

Health in Elite Sports – a “Bio-Psycho-Social” Perspective

Gesundheit im Spitzensport – eine „biopsychosoziale“ Sichtweise

Summary

- › **Background:** In the medical practice of elite sports, health, injury, and illness are mostly handled from an exclusively biomedical perspective. However, research has shown that dealing with health in elite sports is strongly influenced by a so called “culture of risk”. Athletes are willing to take extreme health risks in order to be successful in important competitions, and they find themselves in a permanent action dilemma between the necessity of risking and securing their own health at the same time. Our paper emphasises the importance of integrating psychological and social factors into health management strategies in elite sport.
- › **Method:** The article is based on data from the German Young Olympic Athletes’ Lifestyle and Health Management Study (GOAL Study). This nationwide mixed-method study combines quantitative and qualitative approaches in order to gather a broad range of representative information on squad athletes from all Olympic disciplines as well as in-depth information on selected Olympic disciplines.
- › **Results:** Injuries and pain are everyday epiphenomena of elite sports, already at young age. In many cases, injuries are the result of a complex interplay of biological, psychological and social processes. Athletes are used to train and compete under constant suffering of pain. In order to fulfil sports specific expectations they develop behavioural patterns that outside the context of elite sports would be characterised as harmful. The process of internalising these patterns already starts in adolescence. Coaches play an important role in this process. Athletes implicitly learn to partly give up their individual pain sensorium.

Zusammenfassung

- › **Hintergrund:** In der medizinischen Praxis des Spitzensports werden Gesundheit, Verletzung und Krankheit in der Regel primär aus biomedizinischer Perspektive betrachtet. Die sozialwissenschaftliche Forschung der letzten Jahre hat allerdings gezeigt, dass Gesundheit im Spitzensport durch eine “Kultur des Risikos” geprägt ist. Athletinnen und Athleten stehen vor der Herausforderung, ihre Gesundheit gleichzeitig zu sichern und zu riskieren. Unsere Studie zeigt die Notwendigkeit auf, psychologische und soziale Faktoren in Gesundheitsmanagementstrategien im Spitzensport zu integrieren.
- › **Methode:** Der Artikel basiert auf Daten der German Young Olympic Athletes’ Lifestyle and Health Management Study (GOAL Study). In dieser deutschlandweiten Mixed-Method-Studie wurden quantitative und qualitative Verfahren kombiniert um gleichzeitig möglichst breit gefächerte und detaillierte Informationen über den Umgang mit Gesundheit bei Kaderathleten im Nachwuchssport zu erhalten.
- › **Ergebnisse:** Verletzungen und Schmerzen sind alltägliche Begleiterscheinungen des Spitzensports, bereits im Jugendalter. Sie sind häufig das Resultat eines komplexen Zusammenspiels von biologischen, psychologischen und sozialen Prozessen. Athleten sind daran gewöhnt, unter ständigen Schmerzen zu trainieren und an Wettkämpfen teilzunehmen. Um die Erwartungen des Spitzensports zu erfüllen, entwickeln sie Verhaltensmuster, die außerhalb des Sports als pathologisch gelten würden. Die Sozialisation in diese Muster beginnt bereits im Jugendsport. Trainer spielen hier eine wichtige Rolle. Athleten lernen implizit, ihr individuelles Schmerzsensorium teilweise auszuschalten.

KEY WORDS:

Health in Elite Sports, Sports Injuries, Biopsychosocial Perspective, Psychosocial Factors

SCHLÜSSELWÖRTER:

Gesundheit im Spitzensport, Nachwuchsathleten, Sportverletzungen, biopsychosoziale Sichtweise, psychosoziale Faktoren

Introduction

When we started with our research about sociological factors of health in elite sports several years ago, a sports federations’ representative told us:

„In our sport, health problems don’t have anything to do with the psyche or the environment. All health problems in our sport can be traced back to either traumatic or orthopaedic causes”.

Taken together, foregoing studies (1, 5, 6, 10, 13, 18, 20, 23) have shown that this is a common mis-

judgement. Health, injury, and illness in elite sports are closely connected with social factors (7). Firstly, the term “health” in the context of elite sports is directly linked to the ability to perform in a competition. Secondly, the ability to perform on a top level has the highest priority with regard to health related decisions. Thirdly, the individual perception of health related complaints, such as pain or sickness, is strongly influenced by the so called “culture >

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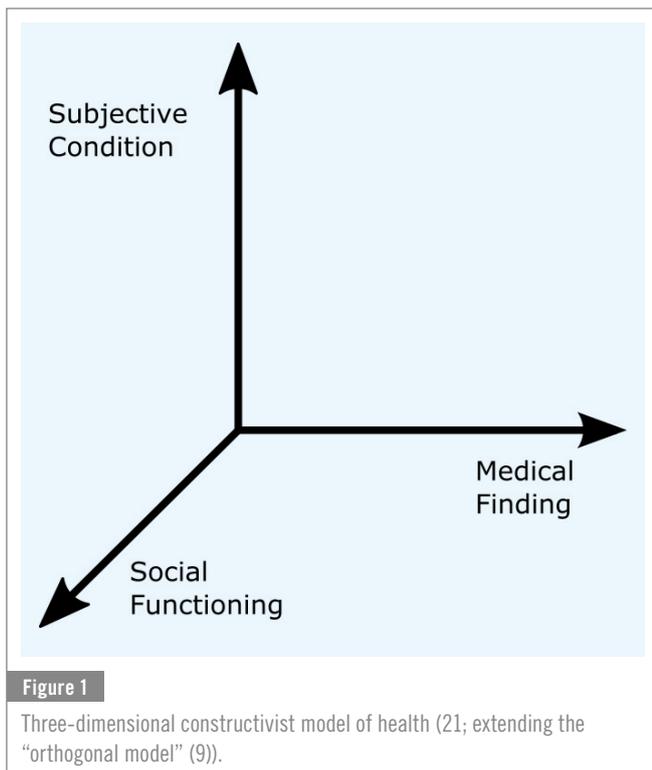
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of risk” in elite sports. This culture of risk is characterised by normalising the occurrence of injuries and accepting the inherent health risks in sports. Fourthly, athletes are willing to take great health risks in order to succeed in important competitions. Fifthly, athletes find themselves caught in a permanent action dilemma, namely between the necessity of risking and securing their health at the same time.

However, in the medical practice of elite sports, issues of health, injury, and illness are most commonly addressed from one single perspective. Physicians and coaches often focus on biomedical aspects of injuries and complaints and rarely try to integrate different understandings of health. The consequence is that relevant factors in the genesis of injuries and complaints are ignored. A multi-perspective analysis of elite athletes’ state of health seems therefore highly important for health management strategies.

Our paper addresses the question of how psychological and social factors influence the genesis of injuries and subjective complaints in elite sports. The article also has the function to give an overview about the detailed analyses of the GOAL study. In the following, we will first outline the biopsychosocial understanding of health. Then we will present some exemplary findings from the German Young Olympic Athletes’ Lifestyle and Health Management Study (GOAL Study) (19) in order to show how the biomedical, psychological and social dimensions of health are related to each other.

The Biopsychosocial Perspective on Health

Already in 1946, the World Health Organization claimed that health can be understood in different ways. Health, according to the definition of the WHO, is “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” (22). The idea of analysing health from an interdisciplinary perspective is, therefore, nothing new. Conceptually, one of the most prominent approaches of the 20th century was the so called “biopsychosocial model”. In this regard, particularly George L. Engel’s (2) model of illness and

healing had great influence on the health sciences. The main conclusion of Engel’s model is that illnesses can only be explained appropriately if biological, psychological, and social factors (and their interdependencies) are taken into account.

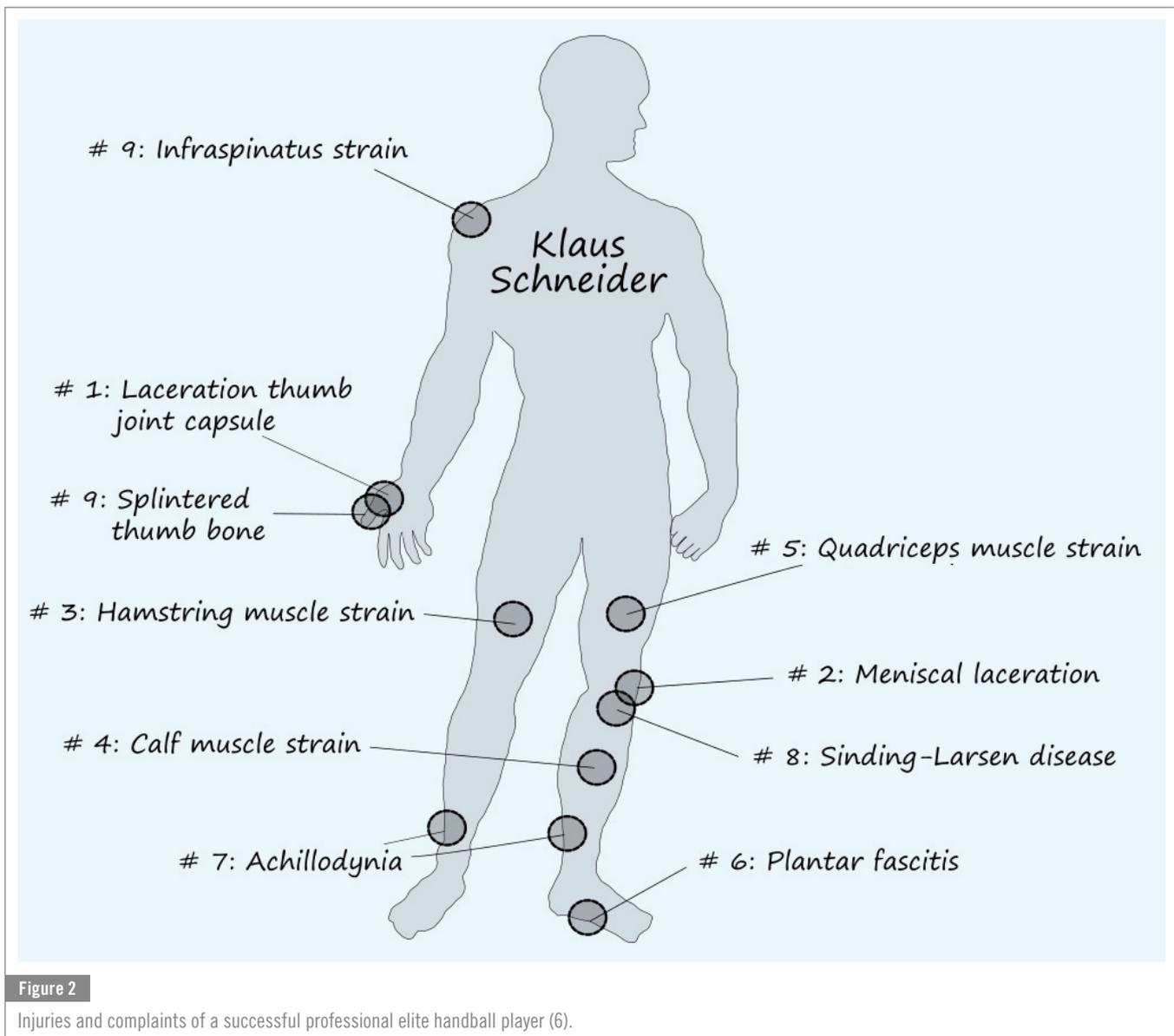
Engel’s model led to a broader understanding of the factors that cause (particularly non-communicable) diseases. It also influenced the clinical practice by paving the way for the assignment of integrated disciplinary teams in health care (3). Despite its success, the model drew a lot of criticism, nevertheless. One of the model’s major weaknesses is its holistic self-definition. The biological, social, and psychological dimensions of illness are explained as one entity which is conceptually inconsistent (4). Methodologically, it is not only a “paradigmatic incommensurability” that inhibits the amalgamation of different disciplinary perspectives, but it is also the fact that these different disciplinary perspectives on health do not even share the same subjects and objectives. Sociological explanations of health, for example, mostly ignore physiological processes. Physiological models, on the other hand, often do not consider environmental preconditions that lead to illnesses and injuries.

However, these arguments do not generally speak against an analysis of health and illness from different perspectives. Still, one has to keep in mind that one specific disciplinary perspective only allows the analysis of specific parts of a bigger picture (8). We therefore make the argument for a multi-disciplinary, constructivist view on health in elite sports. This approach implicates the analysis of different dimensions of health, which have to be integrated on a transdisciplinary level. The different bio-, psycho- and social dimensions of health are firstly the medical finding, secondly the subjective condition and thirdly the social functioning (21). We define a „medical finding” as the medical diagnosis of an illness or injury which requires the application of natural scientific methods (e.g. exercise ECG, X-ray). The term “subjective condition” refers to an individual’s feelings and attitudes towards health and can only be analysed by using subjective reports (e.g. questionnaires, interviews, experiments). Finally, to observe “social functioning”, as the ability of a person to fulfil his or her roles and social expectations, one needs a sociological understanding of the specific contexts in which injuries or illnesses might occur (e.g. family, workplace or elite sports team).

In elite sport, health problems are usually handled on the basis of medical findings. However, whether and how medical findings are treated depends on two aspects: on the one hand it depends on the athlete’s subjective experience of the severity of this finding; on the other hand it depends on the social functioning of the athlete, i.e. whether he/she is able to practise/ compete or not. In the following, we analyse how the athletes’ subjective experiences of health problems and the dominant relevance of social functioning shape the handling of medical issues in elite sport (Figure 1).

Method

To analyse interdependencies of biological, psychological and social factors of health in elite sports, we use data from the German Young Olympic Athletes’ Lifestyle and Health Management Study (GOAL Study). This nationwide mixed-method study combines quantitative and qualitative approaches in order to gather a broad range of representative information on squad athletes from all Olympic disciplines as well as in-depth information on selected Olympic disciplines (19). First, we conducted a survey with 1138 young elite athletes from all Olympic sport disciplines (at least at the lowest national squad



(in Germany D/C squad) or a corresponding team level), using a 24-page bound questionnaire consisting of 85 questions (overall response rate: 61,75%). These questions covered the athletes' health status, health-related behaviour, lay health representations including subjective concepts toward nutrition as well as their health-related social networks, socio-demographics, and discipline-specific information. Second, we did case studies in four Olympic disciplines: artistic gymnastics, biathlon, handball and wrestling. Here we led 50 biographical interviews with young elite athletes, coaches and physicians. These interviews included biographical visualisations (mappings) of their health related history. Furthermore, we systematically observed the health related behaviour of athletes, coaches and medical staff for more than 50 days during training and competition. Additionally, in two following sub-studies, we analysed health management systems in Olympic Training Centres and conducted experiments with young female athletes in handball and judo in order to study their body image and body scheme.

The study was conducted between January 2010 and March 2014 and it was funded by the Federal Institute of Sport Science (BISp) in Bonn, Germany. The study's project partners were the University of Tübingen's Institute of Sport Science and the Department of Psychosomatic Medicine and Psychotherapy, and the Mannheim Institute of Public Health, Social and

Preventive Medicine at Heidelberg University. The Medical Faculty of Tübingen's ethics committee approved the research project (222/2009B01).

In order to show the relevance of medical issues in young elite sports, we will report how many days of competition the 1138 athletes missed due to injuries or illnesses. In order to illustrate a possible "endpoint" of an athletic career, we further refer to selected qualitative data from our foregoing Health in Elite Sport Study with adult elite athletes (6, 20). In order to analyse the biopsychosocial complexity of injury genesis and health experience of the athletes, we refer to prototypical case studies of the GOAL study. The basis of these cases are the 50 biographical interviews which include 24 semi-narrative biographical in-depth interviews with 14- to 18-year-old national squad members from the Olympic disciplines artistic gymnastics, biathlon, handball, and wrestling (17). The disciplines were selected based on a contrastive sampling. The interviews, which lasted 50–150 min, were conducted at either the athletes' training sites, their homes, or during national training camps. A narrative-thematic interview style was used to provide a framework in which the adolescents could share both key moments in their ongoing involvement in elite sport, as well as experiences with health and ill-health. The athletes were additionally asked to record crucial events on a diagram, which was used as a >

supportive tool within the guided interviews and helped the adolescents to adopt a biographical perspective in their narrations (19, 6). Interview transcripts were created using a simplified conversation-analysis transcription style. A reconstructive, conversational analysis method was then carried out to identify athletes' pain and injury experiences (16, 17). For validation, the material was analysed in a group discussion with experts for qualitative research and triangulated with observations of the athletes' training practices and competitions.

The combined biographical interview and mapping method is particularly suitable for the re-constructive analysis of socialisation processes. In contrast to longitudinal studies, the subjects can contextualize the subjective experience of certain events and report about processes of internalization of social norms and values (16).

In the following, we will firstly show that already in young elite sports, injuries and complaints are "normalised". Secondly, we will discuss that even traumatic events are the result of complex biopsychosocial interactions, in which the subjective experience of injuries and pain is shaped by the specific social dynamics of elite sports. Thirdly, we will outline that for athletes the trivialisation of medical findings is a prerequisite of exceeding limits in order to get better.

Results

Injuries as a "Socially Normal" Phenomenon in Elite Sports

The following illustration (Fig. 2) represents an injury map of a professional adult top athlete (the name was changed) in the middle of his internationally successful career (6). A relevant accumulation of medical findings is shown. This clinical presentation is typical for successful athletes with long-lasting careers (20) (Figure 2).

Taking a look at a short period of the injury-biography of this "typical" athlete (Fig. 3), we see three phenomena that are characteristic for the social context "elite sports": First, the subjective grade of complaint does not necessarily correspond with injury lay-offs. Moreover, a successful participation in competitions can be maintained despite pain and medical diagnoses of overload injuries. Second, the subjective grade of complaints is significantly lower if the number of competitions is reduced and physiotherapy is increased. Third, most complaints have a history of being ignored, trivialised, and masked by using pain killers (Figure 3).

A relevant accumulation of injuries and complaints is already observable in adolescent elite sports. The GOAL study data also shows that most athletes regularly missed competitions and had to take training breaks because of injuries and illnesses.

„Well, without injuries ... it doesn't work. It's IMPOSSIBLE that one ... after so many years never has had an injury or that everything goes fine. That's impossible ... because the body is strained too much ... it CAN'T bear it. (...) Okay, it is simply part of it. (Gymnastics, male athlete, 17 years old).

On average, athletes missed 6,7 days of competition (4,6 injury, 2,1 illness-related) in the season prior to our survey. Social functioning, as the ability to compete, is therefore reduced by biomedical problems. However, this interrelation varies between sports. Most missed competition days were reported in power sports (such as weight lifting, discus, javelin or shot put; mean: 6,5 days; standard deviation: 7,5), in ball games (mean: 6,7 days; standard deviation: 9,8), and in aesthetic sports (such as artistic gymnastics, rhythmic gymnastics, or figure skating;

6,5 days; standard deviation: 15,0). The lowest number of missed competitions days (mean: 2,9 days, standard deviation: 5,5) was found in technical sports (such as golf, long- and high-jump, rifle-shooting). Training breaks induced by injuries and illnesses were particularly often reported in power sports (7,9 weeks on average; standard deviation: 7,6) and in aesthetic sports (6,4 weeks; standard deviation: 6,9). Especially in ball sports (5,0 weeks, standard deviation: 4,9), missed competition days were not always accompanied by training breaks. This indicates that in some sports significant injuries or illnesses do not necessarily lead to a rest period. In these cases, the athletes maintain their social functionality despite being diagnosed with an injury or illness, which, in consequence, may lead to an underestimation of even severe injuries and complaints.

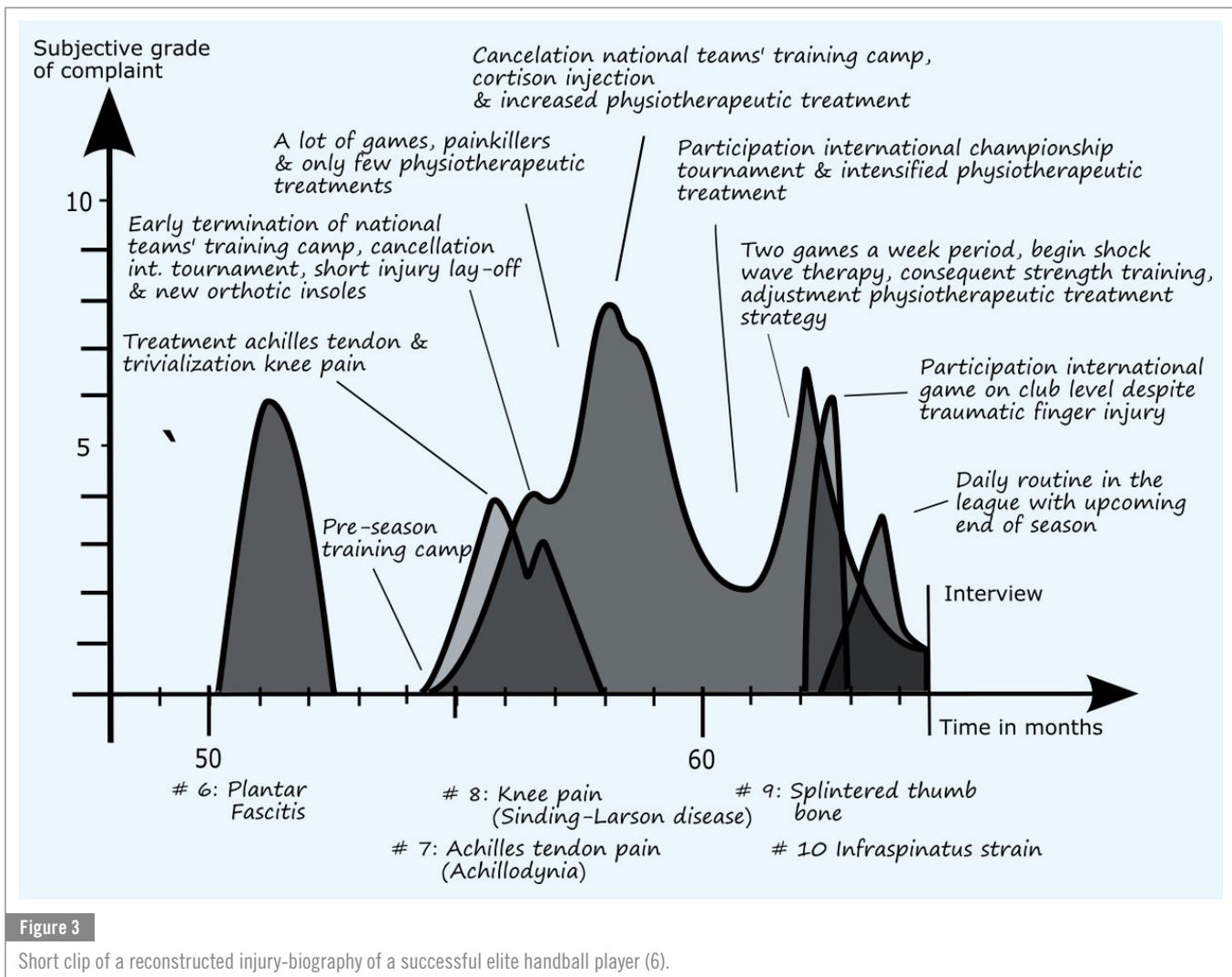
Subjective Health Condition and Social Functioning

Our findings confirm foregoing research that even traumatic events are the result of complex biopsychosocial interactions in which social dynamics lead to the injuries. A major factor in this regard is the tendency to underestimate the severity of already diagnosed injuries and illnesses as long as athletes socially function, which means that they are able to compete.

Our interviews with athletes reveal that their subjective health condition is also very much influenced by the grade of sport specific functioning (16, 17). Accordingly, athletes expect from sport specific health management first and foremost that injuries are "repaired" as soon as possible. Hence, the understanding of health (in both athletes and coaches) is predominantly "mechanical" (15, 17). In contrast, long-lasting therapy that aims to permanently heal complaints is only the second choice. This understanding is particularly problematic with regard to overuse problems. On the one hand, overuse problems are often not identified as the result of a complex process that is dragged on over years. On the other hand, these problems are considered to be easily solved by decreasing training load and prescribing painkillers. In the long-run, this focus on aggressive short-term-solutions can lead to massive health damages.

In foregoing papers, we discussed that particularly the foundation for overuse syndromes (such as plantar fasciitis, achilodynia or stress fractures) is often laid in the phase of adolescence, when athletes qualify for higher performance levels (16, 17). The following exemplary biographical re-construction (Fig. 4) shows that the subjective grade of performance (as a measure of social functioning) and subjective health hardly correlate (19). The detailed analysis of this biographical mapping also reveals the influence of so called status passages from a lower to a higher performance level. Both starting to train at a national training centre and the assignment to a national youth squad correlate with a decrease in the athlete's subjective state of health. A closer look at the graph also shows other interdependencies of different aspects of health. Nutrition, for example, is not relevant at all before the athlete becomes a member of the youth national squad, whereas the transfer to a boarding school for example leads to a higher subjective relevance of health. In turn, the subjective relevance of health frequently drops during competition breaks, when sports specific functioning is less relevant (Figure 4).

Especially health related growth problems in young athletes (such as apophysitis, epiphyseal injuries, or stress fractures) seem to be a result of a "deceptive structural synchronicity" between the social structures of talent fostering on the one hand and the biopsychosocial development of the individual athlete on the other (16). Social structures in young elite sports imply a linear development. But the fact that individual development is



non-linear and multi-dimensional can lead to a mismatch between the individual developmental state and sports specific requirements. Particularly the change of reference groups caused by the transfer to a higher performance level can catalyse these incongruities of load and load-bearing capacity (16).

Coaches and athletes are rarely aware that developmental asynchronicity can cause severe subjective health complaints and be a relevant cause of a medical finding such as apophysitis. In most cases, growth problems are rather trivialised, and teams do therefore not have individually tailored strategies at their disposal in order to prevent growth induced health damage (17).

Subjective Trivialising of Medical Findings as a Prerequisite of Social Functioning

Trivialising medical findings and normalising subjective complaints is a complex biopsychosocial interplay that is the result of a long-lasting socialisation process during which young athletes “incorporate” the sports specific culture of risk (5, 11, 12, 16, 17). The goal of this process is to enable the athlete to regularly exceed his or her capacity limits in order to become better. Coaches usually are aware of the implicit danger of these “boundary crossings” (15):

“The pain is a sort of warning sign, stop here and don't go any farther... like, WATCH OUT, caution; something might happen ..., that's the THING, FINDING that line. Can I go FURTHER now or not? With footballers, if they have a little ache, they can just take a break. This makes us laugh because usually we have to go BEYOND the pain. Of course the danger in that is getting a major

injury, like a muscle injury, for example, a pulled muscle. Next comes a muscle fiber tear, and then a muscle bundle tear. That is always the question, how much is too much.” (Coach, aesthetic sport, men and women).

Coaches also verbalise which degree of pain tolerance is necessary to be successful in order to train the athlete's ability to ignore and endure painful incidents (15):

“There is certainly always one here or there who is maybe a little TOUGHER than the others. Who is NOT bothered, even when he's maybe hit right in the face or whatever, and can just keep going on. And there are certainly also athletes who, after getting hit right in the face, are no longer USABLE because of their HEAD, they just aren't ready to do exactly the SAME movements again, as they were doing before” (Ball game coach, male team).

In this regard, the (often only allusively communicated) threat of being sorted out due to lack of stamina and endurance plays a relevant role in the process of socialisation into the culture of risk (15).

“THOSE who are not ready to torture themselves have already been sorted OUT, or have already given up on their own or have been told that it might not be the right thing for them ... thus only the ones who are willing to suffer are in the game.” (Endurance sport coach, mixed team).

At a certain point in their career, many athletes consequently start to fear and avoid expressing pain or discomfort in order to not be branded as weak and, eventually, be sorted out. Peers in the training group play a relevant role regarding the process of trivialising pain. In this regard, joking about

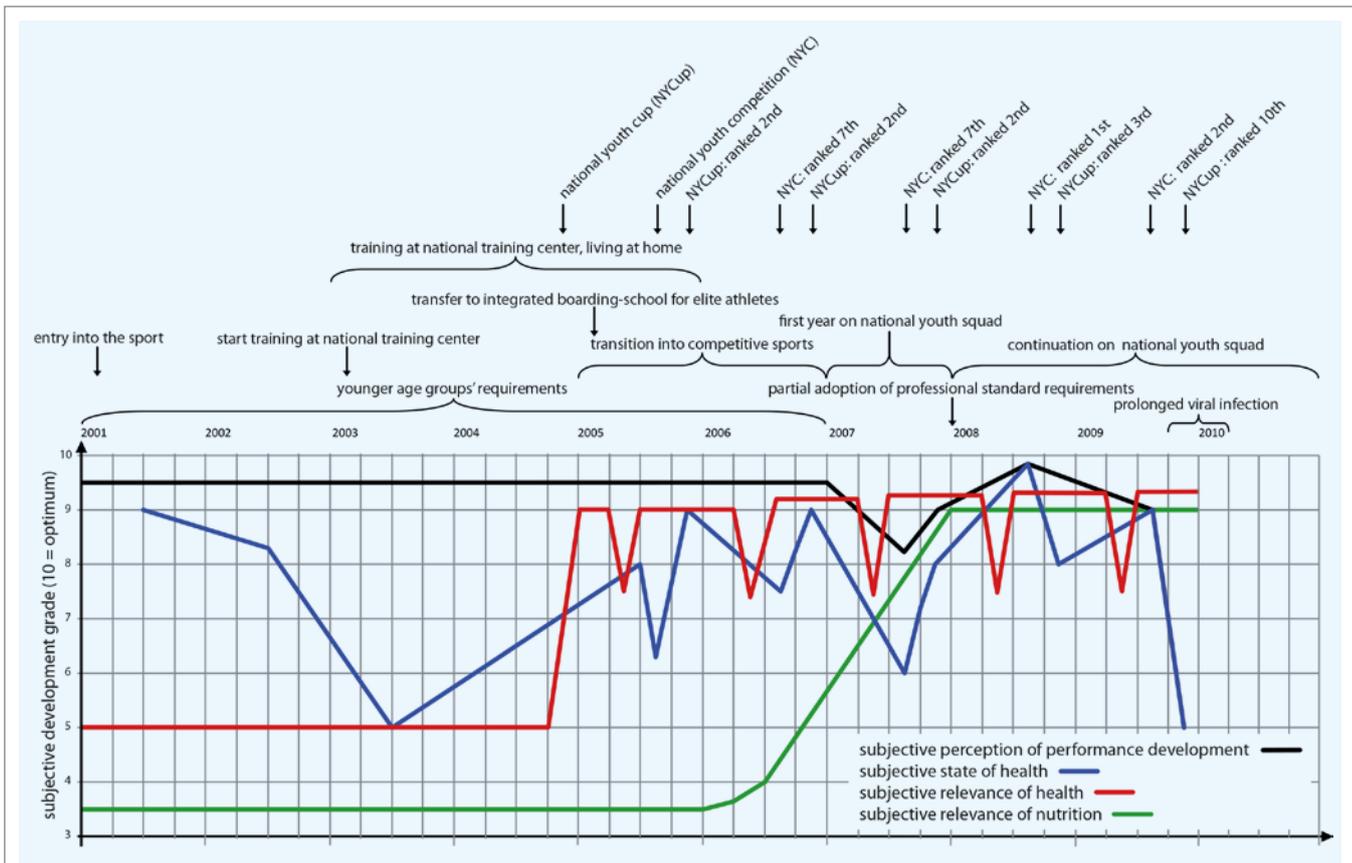


Figure 4
Biographical mapping, drawn by an adolescent elite athlete (19).

athletes who communicate that they are in pain can be interpreted as a typical reaction about how to sanction socially undesired behaviours, such as an overly sensitive reaction to pain experiences. Joking about pain is a common phenomenon in young elite sports.

“We joke about it.... make FUN about it when one bellyaches about it. But, all in all, actually, it is not really a topic. If there’s something more serious then I ask how it is going. If it is a MINOR problem then one makes fun about it” (male athlete, wrestling, 16 years old).

In another passage of the interview, the athlete names „typical injuries“ one has to try to “bite through”.

“Okay, if one has broken his FINGER or has had a capsulation rupture, these are things, when you touch it, it is painful, but when it is taped or iced then you think that it is OKAY again”.

Ignoring and trivialising pain is thus expected, and the willingness to suffer extreme pain without complaining becomes the standard.

“At the end of the day it is like THAT: In competition, nobody is interested in whether you suffer pain or not. You don’t get extra points for clenching your TEETH. Therefore you don’t tell it to anybody or SHOW it but you try to play (laughs) the HARD guy”. (Aesthetic sport athlete, female, 15 years old).

The result of this process is that athletes not only transfer health related responsibility to their coaches and physiotherapists (17) but also partly lose their individual “pain sensorium” by handing over pain control to the coach who is responsible for setting exercise tolerance limits. Accepting this, athletes leave the control of their own subjective health condition to an external monitoring by the coach (respectively at best from the medical staff as “an extended arm” of the coach). At the same time, the young athlete accepts that decisions on whether the

pain is too strong to continue with training or a competition are made by the coach and not by themselves. This paradox of a “representative external monitoring” of the athletes’ subjective conditions is probably one of the most relevant factors in the genesis of overload syndromes.

Conclusion

The management of injuries and complaints in elite sports is not at all a biomedical matter only but a complex biopsychosocial interplay. Both athletes and coaches participate in a ‘culture of risk’. Athletes know that an enhanced performance level can only be achieved by pushing their physical and mental capacities to the limit (1, 11). And although they are indeed aware of the fact that they are permanently forced to risk their health both in training and competitions (14), they are used to train and compete under constant suffering of pain. As a consequence, they develop behavioural patterns that outside the context of elite sports would be characterised as pathological (18). Especially the willingness of athletes to take severe health risks constitutes a major psychological challenge for the medical staff of sports teams. Athletes tend to hand decisions about their own exercise tolerance limits over to their coaches. But the coaches themselves consider the athletes to be responsible for their own health. This vicious biopsychosocial circle leads to a situation in which athletes express pain and discomfort only when unavoidable and only as much as needed.

Limitations

Due to the complexity of biopsychosocial health analyses, we mainly focused on qualitative data. Therefore, our findings

cannot claim to be representative for all athletes. However, we decided to analyse the biopsychosocial aspect of health exactly this way, because the extraction of generative mechanisms of health problems requires a very detailed analysis, which could not be realised – due to research economical reasons – with the entire sample. At the same time, qualitative interviews have the advantage to reduce social desirability effects what is particularly important in a field that is characterised by trivialising and tabooing of complaints. Another limitation is the reconstructive character of the analysis of socialisation effects. One could argue that the analysis of socialisation processes requires longitudinal studies. However, biographies are in principle cognitive reconstructions of individually meaningful events. These reconstructions of events have an impact on the subsequent behaviour, not the event itself. Furthermore, people – as a rule – cannot reflect about the experience of socialisation effects while experiencing a socialisation relevant event. In this regard, a reconstructive analysis gives deeper insights about long going internalisation processes of social structures and rules.

Future studies

For future studies we would recommend an integration of biomedical examinations with psychological and sociological analyses of pain, injury and health in sports in one integral data set, especially when it comes down to analysing risk factors for overuse injuries and even traumatic injuries. In this regard, multi-methodological longitudinal studies could potentially unveil interactions and causal relations between different fac-

tors over time. In this regard, it would be particularly of interest, how psychosocial risk factors – such as the athletes' willingness to compete hurt or the perceived social pressure to ignore pain – contribute to the development of more severe injuries or psychological complaints.

Practical recommendations

Physicians have to be very aware of the common practise of ignoring or trivialising injuries and pain in favour of keeping the chance to perform in competitions, and they have to consider this practise in their medical treatment strategies. As long as health management strategies in elite sports deal with health problems as if they were sudden events and neglect the influence of psychological and sociological factors, necessary treatment will all too often come too late and fall too short. ■

Conflict of Interest

The authors have no conflicts of interest.

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