt https://wwwsapp1.suva.ch/sap/public/bc/its/mimes/zwaswo/99/pdf/88199_d.pdf	Multiple expert recommendation	3.2	3.6	3.7	10.4
31	Junsten	2008	Sweden	Vilka träningsmetoder förebygger skador i knä – och fotled inom idrott?	Lulea University of Technology. Sweden http://epubl.ltu.se/1402-1773/2008/332/LTU-CUPP-08332-SE.pdf	Multiple Scientific	3.8	3.2	3.4	10.4
32	Holm	2004	Norway	Effect of Neuromuscular Training on Proprioception. Balance. Muscle Strength. and Lower Limb Function in Female Team Handball Players	Clinical Journal of Sport Medicine 2004;14:88–94 http://www.cjsportsmed.com	Single Scientific	3.5	3.4	3.5	10.4
33	Hrysomallis. C.	2007	Australia	Relationship between Balance Ability. Training and Sports Injury Risk	Sports Medicine 2007; 37 (6): 547-556 http://www.ingentaconnect.com/content/adis/smd	Multiple Scientific	3.7	3.3	3.4	10.4
34	Dansk Håndbold Forbund	2006	Denmark	Fysisk træning Ungdom	DHF Coaches Education frameworkwww.dhf.dk	Multiple Expert	3.3	3.7	3.3	10.3
35	Petersen	2005	Germany	Rupturen des vorderen Kreuzbandes bei weiblichen Athleten. Teil 1: Epidemiologie. Verletzungsmechanismen und Ursachen	Deutsche Zeitschrift für Sportmedizin 56. 6 (2005): 150-164 http://www.zeitschrift-sportmedizin.de/	Multiple Scientific	3.6	3.4	3.3	10.3
36	Yoo	2009	South Korea	A Meta-Analysis of the Effect of Neuromuscular Training on the Prevention of the Anterior Cruciate Ligament Injury in Female Athletes	Knee Surgery. Sports Traumatology. Arthroscopy DOI 10.1007/s00167-009-0901-2 http://www.springerlink.com/content/0942-2056 (online first)	Multiple Scientific	3. 7	3.4	3.2	10.3

37	Buholzer. O.	2000	Switzerland	Dänk a Glänk: Handball-Manual für Trainerinnen und Trainer	Suva - Schweizerische Unfallversicherungsanstalt https://wwwsapp1.suva.ch/sap/public/bc/its/mimes/zwaswo/99/pdf/88138_d.pdf	Multiple Expert	3.2	3.6	3.4	10.2
38	Hatzimanouil	2007	Greece	Prevention of Injuries in Contact Sports Such as Soccer. Basketball. Water Polo and Team Handball	Inquiries in Sport & Physical Education Volume 5 (1). 143 – 155 http://www.hape.gr/emag/vol5_1/hape172.pdf	Multiple Scientific	3.7	3.2	3.3	10.2
39	Kreische. G	2007	Germany	Stabilisierung zur Verletzungsprävention am Sprunggelenk – eine Metaanalyse	University of Würzburg. Germany	Multiple Scientific	3.4	3.4	3.2	10.1
40	Knobloch. K.	2007	Germany	Verletzungsprävention im Handball	Landes Sport Bund 2007 (8): 16 www.lsb-niedersachsen.de	Science-based	3.6	3.4	3.1	10.1
41	Pánics	2008	Hungary	Effect of Proprioception Training on Knee Joint Position Sense in Female Team Handball Players	British Journal of Sports Medicine 2008;42;472-476 http://bjsm.bmj.com/	Single Scientific	3.6	3.2	3.3	10.1
42	Pieper	2007	Germany	Sportverletzungen und Überlastungsschäden im Handballsport	Sportorthopädie / Sporttraumatologie 23. 4–10 (2007) http://www.sciencedirect.com/science/journal/0949328X	Single Expert	3.3	3.3	3.4	10.1
43	Holdhaus. H.	2008	Austria	Summary of the Injury Study Conducted at the EHF Men's Euro 2008 in Norway	Webpage of the European Handball Federation http://www.eurohandball.com/article/012169	Science-based	3.4	3.6	3.1	10.1
44	Oehlert	2004	Germany	Verletzungen im olympischen Handballturnier: eine Videoanalyse	Sportverletzung / Sportschaden 2004; 18: 80-84 http://www.thieme.de/fz/sport/index.html	Multiple Expert	3.0	3.6	3.4	10
45	Gollhofer	2006	Germany	Bewegungskontrolle und Verletzungsprophylaxe	Deutsche Zeitschrift für Sportmedizin 57. 2006 (11/12): 266-270 www.zeitschrift-sportmedizin.de	Multiple Scientific	3.4	3.3	3.2	10
46	Badel	2007	Switzerland	Dental / Orofacial Trauma in Contact Sports and Intraoral Mouthguard Programmes	Kinesiology 39 (2007) 1:97-105 http://hrcak.srce.hr/kineziologija	Science-based	3.8	3.7	2.4	9.9
47	Curdt. S.	2003	Germany	Verletzungen im Hallenhandball - Eine empirisch-vergleichende Untersuchung über die Verletzungs-häufigkeiten in unterschiedlichen Leistungsklassen bei Handballspielern in Nordhessen sowie über relevante Präventionsmaßnahmen	University of Kassel. Germany	Single Expert	3.3	3.3	3.2	9.8
48	Dansk Håndbold Forbund	2006	Denmark	Fysisk træning Senior	DHF Coaches Education framework www.dhf.dk	Multiple Expert	2.9	3.6	3.2	9.7
49	Langevoort	2007	Netherlands	Handball Injuries during Major International Tournaments	Scandinavian Journal of Medicine & Science in Sports 2007: 17: 400–407 http://www3.interscience.wiley.com/journal/118521374/home	Science-based	3.2	3.3	3.1	9.7
50	Platen	2007	Germany	Verletzungsproblematik im Frauensport unter besonderer Berücksichtigung des Frauenhandballs	Sportorthopädie / Sporttraumatologie 23. 19–26 (2007) http://www.sciencedirect.com/science/journal/0949328X	Multiple Scientific	3.3	3.2	3.1	9.6
51	Bencke	2000	Denmark	Motor Pattern of the Knee Joint Muscles during Side-Step Cutting in European Team Handball Influence on Muscular Co-ordination after an Intervention Study	Scandinavian Journal of Medicine & Science in Sports 2000. 10: 68–77http://www3.interscience.wiley.com/journal/118521374/home	Single Scientific	3.0	3.3	3.2	9.6
52	Fayolle. C.D.	1993	France	L'éducation proprioceptive collective	Approches du Handball. 1993. (18): 13-15	Single Expert	3.1	3.4	3.0	9.5
53	Mayer. S.	1999	Germany	Empirische Untersuchung zu Verletzungen bzw. muskulären Dysbalancen im leistungsorientierten Damenhandball und Erstellung eines präventiven Trainingsprogramms	University of Erlangen – Nürnberg. Germany	Single Expert	3.6	3.1	2.8	9.5
54	Luck	1996	Germany	Sportmedizinische Aspekte des Handballsports	Deutsche Zeitschrift für Sportmedizin 47. (9) 1996: 479-482	Single Expert	3.1	3.1	3.2	9.4

55	Knobloch	2005	Germany	Prävention von Schulsportverletzungen – Analyse von Ballsportarten bei 2234 Verletzungen	Sportverletzung und Sportschaden 2005 (19): 82-88 http://www.thieme.de/fz/sport/index.html	Science-based	3.0	3.3	3.1	9.4
56	Knapik	2007	USA	Mouthguards in Sport Activities History. Physical Properties and Injury Prevention Effectiveness	Sports Medicine 2007; 37 (2): 117-144 http://www.ingentaconnect.com/content/adis/smd	Multiple Scientific	3.7	3.1	2.7	9.4
57	bfu Beratungsstelle für Unfallverhütung	2004	Switzerland	Unterrichtsblätter zur Sicherheitsförderung an Schulen - Ballspiele	bfu – Beratungsstelle für Unfallverhütung http://www.bfu.ch/PDFLib/255_76.pdf	Multiple Expert	3.0	3.6	2.8	9.3
58	Zebis	2009	Denmark	Identification of Athletes at Future Risk of Anterior Cruciate Ligament Ruptures by Neuromuscular Screening	American Journal of Sports Medicine DOI: 10.1177/0363546509335000 http://ajs.sagepub.com/ (online first)	Single Scientific	3.8	2.8	2.7	9.2
59	Seil	1997	Germany	Sports Injuries in Team Handball - A One-Year Prospective Study of Sixteen Men's Senior Teams of a Superior Nonprofessional Level	Sportverletzung / Sportschaden 11 (1997): 58-62 http://www.thieme.de/fz/sport/index.html	Science-based	3.1	3.0	3.0	9.1
60	Pokorný	2008	Czech Republic	Experience with Prevention of Sport Related Injuries in Czech Handball	Charles University Prague. Czech Republic	Single Scientific	3.2	3.1	2.8	9.1
61	Junge	2005	Switzerland	Injuries in Team Sport Tournaments during the 2004 Olympic Games	American Journal of Sports Medicine. Vol. 34. No. 4. 565-576 http://ajs.sagepub.com/	Science-based	2.9	3.2	3.0	9.1
62	Kececi	2005	Turkey	Dental Trauma Incidence and Mouthguard Use in Elite Athletes in Turkey	Dental Traumatology 2005; 21: 76–79 http://www3.interscience.wiley.com/journal/120126157/issue	Single Scientific	3.4	3.2	2.4	9.1
63	Abernethy	2007	Ireland	Strategies to Prevent Injury in Adolescent Sport: a Systematic Review	British Journal of Sports Medicine. 41. 627-638 www.bjsportmed.com	Multiple Scientific	3.1	3.0	2.9	9
64	Lieger	2008	Switzerland	Orofacial/Cerebral Injuries and the Use of Mouthguards by Professional Athletes in Switzerland	Dental Traumatology 2006; 22: 1–6 http://www3.interscience.wiley.com/journal/118537215/home	Science-based	3.3	3.0	2.7	9
65	Parkkari	2001	Finland	Is it Possible to Prevent Sports Injuries? Review of Controlled Clinical Trials and Recommendations for Future Work	Sports Medicine 2001; 31 (14): 985-995 http://www.ingentaconnect.com/content/adis/smd	Multiple Scientific	2.9	3.1	3.0	9
66	Ardila	2007	Columbia	Evidencia del trabajo propioceptivo utilizado en la prevención de lesiones deportivas	Universidad de Antioquia. Colombia: 2007. http://viref.udea.edu.co/contenido/pdf/062-evidencia.pdf	Science-based	3.1	2.8	3.0	8.9
67	Mayer. S.	2003	Germany	Verletzungen. Prävention. Rehabilitation im leistungsorientierten Damenhandball	Leistungssport (2) 2004: 40-44	Single Expert	2.9	2.9	2.8	8.6
68	Oxizoglou	2005	Greece	"Injuries of the Lower Extremities among Greek Handball Players and Preventive Measures	Fizička kultura. Belgrad. 59 (2005) 1-4. p. 31 - 40. ref. 47 http://scindeks-clanci.nb.rs/data/pdf/0350-3828/2005/0350-38280504031O.pdf	Multiple Expert	2.9	2.8	2.9	8.6
69	Schott. C.	2008	Germany	Verletzungen und Prävention der unteren Extremitäten im Damenhandball	University of Regensburg. Germany	Science-based	3.0	2.7	2.8	8.4
70	Moegling. K.	2003	Germany	Verletzungen im Jugendhandball	Institute for motor learning and motor science http://www.ifbub.de/fileadmin/forschungsberichte/handballstudiezusf.pdf	Single Expert	2.8	2.8	2.6	8.1
71	SUVA accident insurance company		Switzerland	Handball: SuvaLiv-Fairness-Preis	Suva – Swiss accident insurerhttp://www.suva.ch/home/suvaliv/kampagnen/kampagne_daenk_glaenk/handballfairness-preis.htm	Single Expert	3.0	2.4	2.7	8.1
72	Hübner	2002	Germany	Handball – attraktiv und sicher vermitteln	Federation of German statutory accident insurers http://regelwerk.unfallkassen.de/regelwerk/data/regelwerk/s_inform/SI_8071.pdf	Multiple Expert	2.6	2.8	2.5	7.9
73	Luck. W.	1991	Germany	Ätiologie. Lokalisation. Therapie. und Prävention typischer Verletzungen in der Sportspielart Handball	Deutsche Zeitschrift für Sportmedizin 42 (10). 1991: 432-438	Single Expert	2.4	2.8	2.7	7.9

74	Christensen	2007	Denmark	Effekten af ét neuromuskulært opvarmende træningspas med fokus på forebyggelse af ACL skader hos 24 unge raske kvindelige håndboldspillere. - Et RCT studie med brug af 3D biomekanisk bevægelsesanalyse	University College Oresund http://old.fysiostud.dk/graphics/PDFfiler/Bachelorprojekter%202007/Effekten_af_%E9t_neuromuskul%E6rt_opvarmende_tr%E6ningspas.pdf.pdf	Single Scientific	2.4	2.4	2.4	7.3
75	Dittert. A.	2006	Switzerland	MBT im Handball	Masai Barefoot Technology http://www.mbt-history.com/history/newsbilder/CH/BookletAndyDittert20040617_1.pdf	Single Expert	2.0	1.7	1.2	4.9

Training & Physical Preparation (Handball)

#	Author	Year	Country	Title	Source	Validation	Effect	Applic	Accept	To-tal
1	Olsen. O.E.	2003	Norway	bedre handball og uten skader	Scandinavian Journal of Medicine & Science in Sports 2003: 13: 299–304 http://www3.interscience.wiley.com/journal/118521374/home	Science-based	4.5	4.3	4.4	13.2
2	Olsen	2005	Norway	Exercises to prevent lower limb injuries in youth sports: cluster randomised controlled trial	British Medical Journal 2005;330;449 http://bmj.com/	Single Scientific	4.4	4.3	4.1	12.8
3	Oslo Sports Trauma Research Centre	2007	Norway	Slik Unngår Du Skader i Håndball	Senter for idrettsskadeforskning. Norway www.skadefri.no	Science-based	4.3	4.2	4.0	12.6
4	Myklebust	2003	Norway	Prevention of Anterior Cruciate Ligament Injuries in Female Team Handball Players: A Prospective Intervention Study Over Three Seasons	Clinical Journal of Sport Medicine. 13: 71–78 http://www.cjsportsmed.com	Single Scientific	4.8	3.9	3.7	12.3
5	Svenska Handboll Forbundet	2007	Sweden	Knä och axelkontroll – Prestera bättre - Handbollsövningar	Svenska Handbollförbundet www.handboll.info	Science-based	3.9	4.3	4.0	12.2
6	Hewett	2006	USA	Cruciate Ligament Injuries in Female Athletes	American Journal of Sports Medicine 2006 34: 490 http://ajs.sagepub.com	Multiple Scien-tific	4.6	3.8	3.8	12.1
7	Renstrom	2008	Sweden	Non-contact ACL Injuries in Female Athletes: An International Olympic Committee Current Concepts Statement	British Journal of Sports Medicine 2008; 42: 394–412 http://bjsm.bmj.com/	Multiple Scien-tific	4.1	3.9	3.8	11.8
8	Henke	2005	Germany	Sportunfälle im Berufshandball – Epidemiologie und Prävention	Ruhr University Bochum. Germany	Science-based	4.0	3.9	3.8	11.7
9	Zebis	2008	Denmark	The Effects of Neuromuscular Training on Knee Joint Motor Control During Sidecutting in Female Elite Soccer and Handball Players	Clinical Journal of Sport Medicine 2008;18:329–337 http://www.cjsportsmed.com	Single Scientific	4.3	3.8	3.6	11.7
10	Dansk Håndbold Forbund	2006	Denmark	Knokl for dit knae	DHF Coaches Education framework www.dhf.dk	Multiple Expert	3.8	4.0	3.9	11.7
11	Rivilla. J.	2008	Spain	Programa Específico de Protección Total en Ba-lonmano: PROTBAL	Polytechnic University of Madrid. Spain http://balonmanointeligente.blogspot.com/ http://www.youtube.com/watch?v=ZyBXXPJYeeQ	Science-based	4.2	3.9	3.6	11.7
12	Wedderkopp	2003	Denmark	Comparison of Two Intervention Programmes in Young Female Players in European Handball – with and without Ankle Disc	Scandinavian Journal of Medicine & Science in Sports 2003: 13: 371–375 http://www3.interscience.wiley.com/journal/118521374/home	Single Scientific	4.3	3.7	3.7	11.7
13	Olsen	2004	Norway	Injury Mechanisms for Anterior Cruciate Ligament Injuries in Team Handball: A Systematic Video Analysis	American Journal of Sports Medicine 2004; 32; 1002 http://ajs.sagepub.com/	Multiple Scien-tific	3.9	3.8	3.9	11.6

14	Wedderkopp	1999	Denmark	Prevention of Injuries in Young in European Team Handball. A Prospective Intervention Study Female Players	Scandinavian Journal of Medicine & Science in Sports 1999: 9: 41-47 http://www3.interscience.wiley.com/journal/118521374/home	Single Scientific	4.4	3.7	3.4	11.6
15	Buchheit	2008	France	Préparation physique - Un programme simple et rapide pour la prévention des blessures en Hand-ball: le 2 x 7 + 1	Approche(s) du handball 106. 2008: 10-33 http://www.martin-buchheit.net/Dossiers/M.%20Buchheit%20-%202%20x%207%20+1%20(App%20HB%20-%20106-08.2008)%205Mo.pdf	Science-based	3.7	4.0	3.7	11.4
16	Flack. M.	2007	Germany	Workshop „Prävention und Koordination	Handball-Verband Niedersachsen. Youth coaches' education work-shophttp://www.hvn-online.com/hvn/Dokumentablage/Praev_Airex_07_04.pdf	Single Expert	3.7	3.7	3.8	11.1
17	Petersen	2004	Germany	A Controlled Prospective Case Control Study of a Prevention Training Program in Female Team Handball Players: the German Experience	Archives of Orthopaedic and Trauma Surgery (2005) 125: 614–621 http://www.springerlink.com/content/101491/?p=f2d9bf7816b14f7aa2c7e7fb321a5b28&pi=0	Single Scientific	4.0	3.6	3.5	11.1
18	Dansk Håndbold Forbund	2006	Denmark	Opvarmning og skadesforebyggende træning	DHF Coaches Education framework www.dhf.dk	Multiple Expert	3.8	3.8	3.4	11
19	Dansk Håndbold Forbund	2006	Denmark	Skudklar Skulder	DHF Coaches Education framework www.dhf.dk	Multiple Expert	3.5	3.8	3.6	11
20	Kolodziej. C	2009	Germany	Handballspezifisches Präventionsprogramm	Bavarian Handball Federation www.bhv-online.de	Multiple Expert	3.6	3.5	3.8	10.9
21	Petersen	2003	Germany	Prävention von Rupturen des vorderen Kreuzban-des im Ballsport: eine Literaturübersicht	Sportorthopädie / Sporttraumatologie 19. 105–109 (2003) http://www.sciencedirect.com/science/journal/0949328X	Multiple Scienti-fic	3.6	3.7	3.5	10.8
22	Silvers	2007	USA	Prevention of Anterior Cruciate Ligament Injury in the Female Athlete	British Journal of Sports Medicine 2007; 41; i52-i59 http://bjsm.bmj.com/	Multiple Scien-tific	3.8	3.6	3.3	10.7
23	Kvorning	2007	Denmark	Styrketraining	IDRÆTSSKADEBOGEN (2007) 137-158 http://sitecore.dif.rove.dk/asp/publikationer_pdf.asp?pdfid=741	Science-based	3.4	3.6	3.6	10.6
24	Muschol	2007	Germany	Verletzungsprophylaxe für Knie und Schultergelen-ke im Handball	Sportorthopädie / Sporttraumatologie 23 (2007): 11–18 http://www.sciencedirect.com/science/journal/0949328X	Science-based	4.0	2.9	3.7	10.6
25	Buholzer. O.	2003	Switzerland	Dänk a Glänk. Spielerisches Aufwärmen:Handball	Suva - Schweizerische Unfallversicherungsanstalt https://wwwsapp1.suva.ch/sap/public/bc/its/mimes/zwaswo/99/pdf/88199_d.pdf	Multiple expert recommendatio n	3.2	3.6	3.7	10.4
26	Junsten	2008	Sweden	Vilka träningsmetoder förebygger skador i knä – och fotled inom idrott?	Lulea University of Technology. Sweden http://epubl.ltu.se/1402-1773/2008/332/LTU-CUPP-08332-SE.pdf	Multiple Scien-tific	3.8	3.2	3.4	10.4
27	Holm	2004	Norway	Effect of Neuromuscular Training on Proprioceptive-tion. Balance. Muscle Strength. and Lower Limb Function in Female Team Handball Players	Clinical Journal of Sport Medicine 2004;14:88–94 http://www.cjsportsmed.com	Single Scientific	3.5	3.4	3.5	10.4
28	Hrysomallis. C.	2007	Australia	Relationship between Balance Ability. Training and Sports Injury Risk	Sports Medicine 2007; 37 (6): 547-556 http://www.ingentaconnect.com/content/adis/smd	Multiple Scien-tific	3.7	3.3	3.4	10.4
29	Dansk Håndbold Forbund	2006	Denmark	Fysisk træning Ungdom	DHF Coaches Education frameworkwww.dhf.dk	Multiple Expert	3.3	3.7	3.3	10.3
30	Petersen	2005	Germany	Rupturen des vorderen Kreuzbandes bei weibli-chen Athleten. Teil 1: Epidemiologie. Verletzungs-mechanismen und Ursachen	Deutsche Zeitschrift für Sportmedizin 56. 6 (2005): 150-164 http://www.zeitschrift-sportmedizin.de/	Multiple Scienti-fic	3.6	3.4	3.3	10.3
31	Yoo	2009	South Korea	A Meta-Analysis of the Effect of Neuromuscular Training on the Prevention of the Anterior Cruciate Ligament Injury in Female Athletes	Knee Surgery. Sports Traumatology. Arthroscopy DOI 10.1007/s00167-009-0901-2 http://www.springerlink.com/content/0942-2056 (online first)	Multiple Scien-tific	3. 7	3.4	3.2	10.3
32	Hatzimanouil	2007	Greece	Prevention of Injuries in Contact Sports Such as Soccer. Basketball. Water Polo and Team Handball	Inquiries in Sport & Physical Education Volume 5 (1). 143 – 155 http://www.hape.gr/emag/vol5_1/hape172.pdf	Multiple Scien-tific	3.7	3.2	3.3	10.2

33	Knobloch. K.	2007	Germany	Verletzungsprävention im Handball	Landes Sport Bund 2007 (8): 16 www.lsb-niedersachsen.de	Science-based	3.6	3.4	3.1	10.1
34	Pánics	2008	Hungary	Effect of Proprioception Training on Knee Joint Position Sense in Female Team Handball Players	British Journal of Sports Medicine 2008;42;472-476 http://bjsm.bmj.com/	Single Scientific	3.6	3.2	3.3	10.1
35	Pieper	2007	Germany	Sportverletzungen und Überlastungsschäden im Handballsport	Sportorthopädie / Sporttraumatologie 23. 4–10 (2007) http://www.sciencedirect.com/science/journal/0949328X	Single Expert	3.3	3.3	3.4	10.1
36	Gollhofer	2006	Germany	Bewegungskontrolle und Verletzungsprophylaxe	Deutsche Zeitschrift für Sportmedizin 57. 2006 (11/12): 266-270 www.zeitschrift-sportmedizin.de	Multiple Scienti-fic	3.4	3.3	3.2	10
37	Curdt. S.	2003	Germany	Verletzungen im Hallenhandball - Eine empirisch-vergleichende Untersuchung über die Verletzungs-häufigkeiten in unterschiedlichen Leistungsklassen bei Handballspielern in Nordhessen sowie über relevante Präventionsmaßnahmen	University of Kassel. Germany	Single Expert	3.3	3.3	3.2	9.8
38	Dansk Håndbold Forbund	2006	Denmark	Fysisk træning Senior	DHF Coaches Education framework www.dhf.dk	Multiple Expert	2.9	3.6	3.2	9.7
39	Bencke	2000	Denmark	Motor Pattern of the Knee Joint Muscles during Side-Step Cutting in European Team Handball Influence on Muscular Co-ordination after an Intervention Study	Scandinavian Journal of Medicine & Science in Sports 2000. 10: 68–77http://www3.interscience.wiley.com/journal/118521374/home	Single Scientific	3.0	3.3	3.2	9.6
40	Fayolle. C.D.	1993	France	L'éducation proprioceptive collective	Approches du Handball. 1993. (18): 13-15	Single Expert	3.1	3.4	3.0	9.5
41	Mayer. S.	1999	Germany	Empirische Untersuchung zu Verletzungen bzw. muskulären Dysbalancen im leistungsorientierten Damenhandball und Erstellung eines präventiven Trainingsprogramms	University of Erlangen – Nürnberg. Germany	Single Expert	3.6	3.1	2.8	9.5
42	Knobloch	2005	Germany	Prävention von Schulsportverletzungen – Analyse von Ballsportarten bei 2234 Verletzungen	Sportverletzung und Sportschaden 2005 (19): 82-88 http://www.thieme.de/fz/sport/index.html	Science-based	3.0	3.3	3.1	9.4
43	Pokorný	2008	Czech Republic	Experience with Prevention of Sport Related Injuries in Czech Handball	Charles University Prague. Czech Republic	Single Scientific	3.2	3.1	2.8	9.1
44	Ardila	2007	Columbia	Evidencia del trabajo propioceptivo utilizado en la prevención de lesiones deportivas	Universidad de Antioquia. Colombia: 2007. http://viref.udea.edu.co/contenido/pdf/062-evidencia.pdf	Science-based	3.1	2.8	3.0	8.9
45	Christensen	2007	Denmark	Effekten af ét neuromuskulært opvarmende træningspas med fokus på forebyggelse af ACL skader hos 24 unge raske kvindelige håndboldspillere. - Et RCT studie med brug af 3D biomekanisk bevægelsesanalyse	University College Oresund http://old.fysiostud.dk/graphics/PDFfiler/ Bachelorprojekter%202007/Effekten_af_%E9t_neuromuskul% E6rt_opvarmende_tr%E6ningspas.pdf.pdf	Single Scientific	2.4	2.4	2.4	7.3

Technical & Political Strategies (Handball)

#	Author	Year	Country	Title	Source	Validation	Effect	Apllic	Accept	Total
1	Holdhaus. H.	2008	Austria	Summary of the Injury Study Conducted at the EHF Men's Euro 2008 in Norway	Webpage of the European Handball Federation http://www.eurohandball.com/article/012169	Science-based	3.4	3.6	3.1	10.1
2	Langevoort	2007	Netherlands	Handball Injuries during Major International Tournaments	Scandinavian Journal of Medicine & Science in Sports 2007: 17: 400–407 http://www3.interscience.wiley.com/journal/118521374/home	Science-based	3.2	3.3	3.1	9.7
3	Junge	2005	Switzerland	Injuries in Team Sport Tournaments during the 2004 Olympic Games	American Journal of Sports Medicine. Vol. 34. No. 4. 565-576 http://ajs.sagepub.com/	Science-based	2.9	3.2	3.0	9.1
4	Moegling. K.	2003	Germany	Verletzungen im Jugendhandball	Institute for motor learning and motor science http://www.ifbub.de/fileadmin/forschungsberichte/handballstudiezusf.pdf	Single Expert	2.8	2.8	2.6	8.1
5	SUVA accident insurance company		Switzerland	Handball: SuvaLiv-Fairness-Preis	Suva – Swiss accident insurerhttp://www.suva.ch/home/suvaliv/kampagnen/kampagne_daenk_glaenk/handballfairness-preis.htm	Single Expert	3.0	2.4	2.7	8.1

Equipment & Facilities (Handball)

#	Author	Year	Country	Title	Source	Validation	Effect	Applic	Accept	Total
1	Badel	2007	Switzerland	Dental / Orofacial Trauma in Contact Sports and Intraoral Mouthguard Programmes	Kinesiology 39 (2007) 1:97-105 http://hrcak.srce.hr/kineziologija	Science-based	3.8	3.7	2.4	9.9
2	Knapik	2007	USA	Mouthguards in Sport Activities History. Physical Properties and Injury Prevention Effectiveness	Sports Medicine 2007; 37 (2): 117-144 http://www.ingentaconnect.com/content/adis/smd	Multiple Scientific	3.7	3.1	2.7	9.4
3	Kececi	2005	Turkey	Dental Trauma Incidence and Mouthguard Use in Elite Athletes in Turkey	Dental Traumatology 2005; 21: 76–79 http://www3.interscience.wiley.com/journal/120126157/issue	Single Scientific	3.4	3.2	2.4	9.1

Multi-faceted approaches (Handball)

#	Author	Year	Country	Title	Source	Validation	Effect	Applic	Accept	Total
1	ARAG Allgemeine Versicherungs - AG	2003	Germany	Unfallverhütung im Handball – Teil 1: Maßnahmen zur Vermeidung von Knie- und Sprunggelenksverletzungen	ARAG Allgemeine Unfallversicherung. Duesseldorf: 2003 www.arag-sport.de	Science-based	4.1	4.2	4.2	12. 6
2	Aaltonen et al.	2007	Finland	Prevention of Sports Injuries - Systematic Review of Randomized Controlled Trials	Archive of Internal Medicine 15 (167). 1585-1592 www.archinternmed.com	Multiple Scientific	4.0	3.6	3.8	11.4
3	ARAG Allgemeine Versicherungs - AG	2003	Germany	Unfallverhütung im Handball – Teil 2: Maßnahmen zur Vermeidung von Verletzungen und Schäden im Hand- und Schulterbereich	ARAG Allgemeine Unfallversicherung. Duesseldorf: 2003 www.arag-sport.de	Multiple Expert	3.5	3.8	3.8	11.1
4	Olsen et al.	2003	Norway	Relationship between FloorType and Risk of ACL Injury in Team Handball	Scandinavian Journal of Medicine & Science in Sports 2003: 13: 299–304 http://www3.interscience.wiley.com/journal/118521374/home	Science-based	4.1	3.6	3.0	10.7
5	Schnurrer-Luke et al.	2007	Croatia	Balance Index Score as a Predictive Factor for Lower Sports Results or Anterior Cruci-	Collegium Antropologicum 31 (2007) 1: 253–258 http://www.collantropol.hr/	Single Scientific	3.7	3.6	3.2	10.4

				ate Ligament Knee Injuries in Croatian Female Athletes – Preliminary Study						
6	Buholzer. O.	2000	Switzerland	Dänk a Gläänk: Handball-Manual für Trainerinnen und Trainer	Suva - Schweizerische Unfallversicherungsanstalt https://wwwsapp1.suva.ch/sap/public/bc/its/mimes/zwaswo/99/pdf/88138_d.pdf	Multiple Expert	3.2	3.6	3.4	10.2
7	Kreische. G	2007	Germany	Stabilisierung zur Verletzungsprävention am Sprunggelenk – eine Metaanalyse	University of Würzburg. Germany	Multiple Scientific	3.4	3.4	3.2	10.1
8	Oehlert et al.	2004	Germany	Verletzungen im olympischen Handballturnier: eine Videoanalyse	Sportverletzung / Sportschaden 2004; 18: 80-84 http://www.thieme.de/fz/sport/index.html	Multiple Expert	3.0	3.6	3.4	10
9	Platen et al.	2007	Germany	Verletzungsproblematik im Frauensport unter besonderer Berücksichtigung des Frauenhandballs	Sportorthopädie / Sporttraumatologie 23. 19–26 (2007) http://www.sciencedirect.com/science/journal/0949328X	Multiple Scientific	3.3	3.2	3.1	9.6
10	Luck et al.	1996	Germany	Sportmedizinische Aspekte des Handballsports	Deutsche Zeitschrift für Sportmedizin 47. (9) 1996: 479-482	Single Expert	3.1	3.1	3.2	9.4
11	bfu Beratungsstelle für Unfallverhütung	2004	Switzerland	Unterrichtsblätter zur Sicherheitsförderung an Schulen - Ballspiele	bfu – Beratungsstelle für Unfallverhütung http://www.bfu.ch/PDFLib/255_76.pdf	Multiple Expert	3.0	3.6	2.8	9.3
12	Zebis et al.	2009	Denmark	Identification of Athletes at Future Risk of Anterior Cruciate Ligament Ruptures by Neuromuscular Screening	American Journal of Sports Medicine DOI: 10.1177/0363546509335000 http://ajs.sagepub.com/ (online first)	Single Scientific	3.8	2.8	2.7	9.2
13	Seil et al.	1997	Germany	Sports Injuries in Team Handball - A One-Year Prospective Study of Sixteen Men's Senior Teams of a Superior Nonprofessional Level	Sportverletzung / Sportschaden 11 (1997): 58-62 http://www.thieme.de/fz/sport/index.html	Science-based	3.1	3.0	3.0	9.1
14	Abernethy et al.	2007	Ireland	Strategies to Prevent Injury in Adolescent Sport: a Systematic Review	British Journal of Sports Medicine. 41. 627-638 www.bjsportmed.com	Multiple Scientific	3.1	3.0	2.9	9
15	Lieger et al.	2008	Switzerland	Orofacial/Cerebral Injuries and the Use of Mouthguards by Professional Athletes in Switzerland	Dental Traumatology 2006; 22: 1–6 http://www3.interscience.wiley.com/journal/118537215/home	Science-based	3.3	3.0	2.7	9
16	Parkkari et al.	2001	Finland	Is it Possible to Prevent Sports Injuries? Review of Controlled Clinical Trials and Recommendations for Future Work	Sports Medicine 2001; 31 (14): 985-995 http://www.ingentaconnect.com/content/adis/smd	Multiple Scientific	2.9	3.1	3.0	9
17	Mayer. S.	2003	Germany	Verletzungen. Prävention. Rehabilitation im leistungsorientierten Damenhandball	Leistungssport (2) 2004: 40-44	Single Expert	2.9	2.9	2.8	8.6
18	Oxizoglou et al.	2005	Greece	"Injuries of the Lower Extremities among Greek Handball Players and Preventive Measures	Fizička kultura. Belgrad. 59 (2005) 1-4. p. 31 - 40. ref. 47 http://scindeks-clanci.nb.rs/data/pdf/0350-3828/2005/0350-38280504031O.pdf	Multiple Expert	2.9	2.8	2.9	8.6
19	Schott. C.	2008	Germany	Verletzungen und Prävention der unteren Extremitäten im Damenhandball	University of Regensburg. Germany	Science-based	3.0	2.7	2.8	8.4
20	Hübner et al.	2002	Germany	Handball – attraktiv und sicher vermitteln	Federation of German statutory accident insurers http://regelwerk.unfallkassen.de/regelwerk/data/regelwerk/s_inform/SI_8071.pdf	Multiple Expert	2.6	2.8	2.5	7.9
21	Luck. W.	1991	Germany	Ätiologie. Lokalisation. Therapie. und Prävention typischer Verletzungen in der Sportspielart Handball	Deutsche Zeitschrift für Sportmedizin 42 (10). 1991: 432-438	Single Expert	2.4	2.8	2.7	7.9
22	Dittert. A.	2006	Switzerland	MBT im Handball	Masai Barefoot Technology http://www.mbt-history.com/history/newsbilder/CH/BookletAndyDittert20040617_1.pdf	Single Expert	2.0	1.7	1.2	4.9

The online evaluation process among 11 experts resulted in the following top 12 recommendations for injury prevention in handball:

1. Exercises that improve landing, jumping, cutting and planting technique. In addition, balancing and strengthening exercises should be applied as shown in the programme. Proper technique in the execution of all exercises is essential and should be supervised by the coaches. The programme should be applied as warm-up before each workout. Some of the exercises can even be before matches (balance exercises just before the training).
2. A structured warm-up programme containing agility, balance, strength and playing technique exercises, designed to improve awareness and knee and ankle control during landing and pivoting movements prevents knee and ankle injuries among youth athletes. It is suggested that programmes focusing on technique (cutting and landing movements) and balance training (on wobble boards, mats or similar equipments) should already be implemented in players aged 10-12 years. Furthermore, preventive training should also be routine in training programmes for adolescents.
3. Structured warming-up and mobilisation before training and competition, improving the flexibility, core stability and handball specific coordination, promotion of correct knee and foot position, appropriate shoes and flooring.
4. Better preparation of athletes, in particular female athletes in view of typical injury situations and mechanisms (e.g. landings, side-cutting). Regular application of balance, coordination, jump and strength exercises as part of warm-up routine in handball training (pre-seasonal, season-attending) to prevent knee and ankle injuries; “Knee over toe” technique.
5. Prevention of ACL injuries is possible with the use of neuromuscular training in female elite team handball players, but successful prevention depends on good compliance among the players.
6. Training programme consisting of 12 basic exercises dealing with stabilisation of the core and shoulder girdle, balancing and coordination practices and proper jumping and landing technique. It is recommended to pick up 5-6 exercises per session covering knee and shoulder stabilisation and coordination elements as integral part of the warm-up routine. During pre-season the programme should be included in each session, during regular season twice a week.
7. Neuromuscular training may assist in the reduction of ACL injuries in females athletes if (a) plyometrics, balance, and strengthening exercises are incorporated into a comprehensive training protocol; (b) the training sessions are performed more than 1 time per week; (c) the duration of the training programme is a minimum of 6 weeks in length.
8. Preventive training programmes should include strength and power exercises, neuromuscular training, plyometrics and agility exercises: They should be integrated into warm-up routine of the regular training. When properly executed they can serve

to enhance performance and prevent injuries. Focus should be on performance of the hip-knee-foot line and ‘‘kissing knees’’ should be avoided. Sustainability and compliance (e.g. acceptance among athletes and coaches) are essential criteria for a successful programme. Ideally, these prevention programmes should be introduced as early as possible in the training period. In some sports this would be at the age of 6–10 years.

9. In general, preventive training interventions should be tailored to the demands of handball (e.g. contact with opponents) and reflect the present injury situations and mechanisms. Furthermore, the education of correct technique in handball movement patterns that frequently lead to injuries (e.g. jumping, landing, feints) is essential part of injury prevention. Athletic training and coordination (e.g. strengthening, stabilization, proprioception) combine prevention and performance enhancement and thus are recommended.
10. Neuromuscular training increases EMG activity for the medial hamstring muscles, thereby decreasing the risk of dynamic valgus. This observed neuromuscular adaptation during side-cutting manoeuvres can potentially reduce the risk for non-contact ACL injury.
11. Education of correct knee joint position, exercises from respective exercise groups (balancing, strengthening and technique training) should be applied during each session of the first eight weeks of training. Followed by once a week in the course of the season.
12. An appropriate warm-up including activation, mobilisation/stretching and preventive exercises (e.g. proprioception, balancing) is obligatory for each training session. In addition, a regular structured prevention programme containing (a). basic strengthening (b). advanced strengthening with integral technical, coordinative and cognitive handball elements (c). an individual / position-specific preparation for typical injury mechanisms should be applied. Frequency, intensity and contents depend on season phase and individual status of athlete.

2.3.3 Expert Consultation Meetings & Conclusion for WP 6

The results of the online evaluation give a first impression which fields of prevention are most promising and which explicit measures seem most valuable in terms of effectivity, applicability and acceptance. The survey among coaches delivers essential background information about the perception of injuries, practised prevention, education level, claims and demands as well as willingness to implement further safety programmes.

In the light of implementing best prevention measures into real-world basketball and handball communities (coming in WP 6), it is necessary to elaborate promotion strategies that are suited to the demands and capacities of the respective target community. The achieved results from the first consensus process should be seen as a

first draft package of currently available best prevention measures which shall serve as basis for advanced discussion. The collaborating national sports federations were therefore encouraged to nominate national experts that have a keen interest in refining the prepared information according to the structure, philosophy, demands and capacities of the respective federation. These national meetings should finally lead to a decision which best practices and which promotion strategies are best suited for the individual situation of each sports federation.

The following chapter briefly describes the main outcomes of the expert consultation meetings which will serve as guide for the implementation phase in work package 6.

2.3.3.1 Basketball

Swedish experts were recruited from the coaching education department, medical committee and from the national team programme of the Swedish Basketball Federation (SBF). All of them were either coaches, physiotherapists or sport scientists with long experience in educating athletes and coaches. The administrative level of the federation was represented by the general secretary to guarantee a smooth implementation within the organisations' structure.

The Slovak Basketball Association (SBA) nominated experts in physical education and coaches' education from the sports faculty of the Comenius University in Bratislava. The department for sports games is responsible for the education of basketball coaches in Slovakia. All experts have a practical and scientific background in basketball.

"Training & Physical Preparation" offers the most and – with regard to the online evaluation – also the best opportunities to take measures against basketball injuries. Beyond that, the survey among coaches showed up that poor physical preparation is seen as predominant intrinsic injury risk factor that should consequently be fighted with better athletic preparation. Thus, the experts in both federations independently came to the consensus that the education of coaches should be focused. Coaches are the best platform to deliver appropriate training programmes and they embody the link between theory and practice. The integration – if not integral part so far – and / or improvement and modification of injury prevention contents into the regular national coaches' education curriculum is aspired as main aim. The evaluated measures will be sighted. Best promising training measures will be collected and adopted to the specific situation in the different target groups as displayed in the prevention matrix (Tab.11.).

Furthermore, best measures from the other three prevention fields e.g. protective equipment will be collected and replenished to cope with other basketball specific injury mechanisms and to deliver a comprehensive education module that should also contain important theoretical information. To satisfy other target groups such as athletes, parents or functionaries it is also considered to produce informative media e.g. handouts, brochures, DVDs with basic information covering all fields of injury prevention.

The following figure indicates the main topics of prevention in relation to the fields of prevention and target groups.

Tab.11. Prevention matrix in basketball

Gender	Age	Performance Level	Training & Physical Preparation	Technical & Political Approaches	Equipment & Facilities	Medical & Non-medical Support
Female	Children	low	Basic Technique Training, Balance, Strength & Stabilisation, Flexibility & Mobilisation, Agility	Fair Play & Respect	Shoe	
		medium	BTT, BAL, S, F, A	Fair Play & Respect	Shoe	
		high	BTT, BAL, S, F, A	Fair Play & Respect	Shoe	
	Youth	low	BTT, BAL, S, F, A	Fair Play & Respect	Shoe, Orth	
		medium	BTT, BAL, S, F, A	Fair Play & Respect	Shoe, Orth	
		high	Advanced Technique Training BAL, S, F, A	Reduction of matches, Regeneration	Tape, Mouthgurads, Floor	Medical Check-Ups, Performance Diagnostics, Physio
	Adult	low	BTT, BAL, S, F, A	Fair Play & Respect	Tape, MG, Orth	
		medium	BTT, BAL, S, F, A	Fair Play & Respect	Tape, MG, Orth	
		high	ATT, BAL, S, F, A	Reduction of matches, Regeneration	Tape, MG, Floor, Orth	Medical Check-Ups, Performance Diagnostics, Physio
Male	Children	low	BTT, BAL, S, F, A	Fair Play & Respect	Shoe	
		medium	BTT, BAL, S, F, A	Fair Play & Respect	Shoe	
		high	BTT, BAL, S, F, A	Fair Play & Respect	Shoe	
	Youth	low	BTT, BAL, S, F, A	Fair Play & Respect	Shoe, Orth	
		medium	ATT, BAL, S, F, A	Fair Play & Respect	Shoe, Orth	
		high	BTT, BAL, S, F, A	Reduction of matches, Regeneration	Tape, MG, Floor, Orth	Medical Check-Ups, Performance Diagnostics, Physio
	Adult	low	BTT, BAL, S, F, A	Fair Play & Respect	Tape, MG, Orth	
		medium	ATT, BAL, S, F, A	Fair Play & Respect	Tape, MG, Orth	
		high	ATT, BAL, S, F, A	Reduction of matches, Regeneration	Tape, MG, Floor, Orth	Medical Check-Ups, Performance Diagnostics, Physio

Swedish Basketball Federation and the Slovak Basketball Association will fill these topics with detailed contents according to the recommendations that are given in the previous chapters.

2.3.3.2 Handball

Norwegian experts were recruited from the coaching and training department. In addition, the Norwegian Handball Federation (NHF) nominated scientific personnel from the Oslo Sports Trauma Research Centre, which has a long year experience in the prevention of injuries in team sports. All of them were either coaches, physiotherapists

or sport scientists with good reputation in educating handball coaches, players and health care professionals.

The Czech Handball Federation (CHF) nominated experts in physical education and coaches' education from the sports faculty of the Charles University in Prague. Furthermore, the methods commission and the coaches' commission of the CHF were directly involved in these meetings. All experts have a university background and possess a long experience in science as well as coaching on national and international level.

Similar to basketball "Training & Physical Preparation" offers by far the most and – with regard to the online evaluation – also the best opportunities to take measures against handball injuries. Beyond that, the survey among coaches showed up that a poor physical condition and insufficient training is seen as predominant intrinsic injury risk factor that should consequently be fighted with a better athletic and technical preparation of players. Thus, the experts in both federations independently came to the consensus that the education of coaches should be focused. Coaches are the best platform to deliver appropriate training programmes and they embody the link between theory and practice. The integration – if not integral part so far – and/or improvement and modification of injury prevention contents into the regular national coaches' education curriculum is aspired as main aim. The evaluated measures will be sighted. Best promising training measures will be collected and adopted to the specific situation in the different target groups as displayed in the prevention matrix.

Furthermore, best measures from the other three prevention fields e.g. protective equipment will be collected and replenished to cope with other basketball specific injury mechanisms and to deliver a comprehensive education module that should also contain important theoretical information. To satisfy other target groups such as athletes, parents or functionaries it is also considered to produce informative media e.g. handouts, brochures, DVDs with basic information covering all fields of injury prevention. Above all, the Norwegian Handball Federation plans to promote best injury prevention measures through TV spots on the occasion of an international handball tournament.

It is recognisable that there are definitely similarities in the chosen approaches for both sports. As typical in team sports, besides athletes and officials, coaches as multipliers are the main target group for the dissemination and implementation of prevention measures. Beyond that, one has to state that physical demands as well as the injury situation not that different from another. So it is not surprising that the main topics of prevention in relation to the fields of prevention and targets groups as laid down in the following figure (Tab. 12.) are nearly equal.

Norwegian and Czech Handball Federation will fill these topics with detailed contents according to the recommendations that are given in the previous chapters.

Tab.12. Prevention matrix in handball

Gender	Age	Performance Level	Training & Physical Preparation	Technical & Political Approaches	Equipment & Facilities	Medical & Non-medical Support
Female	Children	low	Basic Technique Training, Balance, Strength & Stabilisation, Flexibility & Mobilisation, Agility	Fair Play & Respect	Shoe	
		medium	BTT, BAL, S, F, A	Fair Play & Respect	Shoe	
		high	BTT, BAL, S, F, A	Fair Play & Respect	Shoe	
	Youth	low	BTT, BAL, S, F, A	Fair Play & Respect	Shoe, Orth	
		medium	BTT, BAL, S, F, A	Fair Play & Respect	Shoe, Orth	
		high	Advanced Technique Training (with contact) BAL, S, F, A	Reduction of matches, Regeneration	Tape, Mouthgurads, Floor	Medical Check-Ups, Performance Diagnostics, Physio
	Adult	low	BTT, BAL, S, F, A	Fair Play & Respect	Tape, MG, Orth	
		medium	BTT, BAL, S, F, A	Fair Play & Respect	Tape, MG, Orth	
		high	ATT, BAL, S, F, A	Reduction of matches, Regeneration	Tape, MG, Floor, Orth	Medical Check-Ups, Performance Diagnostics, Physio
Male	Children	low	BTT, BAL, S, F, A	Fair Play & Respect	Shoe	
		medium	BTT, BAL, S, F, A	Fair Play & Respect	Shoe	
		high	BTT, BAL, S, F, A	Fair Play & Respect	Shoe	
	Youth	low	BTT, BAL, S, F, A	Fair Play & Respect	Shoe, Orth	
		medium	ATT, BAL, S, F, A	Fair Play & Respect	Shoe, Orth	
		high	BTT, BAL, S, F, A	Reduction of matches, Regeneration	Tape, MG, Floor, Orth	Medical Check-Ups, Performance Diagnostics, Physio
	Adult	low	BTT, BAL, S, F, A	Fair Play & Respect	Tape, MG, Orth	
		medium	ATT, BAL, S, F, A	Fair Play & Respect	Tape, MG, Orth	
		high	ATT, BAL, S, F, A	Reduction of matches, Regeneration	Tape, MG, Floor, Orth	Medical Check-Ups, Performance Diagnostics, Physio

Nevertheless, sports injury prevention has shown to work best only when it is sport specific. Thus, the main differences between both sports are in the details e.g. basketball and handball specific training contents and philosophies. Having the herewith affiliated implementation in mind the greatest added value will result from the slightly different ways to approach the core issues and from the detailed sport specific contents that are hidden behind the above-mentioned rough scheme.

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Appendix

55

A. FIBA Questionnaire

INJURY PREVENTION IN BASKETBALL

Questionnaire for basketball coaches

Dear participants. We are interested in your experiences and opinions concerning basketball injuries and their prevention. Please, support our survey by filling in this questionnaire.

First of all, some general information about your person

Your age: ☐ Your country: ☐

Your gender: ☐ Male ☐ Female

Coaching Education: ☐ None ☐ License ☐

☐ Sports Scientist ☐ Sports Physician ☐ Physiotherapist

Which teams do you coach?

1.	2.	3.
☐ Men ☐ Women	☐ Men ☐ Women	☐ Men ☐ Women
☐ Senior team (18+)	☐ Senior team (18+)	☐ Senior team (18+)
☐ Youth team (14+)	☐ Youth team (14+)	☐ Youth team (14+)
☐ Children	☐ Children	☐ Children
League ☐	League ☐	League ☐
Sessions/week ☐	Sessions/week ☐	Sessions/week ☐

The following questions deal with your personal perception of basketball injuries

1. **On a 5-point scale, do you think injuries are a major issue in basketball?**

   ○5 ○4 ○3 ○2 ○1

   very important issue ***not important at all***

2. **Which specific injuries do you see as the biggest problem in basketball? (3 answers max.)**

   ☐ Head injuries ☐ Finger Injuries ☐ Knee injuries ☐ Ankle injuries

   ☐ Other ☐

3. **What do you see as main causes for basketball injuries? (3 answers max.)**

   ☐ Bad luck ☐ Too little regeneration ☐ Bad technique

   ☐ Fouls / unfair play ☐ Insufficient warm-up ☐ Poor equipment

   ☐ Body contact ☐ Poor physical condition ☐ Previous injuries

   ☐ Too many matches ☐ Other ☐

4. **Do you think that basketball injuries are preventable?**

   ☐ No (please, go to question 10) ☐ Yes, basketball injuries are preventable

This part of the questionnaire broaches the issue of injury prevention in basketball

5. How can the number and/or the severity of basketball injuries be reduced? (3 answers max.)

☐ Better athletic preparation ☐ Modification of rules ☐ Stricter officiating
☐ Longer regeneration ☐ Protective equipment ☐ Less matches
☐ Medical Screenings ☐ Better equipment ☐ Preventive training measures
☐ Physiotherapy ☐ Other

6. Do you carry out any preventive training measures with your teams?

☐ No (please go to question 10) ☐ Yes, by means of **(multiple answers possible)**:

☐ Strengthening ☐ Warm-up ☐ Athletic drills
☐ Stretching ☐ Balance exercises ☐ Coordination exercises
☐ Cool down ☐ Technique Training ☐ Mobilisation exercises
☐ Other

7. When and how often do you apply these preventive training measures?

☐ During preseason: ☐ every session ☐ once a week ☐ less than once a week
☐ During season: ☐ every session ☐ once a week ☐ less than once a week

8. On a 5-point scale, how do your players like these preventive training measures?

○ **5** ○ **4** ○ **3** ○ **2** ○ **1**

like it very much ***dislike it***

9. On a 5-point scale, do you feel familiar and comfortable with applying these preventive training measures?

○ **5** ○ **4** ○ **3** ○ **2** ○ **1**

feel very familiar with it ***need more instruction on this issue***

10. Do your players use other prevention measures?

☐ No (please go to question 11) ☐ Yes, by means of **(multiple answers possible)**:

☐ Physiotherapy ☐ Mouthguards ☐ Taping
☐ Orthoses ☐ Protectors ☐ Medical Screenings
☐ Massage ☐ Other

11. Do you know any specific programmes to prevent injuries in basketball?

☐ No ☐ Yes, namely

12. Do you think that injuries and their prevention should be integral part of coaches' education in basketball?

☐ No ☐ Yes

13. Do you need more information on basketball injuries and their prevention?

☐ No ☐ Yes

THANKS FOR YOUR SUPPORT!!

SUBMIT

B. EHF Questionnaire

INJURY PREVENTION IN HANDBALL

Questionnaire for handball coaches

Dear participants. We are interested in your experiences and opinions concerning handball injuries and their prevention. Please, support our survey by filling in this questionnaire.

First of all, some general information about your person

Your age: ☐ Your country: ☐

Your gender: ☐ Male ☐ Female

Coaching Education: ☐ None ☐ License ☐

☐ Sports Scientist ☐ Sports Physician ☐ Physiotherapist

Which teams do you coach?

1.	2.	3.
☐ Men ☐ Women	☐ Men ☐ Women	☐ Men ☐ Women
☐ Senior team (18+)	☐ Senior team (18+)	☐ Senior team (18+)
☐ Youth team (14+)	☐ Youth team (14+)	☐ Youth team (14+)
☐ Children	☐ Children	☐ Children
League ☐	League ☐	League ☐
Sessions/week ☐	Sessions/week ☐	Sessions/week ☐

The following questions deal with your personal perception of handball injuries

1. **On a 5-point scale, do you think injuries are a major issue in handball?**

   ○5 ○4 ○3 ○2 ○1

   very important issue ***not important at all***

2. **Which specific injuries do you see as the biggest problem in handball? (3 answers max.)**

   ☐ Head injuries ☐ Finger Injuries ☐ Knee injuries ☐ Ankle injuries

   ☐ Other ☐

3. **What do you see as main causes for handball injuries? (3 answers max.)**

   ☐ Bad luck ☐ Too little regeneration ☐ Bad technique

   ☐ Fouls / unfair play ☐ Insufficient warm-up ☐ Poor equipment

   ☐ Body contact ☐ Poor physical condition ☐ Previous injuries

   ☐ Too many matches ☐ Other ☐

4. **Do you think that handball injuries are preventable?**

   ☐ No (please, go to question 10) ☐ Yes, handball injuries are preventable

This part of the questionnaire broaches the issue of injury prevention in handball

5. How can the number and/or the severity of handball injuries be reduced? (3 answers max.)

- ☐ Better athletic preparation
- ☐ Modification of rules
- ☐ Stricter officiating
- ☐ Longer regeneration
- ☐ Protective equipment
- ☐ Less matches
- ☐ Medical Screenings
- ☐ Better equipment
- ☐ Preventive training measures
- ☐ Physiotherapy
- ☐ Other _____

6. Do you carry out any preventive training measures with your teams?

☐ No (please go to question 10) ☐ Yes, by means of **(multiple answers possible)**:

- ☐ Strengthening
- ☐ Warm-up
- ☐ Athletic drills
- ☐ Stretching
- ☐ Balance exercises
- ☐ Coordination exercises
- ☐ Cool down
- ☐ Technique Training
- ☐ Mobilisation exercises
- ☐ Other _____

7. When and how often do you apply these preventive training measures?

☐ During preseason:	☐ every session	☐ once a week	☐ less than once a week	
☐ During season:	☐ every session	☐ once a week	☐ less than once a week	

8. On a 5-point scale, how do your players like these preventive training measures?

○ **5** ○ **4** ○ **3** ○ **2** ○ **1**

like it very much ***dislike it***

9. On a 5-point scale, do you feel familiar and comfortable with applying these preventive training measures?

○ **5** ○ **4** ○ **3** ○ **2** ○ **1**

feel very familiar with it ***need more instruction on this issue***

10. Do your players use other prevention measures?

☐ No (please go to question 11) ☐ Yes, by means of **(multiple answers possible)**:

- ☐ Physiotherapy
- ☐ Mouthguards
- ☐ Taping
- ☐ Orthoses
- ☐ Protectors
- ☐ Medical Screenings
- ☐ Massage
- ☐ Other _____

11. Do you know any specific programmes to prevent injuries in handball?

☐ No ☐ Yes, namely _____

12. Do you think that injuries and their prevention should be integral part of coaches' education in handball?

☐ No ☐ Yes

13. Do you need more information on handball injuries and their prevention?

☐ No ☐ Yes

THANKS FOR YOUR SUPPORT!!

SUBMIT

C. SBA Questionnaire

PREVENCIA ZRANENÍ V BASKETBALE

Dotazník pre basketbalových trénerov

Milí tréneri. Zaujímajú nás Vaše skúsenosti a názory v oblasti výskytu a prevencie zranení v basketbale. Prosím podporte náš výskum vyplnením tohto dotazníka. Výsledky budú spracované a použité pri zostavovaní študijných materiálov, ktoré Vám budú nápomocné pri Vašej práci.

Na úvod všeobecné informácie o Vašej osobe

Váš vek: ☐

Vaše pohlavie: ☐ Muž ☐ Žena

Trénerské vzdelanie: ☐ Žiadna úroveň ○ 1 ○ 2 ○ 3 ○ 4 ○ 5

Prípadné vedecké vzdelanie: ☐ Športový vedec ☐ Športový lekár ☐ Fyzioterapeut

Poznámka k trénerskému vzdelaniu:

NOVÉ OZNAČENIE	STARÉ OZNAČENIE
Trénerský kvalifikačný stupeň	***Trénerská kvalifikačná trieda (nadobudnutá a priznaná ZT SBA do 1.12.2008)***
bez	bez preukazu ZT SBA
1.	*tréner čakateľ
2.	III. trieda
3.	II. trieda
4.	*I. trieda • získaná (D)ŠT I. triedy, • absolvent bakalárskeho štúdia trénerstva** – špecializácia basketbal
5.	*I. trieda • získaná v rámci magisterského štúdia TV, • získaná (D)ŠT I. triedy po magisterskom štúdiu TV, Diplomovaný tréner • absolvent magisterského štúdia trénerstva** – špecializácia basketbal

* len pre potreby tohto dotazníka
** aj medziodborového štúdia trénerstva a učiteľstva TV

Družstvá akej vekovej kategórie trénujete?

1.	2.	3.
☐ Muži ☐ Ženy	☐ Muži ☐ Ženy	☐ Muži ☐ Ženy
☐ Seniori (18+) ☐ Mládežníci (14+) ☐ Deti (do 13)	☐ Seniori (18+) ☐ Mládežníci (14+) ☐ Deti (do 13)	☐ Seniori (18+) ☐ Mládežníci (14+) ☐ Deti (do 13)
Súťaž: ☐ Počet TJ v týždni: ☐	Súťaž : ☐ Počet TJ v týždni : ☐	Súťaž : ☐ Počet TJ v týždni : ☐

Poznámka: **(18+) – 18-roční a starší**
(14+) – 14-roční a starší
(do 13) – 13-roční a mladší

Nasledovné otázky sa zaoberajú Vašim osobným vnímaním zranení v basketbale

1. **Na 5 – bodovej škále ohodnoťte za ako významný problém považujete zranenia v basketbale?**

   ○ 5 ○ 4 ○ 3 ○ 2 ○ 1

   veľmi dôležitý problém *vôbec nie dôležitý problém*

2. **Ktoré špecifické zranenia sú podľa Vás najväčším problémom v basketbale? (max. 3 odpovede)**

   ☐ Zranenia hlavy ☐ Zranenia prstov ☐ Zranenia kolien ☐ Zranenia členkov

   ☐ Iné

3. **Aké sú podľa Vás hlavné príčiny zranení v basketbale? (max. 3 odpovede)**

   ☐ Nešťastné okolnosti ☐ Nedostatok regenerácie ☐ Zlá technika

   ☐ Fauly/nefér hra ☐ Nedostatočné rozcvičenie ☐ Zlé vybavenie (obuv,palubovka)

   ☐ Telesný kontakt ☐ Zlá fyzická kondícia ☐ Predchádzajúce zranenia

   ☐ Priveľký počet zápasov ☐ Iné

4. **Myslíte si, že je možné predchádzať zraneniam v basketbale?**

   ☐ Nie (prosím pokračujte otázkou 10) ☐ Áno, zraneniam v basketbale je možné predchádzať:

Táto časť dotazníka navodzuje problematiku prevencie zranení v basketbale

5. **Ako môže byť zredukovaný počet a/alebo závažnosť zranení v basketbale? (max. 3 odpovede)**

   ☐ Lepšou atletickou prípravou ☐ Upravením pravidiel ☐ Prísnejším rozhodovaním

   ☐ Dlhšou regeneráciou ☐ Ochrannými pomôckami ☐ Redukciou počtu súťažných zápasov

   ☐ Lekárskymi vyšetreniami ☐ Lepším vybavením ☐ Fyzioterapiou

   ☐ Preventívnymi tréningovými opatreniami (tréningové metódy)

   ☐ Iné

6. **Vykonávate preventívne tréningové opatrenia s Vašimi družstvami?**

   ☐ Nie (prosím pokračujte otázkou 10) ☐ Áno, a to: **(viacnásobná odpoveď možná)**:

   ☐ Posiľňovanie ☐ Rozcvičenie ☐ Atletické cvičenia

   ☐ Strečing ☐ Rovnovážne (balančné) cvičenia ☐ Koordinačné cvičenia

   ☐ Ukľudnenie ☐ Tréning (nácvik) techniky ☐ Kompenzačné cvičenia

   ☐ Iné

7. Kedy a ako často aplikujete tieto preventívne tréningové opatrenia?

☐ Počas prípravného obdobia	☐ každý tréning	☐ 1-krát/týždeň	☐ menej ako 1-krát/týždeň
☐ Počas sezóny	☐ každý tréning	☐ 1-krát/týždeň	☐ menej ako 1-krát/týždeň

8. Na 5 – bodovej škále ohodnoťte ako Vaši hráči majú radi (príjmajú) tieto preventívne tréningové opatrenia?

○ **5** ○ **4** ○ **3** ○ **2** ○ **1**

veľmi radi ***vôbec ich nemajú radi***

9. Na 5 – bodovej škále ohodnoťte, či je pre Vás aplikovanie preventívnych opatrení dobre známe a bezproblémové?

○ **5** ○ **4** ○ **3** ○ **2** ○ **1**

dobre známe ***potrebujem viac inštrukcií týkajúcich sa tohto problému***

10. Využívajú Vaši hráči nejaké iné preventívne opatrenia?

☐ Nie (prosím pokračujte otázkou 11) ☐ Áno, a to: **(viacnásobná odpoveď možná)**:

☐ Fyzioterapiu	☐ Chrániče zubov	☐ Tejping
☐ Ortézy	☐ Chrániče	☐ Lekárske prehliadky
☐ Masáž	☐ Iné:	

11. Poznáte nejaké konkrétne programy prevencie vzniku zranení v basketbale?

☐ Nie ☐ Áno (vymenujte):

12. Myslíte si, že vznik a prevencia zranení by mali byť neoddeliteľnou súčasťou vzdelávania trénerov v basketbale?

☐ Nie ☐ Áno

13. Potrebujete viac informácií o vzniku a prevencii zranení v basketbale?

☐ Nie ☐ Áno

ĎAKUJEME ZA VAŠU PODPORU!!

Odoslať dotazník

D. SBF Questionnaire

SVENSK BASKET

SKADEFÖREBYGGANDE ÅTGÄRDER INOM BASKETEN

Frågeformulär för basketränare

Du som ledare inom svensk basket är utvald att delta i denna undersökning. Studien kommer inte bara göra svensk basket bättre utan även europeisk. Vi är intresserade av dina erfarenheter och åsikter om basketskador och hur de kan förebyggas. Enkäten kommer fyllas i av utvalda coacher i andra länder också. SNÄLLA, stöd oss i vår undersökning genom att fylla i denna enkät.

Först av allt, en del allmän information om dig

Ålder: ☐

Kön: ☐ Man ☐ Kvinna

Coachutbildning: ☐ Ingen utbildning Steg: ○ 1 ○ 2 ○ 3 ○ 4

☐ Idrottsforskare ☐ Idrottsläkare ☐ Sjukgymnast

Vilka lag tränar du?

1.	**2.**	**3.**
☐ Män ☐ Kvinnor	☐ Män ☐ Kvinnor	☐ Män ☐ Kvinnor
☐ Seniorlag (18+)	☐ Seniorlag (18+)	☐ Seniorlag (18+)
☐ Ungdomslag (14+)	☐ Ungdomslag (14+)	☐ Ungdomslag (14+)
☐ Barn	☐ Barn	☐ Barn
Serie:	Serie:	Serie:
Träningar/vecka:	Träningar/vecka:	Träningar/vecka:

Följande frågor tar upp din personliga uppfattning om skador inom basketen.

1. **Tror du, på en 5-gradig skala, att skador är en stor del av basketens vardag?**

○ **5** ○ **4** ○ **3** ○ **2** ○ **1**

mycket viktig ***inte alls viktig***

2. **Vilka specifika skador ser du som det största problemet inom basketen? (3 svar max.)**

☐ Skallskador ☐ Fingerskador ☐ Knäskador ☐ Fotledsskador

☐ Andra Skador ☐

3. **Vad anser du är huvudorsaken till basketskador? (3 svar max.)**

☐ Otur ☐ För kort återhämtning ☐ Dålig teknik

☐ Fouls/Ojuste spel ☐ Otillräcklig uppvärmning ☐ Dålig utrustning

☐ Kroppskontakt ☐ Dålig fysisk form ☐ Tidigare skador

☐ För många matcher ☐ Andra orsaker ☐

4. **Tror du att basketskador kan förebyggas?**

☐ Nej (Var vänlig, gå till fråga 10) ☐ Ja, basketskador kan förebyggas

Denna del av frågeformuläret tar upp frågan om skadeförebyggande metoder inom basketen

5. Hur kan antalet skador och/eller graden av skador inom basketen minskas? (3 svar max.)

☐ Bättre fysisk förberedelse ☐ Ändring av regler ☐ Hårdare domare
☐ Längre återhämtning ☐ Skydd (ex. fotled, tand) ☐ Färre matcher
☐ Medicinsk undersökning ☐ Bättre utrustning ☐ Förebyggande träning
☐ Sjukgymnastik ☐ Andra

6. Utför du någon skadeförebyggande träning med ditt lag?

☐ Nej (gå till fråga 10) ☐ Ja, med hjälp av **(flera svar möjliga)**
☐ Styrketräning ☐ Uppvärmning ☐ Kroppsstyrka
☐ Stretching ☐ Balansövningar ☐ Koordinationsövningar
☐ Nedvarvning ☐ Teknikträning ☐ Rörlighetsövningar
☐ Andra

7. När och hur ofta använder du den skadeförebyggande träningen?

☐ Under försäsongen: ☐ Varje träning ☐ En gång i veckan ☐ Mindre än en gång i veckan
☐ Under säsongen: ☐ Varje träning ☐ En gång i veckan ☐ Mindre än en gång i veckan

8. På en 5-gradig skala, vad tycker dina spelare om den skadeförebyggande träningen?

○ **5** ○ **4** ○ **3** ○ **2** ○ **1**

Tycker om den mycket ***Tycker inte om den***

9. På en 5-gradig skala, känner du dig bekväm med och känner du att du behärskar att tillämpa skadeförebyggande träning?

○ **5** ○ **4** ○ **3** ○ **2** ○ **1**

känner väl till ***behöver mer undervisning i denna fråga***

10. Använder dina spelare andra skadeförebyggande åtgärder?

☐ Nej (gå till fråga 11) ☐ Ja, med hjälp av **(flera svar möjliga)**:
☐ Sjukgymnastik ☐ Tandskydd ☐ Tejpning
☐ Ortoser/skydd ☐ Protectors/skydd ☐ Medicinsk undersökning
☐ Massage ☐ Andra

11. Känner du till några särskilda program för att förhindra skador i basketen?

☐ Nej ☐ Ja, nämligen

12. Tycker du att skador och deras förebyggande ska integreras som en del i baskettränarutbildningen?

☐ Nej ☐ Ja

13. Behöver du mer information om skador inom basketen och hur skador kan förebyggas?

☐ Nej ☐ Ja

Denna del av frågeformuläret tar upp frågan om BASKETSMART

14. Har du hört talas om Basketsmart?

☐ Nej ☐ Ja

15. Använder du dig av Basketsmart?

☐ Nej ☐ Ja

16. Har du fått utbildning i Basketsmart?

☐ Nej (gå till fråga 27) ☐ Ja

17. När gick du utbildning i Basketsmart?

☐ 2008 ☐ 2009 ☐ 2010

18. Vilken instruktör hade du?

☐ Jörgen Sandberg ☐ Malin Larsson ☐ Mats Jansson ☐ Emad Karandish

☐ Annan eller kommer inte ihåg

19. Har du använt dig av Basketsmart sedan utbildningen?

☐ Nej ☐ Ja

20. Vid hur många av dessa kör ni Basketsmart?

☐ 0 ☐ 1 ☐ 2 ☐ 3 eller flera

21. Hur går du till väga med att instruera spelarna vid de praktiska momenten?

☐ Visar ☐ Muntlig instruktion ☐ Använder deltagare

☐ Annat

22. Hur har upplägget fungerat?

☐ För långt ☐ För kort ☐ Svårt att hinna med

☐ För mycket fokus på något moment i programmet

☐ Annat

23. Har du stött på några svårigheter/problem i utövandet av Basketsmart? Beskriv.

24. Vad tycker dina spelare om att värma upp med Basketsmart? (flera svar möjliga)

☐ Roligt ☐ Tråkigt ☐ Spelarna förstår varför ☐ Förstår inte varför

☐ ”Nödvändigt ont” ☐ Långtråkigt ☐ Inspirerande

25. Hur många knäskador har ni haft sedan ni började använda er av basketsmart (med knäskada avses akut förseelse som lett till kontakt med sjukvården eller frånvaro från träning i minst en vecka).

☐ 0 ☐ 1 ☐ 2 ☐ 3 eller flera

26. Hur många korsbandsskador har ni haft sedan ni började använda er av basketsmart?

☐ 0 ☐ 1 ☐ 2 ☐ 3 eller flera

27. Utför du någon form av hoppträning idag? I så fall vilken?

☐ Nej ☐ Ja, nämligen **(flera svar möjliga)**:

☐ Häckhoppning ☐ Rephoppning ☐ Plyometriska hopp ☐ Hopp i trapp

☐ Andra

STORT TACK FÖR ATT DU TOG DIG TID ATT FÖRBÄTTRA SVENSK BASKET!

Returnera frågeformuläret

E. CHF Questionnaire

PREVENCE SPORTOVNÍCH ZRANĚNÍ V HÁZENÉ

Dotazník pro trenéry házené

Vážení trenéři, žádáme Vás o vyplnění následujícího dotazníku, ve kterém se zajímáme o Vaše zkušenosti a názory k otázce problematiky sportovních zranění v házené a jejich prevenci. Předem Vám děkujeme za spolupráci při vyplňování.

Obecné informace

Věk: ☐

Pohlaví: ☐ Muž ☐ Žena

Trenérské vzdělání: ☐ Žádné ☐ Trenérská třída ○ A ○ B ○ C

☐ Sportovní teoretik ☐ Kondiční trenér ☐ Fyzioterapeut

Které oddíly trénujete?

1.	2.	3.
☐ Muži ☐ Ženy	☐ Muži ☐ Ženy	☐ Muži ☐ Ženy
☐ Tým dospělých (18+)	☐ Tým dospělých (18+)	☐ Tým dospělých (18+)
☐ Mládežnický tým (14+)	☐ Mládežnický tým (14+)	☐ Mládežnický tým (14+)
☐ Děti	☐ Děti	☐ Děti
Liga ☐	Liga ☐	Liga ☐
Trénink/týden ☐	Trénink/týden ☐	Trénink/týden ☐

Otázky Vašeho osobního názoru k problematice sportovních zranění v házené

1. Na 5ti stupňové škále ohodnoťte důležitost problematiky zranění v házené?

○5 ○4 ○3 ○2 ○1

velmi důležitá *není důležitá*

2. Zranění které určité tělesné oblasti považujete v házené za nevýznamější problém? (Nejvíce 3 odpovědi)

☐ V oblasti hlavy ☐ V oblasti ruky ☐ V oblasti kolene ☐ V oblasti kotníku

☐ Jiné ☐

3. Co podle Vás nejčastější příčinou vzniku zranění v házené? (Nejvíce 3 odpovědi)

☐ Náhoda ☐ Nedostatek regenerace ☐ Nedostatečná technika

☐ Fauly/ „unfair“ hra ☐ Nedostatečné rozcvičení ☐ Nedostatečné vybavení

☐ Tělesná kontakt ☐ Nízká kondiční připravenost ☐ Předchozí zranění

☐ Vysoká četnost utkání ☐ Jiné ☐

4. Myslíte si, zda je možné zranění v házené předcházet?

☐ Ne (přejděte přímo na otázku 10) ☐ Ano

Otázky Vašeho osobního názoru k problematice prevence sportovních zranění v házené

5. Jakým způsobem může být podle Vás snížena četnost a míra závažnosti zranění v házené? (Nejvíce 3 odpovědi)

☐ Lepší kondiční připraveností ☐ Úpravou pravidel ☐ Přísnější dodržování pravidel
☐ Dostatečnou regenerací ☐ Snížením počtu utkání ☐ Používáním ochranných pomůcek
☐ Preventivní lékařské prohlídky ☐ Lepší vybavení ☐ Preventivními pohybovými programy
☐ Fyzioterapie ☐ Jiné

6. Provádíte ve svém týmu nějaké preventivní kroky s cílem snížení rizika vzniku zranění?

☐ Ne (přejděte přímo na otázku 10) ☐ Ano, **(více možných odpovědí)**:

☐ Posilování ☐ Rozcvičení ☐ Atletická cvičení
☐ Protahování ☐ Balanční cvičení ☐ Koordinační cvičení
☐ Zklidnění ☐ Trénink techniky ☐ Uvolňovací cvičení
☐ Jiné

7. Kdy a jak často provádíte tyto preventivní kroky?

☐ Během přípravného období: ☐ každý trénink ☐ 1 týdně ☐ méně než jednou týdně
☐ Během soutěžního období: ☐ každý trénink ☐ 1 týdně ☐ méně než jednou týdně

8. Na 5ti stupňové škále ohodnoťte oblíbenost preventivních kroků u vašich svěřenců.

○ **5** ○ **4** ○ **3** ○ **2** ○ **1**

velmi oblíbené ***nejsou oblíbené***

9. Na 5ti stupňové škále ohodnoťte míru aplikovtelnosti preventivníchkroků.

○ **5** ○ **4** ○ **3** ○ **2** ○ **1**

dobře aplikovatelné ***složitě aplikovatelmné***

10. Využívají vaši svěřenci preventivní opatření snižující riziko vzniku zranění?

☐ Ne (přejděte přímo na otázku 11) ☐ Ano, **(více možných odpovědí)**:

☐ Fyzioterpie ☐ Chrániče zubů ☐ "Tejpování"
☐ Ortézy ☐ Chrániče ☐ Preventivní lékařské prohlídky
☐ Masáže ☐ Jlné

11. Znáte některé konkrétní preventivní programy pro prevenci zranění v házené?

☐ Ne ☐ Ano (jaké?)

12. Měla by být problematika sportovních zranění v házené a možnosti její prevence nedílnou součástí vzdělávání trenérů?

☐ Ne ☐ Ano

13. Chtěli byste se dozvědět více o sportovních zraněních v házené, preventivních opatřeních a preventivních programech snižujících riziko jejich vzniku?

☐ Ne ☐ Ano

DĚKUJEME ZA VYPLNĚNÍ DOTAZNÍKU!!

Předložit dotazník

F. NHF Questionnaire

Norges Håndballforbund

FOREBYGGING AV SKADER I HÅNDBALL

Kjære trener. Vi ønsker å få kunnskap om din erfaring og oppfatning om forebygging av skader i håndball. Vi håper du tar deg tid til å fylle ut spørreskjemaet.

FYLLES UT AV TRENERE:

Generell informasjon om deg som trener

Alder: ☐

Kjønn: ☐ Mann ☐ Kvinne

Trener utdanning: ☐ Ingen ☐ Nivå: ○ 1 ○ 2 ○ 3 ○ 4 ○ 5

☐ Idretts forsker ☐ Idretts lege ☐ Fysioterapeut

Hvilke lag trener du?

1.	2.	3.
☐ Menn ☐ Kvinner	☐ Menn ☐ Kvinner	☐ Menn ☐ Kvinner
☐ Senior (18+) ☐ Ungdom (14+) ☐ Barn	☐ Senior (18+) ☐ Ungdom (14+) ☐ Barn	☐ Senior (18+) ☐ Ungdom (14+) ☐ Barn
Lag ☐	Lag ☐	Lag ☐
Antall økter pr uke ☐	Antall økter pr uke ☐	Antall økter pr uke ☐

De følgende spørsmålene har med din oppfatning av skader i håndball

1. **På en 5-punkts skala, hvor stort problem utgjør skader i håndball?**

○ 5 ○ 4 ○ 3 ○ 2 ○ 1

stort problem ***ikke noe problem i det hele tatt***

2. **Hvilke skadetyper er verst i håndball? Maks 3 svar**

☐ Hodeskader ☐ Finger skader ☐ Kne skader ☐ Ankel skader ☐ Skulder Skader

☐ Andre ☐

3. **Hva anser du som mulige årsaker til skader i håndball? Maks 3 svar**

☐ Uhell ☐ Mangel på restitusjon / hvile ☐ Dårlig teknikk

☐ Ureglementert spill / ”unfair” spill ☐ For dårlig oppvarming ☐ Dårlig utstyr

☐ Kollisjon / kropps kontakt ☐ Dårlig fysikk ☐ Tidligere skader

☐ For mange kamper ☐ Andre ☐

4. **Tror du skader i håndball kan forebygges?**

☐ Nei, gå til spørsmål 10 ☐ Ja, håndball skader kan forebygges ved

De følgende spørsmålene handler om forebygging av skader

5. **Hvordan kan antallet og/eller alvorlighetsgraden av skader i håndball reduseres? Maks 3 svar**

☐ Bedre trente/forberedte utøvere ☐ Regelendringer ☐ Strengere ledere
☐ Bedre rehabilitering ☐ Beskyttelses utstyr ☐ Redusere antall kamper
☐ Medisinsk screening ☐ Bedre utstyr ☐ Forebyggende trening
☐ Fysioterapi ☐ Andre

6. **Gjør du forebyggende trening med laget?**

☐ Nei (gå til spørsmål 10) ☐ Ja, disse **Bruk så mange svaralternativer som du ønsker**

☐ Styrke ☐ Oppvarming ☐ Spesifikke drilløvelser
☐ Tøyninger ☐ Balanse øvelser ☐ Koordinasjons øvelser
☐ Nedvarming ☐ Teknikk trening ☐ Bevegelighets trening
☐ Andre

7. **Når og hvor ofte gjør dere denne type øvelser?**

☐ I forsesongen ☐ hver trening ☐ en gang pr uke ☐ mindre enn en pr uke
☐ I sesongen ☐ hver trening ☐ en gang pr uke ☐ mindre enn en pr uke

8. **På en 5 punkts skala, hvor godt liker spillerne denne type treningsøvelser?**

○ 5 ○ 4 ○ 3 ○ 2 ○ 1

Liker det svært godt ***misliker treningen***

9. **På en 5 punkts skala, hvor kjent og komfortabel er du med denne type treningsøvelser?**

○ 5 ○ 4 ○ 3 ○ 2 ○ 1

Svært godt kjent ***trenger mer instruksjon***

10. **Bruker spillerne andre forebyggende tiltak?**

☐ Nei, gå til spørsmål 11 ☐ Ja, disse **Bruk så mange svaralternativer som du ønsker**

☐ Fysioterapi ☐ Tannbeskytter ☐ Teip
☐ Skinner / ortoser ☐ Annet beskyttelsesutstyr ☐ Medisinsk screening
☐ Massasje ☐ Andre

11. **Kjenner du til noen spesielle program som forebygger skader i håndball?**

☐ Nei ☐ Ja, disse:

12. **Synes du at skader og hvordan de kan forebygges skal være en integrert del av trenerutdanningen i håndball?**

☐ Nei ☐ Ja

13. **Ønsker du mer kunnskap om håndballskader og forebygging av dem?**

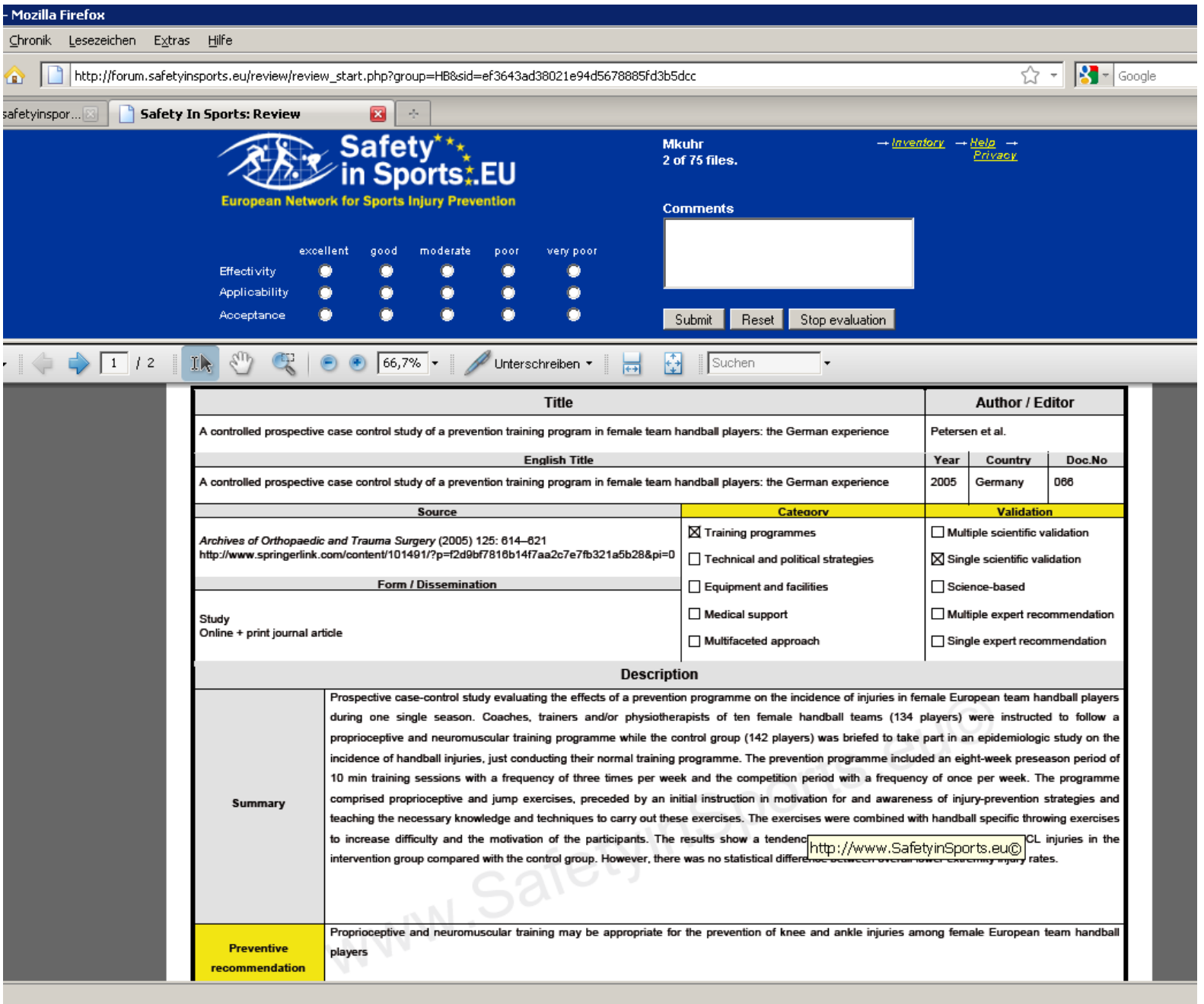
☐ Nei ☐ Ja

14. **Har du besøkt/bruker nettsiden www.skadefri.no?**

☐ Nei ☐ En gang ☐ Av og til ☐ Jevnlig

TUSEN TAKK FOR HJELPEN!! Send inn

G. Online Evaluation Tool Screenshot



Title	Author / Editor
A controlled prospective case control study of a prevention training program in female team handball players: the German experience	Petersen et al.

English Title	Year	Country	Doc.No
A controlled prospective case control study of a prevention training program in female team handball players: the German experience	2005	Germany	066

Source	Category	Validation
Archives of Orthopaedic and Trauma Surgery (2005) 125: 614–621 http://www.springerlink.com/content/101491/?p=f2d9bf7816b14f7aa2c7e7fb321a5b28&pi=0	☒ Training programmes ☐ Technical and political strategies ☐ Equipment and facilities ☐ Medical support ☐ Multifaceted approach	☐ Multiple scientific validation ☒ Single scientific validation ☐ Science-based ☐ Multiple expert recommendation ☐ Single expert recommendation
Form / Dissemination Study Online + print journal article		

Description

Summary

Prospective case-control study evaluating the effects of a prevention programme on the incidence of injuries in female European team handball players during one single season. Coaches, trainers and/or physiotherapists of ten female handball teams (134 players) were instructed to follow a proprioceptive and neuromuscular training programme while the control group (142 players) was briefed to take part in an epidemiologic study on the incidence of handball injuries, just conducting their normal training programme. The prevention programme included an eight-week preseason period of 10 min training sessions with a frequency of three times per week and the competition period with a frequency of once per week. The programme comprised proprioceptive and jump exercises, preceded by an initial instruction in motivation for and awareness of injury-prevention strategies and teaching the necessary knowledge and techniques to carry out these exercises. The exercises were combined with handball specific throwing exercises to increase difficulty and the motivation of the participants. The results show a tendenchttp://www.SafetyinSports.eu©CL injuries in the intervention group compared with the control group. However, there was no statistical differe[illegible] rates.

Preventive recommendation

Proprioceptive and neuromuscular training may be appropriate for the prevention of knee and ankle injuries among female European team handball players

www.SafetyinSports.eu