

# “Playing Hurt” – Competitive Sport Despite being Injured or in Pain

„Playing Hurt“ – Wettkampfteilnahme trotz Verletzungen oder Schmerzen

## Summary

- ▶ **Problem:** Participating in competitive sport or training sessions despite being injured or in pain is very risky, but nevertheless very common. This behaviour, often referred to as “playing hurt”, is especially problematic among elite athletes due to the elevated risks of pain chronification, subsequent injuries and consecutive damages that may occur. The purpose of this study was to evaluate which internal and external determinants and context conditions play a role in the decision to “play hurt.”
- ▶ **Methods:** For this purpose we selected a nationwide collective of young basketball players from the highest national leagues. The German ‘Adolescents’ and Children’s Health in Elite Basketball study’ (ACHE study), a quantitative survey conducted between April 2016 and June 2016, included a total sample size of n = 182 elite basketball players between ages 13 and 19 from 46 German teams.
- ▶ **Results:** Results show that playing while ill or in pain is common practice, even among young elite basketball players. Among all study participants, 39% indicated that they would play even if they did not feel well physically. The regression coefficients of multiple linear regression analyses revealed that groups that are particularly at risk for this behaviour include older adolescents, players who display over-conformity to a sports ethic, those who exhibit higher non-compliance with medical recommendations and players from sporting boarding or similar schools.
- ▶ **Discussion:** On the one hand, the results illustrate the important key role and thus the ethical responsibility that the athletes’ private and team doctors carry. On the other hand, there is an urgent need for a better communication and closer collaboration between the athlete and persons in charge (trainers, parents, doctors, physiotherapists and other caretakers). Our suggestion for improving the situation is an athlete’s conference similar to case conferences in the medical domain.

## KEY WORDS:

Risk, Athletes, Adolescent, Injury, Pain

## Zusammenfassung

- ▶ **Problemstellung:** Trotz akuter Schmerzen oder Verletzungen am Wettkampf oder am Training teilzunehmen, ist hoch riskant, aber dennoch weit verbreitet. Besonders problematisch ist dieses als „playing hurt“ beschriebene Phänomen im Spitzensport, weil dort Risiken wie eine Schmerzchronifizierung, Folgeverletzungen und konsekutive Sportschäden besonders hoch sind. Diese Studie untersucht, welche internen und externen Determinanten und Rahmenbedingungen bei der Entscheidung, verletzt zu spielen, eine Rolle spielen.
- ▶ **Methoden:** Dazu wählten wir ein bundesweites Kollektiv von jugendlichen Basketballern aus den höchsten nationalen Ligen. Die bundesdeutsche ‘Adolescents’ and Children’s Health in Elite Basketball study’ (ACHE study), eine quantitative Befragungsstudie, wurde zwischen April und Juni 2016 durchgeführt und umfasst ein Kollektiv von n=182 Elite-Basketballspielerinnen und -spielern im Alter zwischen 13 und 19 Jahren aus 46 deutschen Mannschaften.
- ▶ **Ergebnisse:** Es zeigt sich, dass verletzt, krank oder unter Schmerzen zu spielen bereits für jugendliche Elitebasketballer zum Alltag gehört. Unter allen Befragten würden 39 Prozent dennoch spielen, auch wenn sie sich körperlich nicht fit fühlten. Die Regressionskoeffizienten multipler linearer Regressionsanalysen zeigten, dass ältere jugendliche Spieler mit sportbezogener Überkonformität, mit hoher Noncompliance gegenüber ärztlichen Empfehlungen und Spieler aus Sportinternaten oder ähnlichen Schulen hierfür besonders anfällig sind.
- ▶ **Diskussion:** Zum einen verdeutlichen die Ergebnisse die Schlüsselrolle und damit auch die ethische Verantwortung auf Seiten der die Jugendlichen betreuenden Mannschafts- und Hausärzte. Zum anderen legen die Ergebnisse nahe, wie dringend nötig eine bessere Kommunikation und engere Zusammenarbeit zwischen Athlet und allen Verantwortlichen (Trainern, Eltern, Ärzten, Physiotherapeuten und anderen Betreuern) wäre. Es wird eine Athletenkonferenz analog der in der Medizin etablierten Fallkonferenz vorgeschlagen.

## SCHLÜSSELWÖRTER:

Risiko, Sportler, Heranwachsende, Verletzungen, Schmerzen

## Problems and Objectives

Taking part in a competition or participating in training despite being in acute pain or feeling ill is very risky, but nevertheless common. This phenomenon has long been referred to as “playing hurt” in the fields of sports sociology (6, 8, 12, 18). However, the topic has received almost no attention in sports medicine to date (6, 13). This is surprising; most sports medicine specialists, orthopaedists, and

surgeons know that taking part in a competition or participating in training despite being in physical discomfort puts athletes at high risk of health problems (8). Playing hurt can lead to severe trauma or the chronification of existing symptoms, or to the end of an individual’s sporting career (18). This issue is especially important given the fact that, in most cases, even acute symptoms are not visible to >

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Table 1

Operationalization of the willingness to play hurt among young competitive basketballers in the highest German leagues.

ITEMS	ANSWER CATEGORIES	N	%
<b>I forgo competing...</b>		182	100
... when I don't feel physically resilient.	agree/neither...nor/disagree	76/36/70	41.7/19.8/38.5
... when I feel joint pain at rest.	agree/neither...nor/disagree	76/44/62	41.7/24.2/34.1
... when I have to take painkillers.	agree/neither...nor/disagree	68/48/66	37.4/26.4/36.2
... when I have a cold with a fever.	agree/neither...nor/disagree	120/24/38	66.0/13.2/20.8
... when my doctor tells me to.	agree/neither...nor/disagree	143/28/11	78.6/15.4/6.0

outsiders – including trainers, teammates and physicians – and the athletes are therefore often able to successfully keep their pain a secret (16).

The health risks associated with “playing hurt” are particularly high among professional athletes. This is especially true for adolescent competitive athletes, as their situation is made more critical by several factors. First, their symptoms appear in a very sensitive phase of development, a time when young athletes have to cope with substantial physical, psychological and social changes (6, 15). Secondly, underage competitive athletes are in complex dependency relationships both inside and outside the sporting system. Finally, adolescents are typically known to be more likely to take risks without having the corresponding levels of experience and without taking personal consequences into consideration (1, 13).

Furthermore, the “risky shift hypothesis” formulated over 50 years ago by Stoner says that this willingness to take risks is particularly common among those who play team sports, as the stronger group identification and the specific interdependencies in team sport is likely to lead to more risk-taking behaviour (14).

For these reasons, we believe that the “playing hurt” phenomenon is a particularly critical issue among the next generation of competitive athletes, and therefore especially worthy of study. Previous studies involving adult athletes have detailed determinants for the willing to play hurt, which can be organised into four categories: First of all, classic socio-demographic determinants such as age and sex are considered (3, 5, 6, 10, 13). In addition to this, there are also individually acquired psychological determinants, namely character traits and attitudes which are often discussed in connection to the willingness to play hurt. The most common of these is the connection between the sport and discipline-specific core norms which athletes internalise during the course of their careers (3). This process of socialisation into a specific sports culture can lead to hyper-inclusion, which results in “over-conformity to a sports ethic” (6).

In contrast to these determinants on the micro level, the sociological paradigm emphasises the significance of social (meso level) and structural (macro level) context conditions in the decision-making dilemma. Whereas athletes often believe that it is their own decision whether to play or not, studies based on the sociology of sport show that such decisions are actually embedded in a set of social and structural context conditions – the so-called sport-specific environment (6, 8, 12). These context conditions can create a situation in which playing hurt seems to be the only or the most acceptable option available to an athlete (3). Such social determinants include the influence of third parties or significant others (13, 18). Sport-specific actors (team mates, physiotherapists and club physicians) represent the “interactive sportsnet” in the centre of which the trainer is generally located (7, 8, 18). It is possible to differentiate between the sportsnet and social contacts outside the sporting system such as parents,

friends, family physicians and teachers (8). Third parties can have a protective effect during injury or illness: They can behave in a generally supportive, emotionally assisting and stress-reducing manner. Or they can push the adolescent athlete to take part in training or a sporting match (13, 18).

Finally, structural determinants (such as the type of school the athlete attends, or their performance level) must be taken into consideration in the decision making process (13). In youth sports, sporting scholarships and sport schools are an example of how access to privileges is tied to sporting success (6, 10).

Similar to social ecological models figure 1 presents an analytical model for organising the correlates for willingness to play hurt. According to a study by Roderick and Waddington, the first two groups of determinants can be referred to as internal factors, and the last two groups as external factors (external context conditions (12)). Similar dichotomies have also been used by Wilgen and Verhagen (intrinsic versus extrinsic factors (19)) and Meyer and Thiel (personal versus context factors (6)).

The specifications of youth competitive sport establish a special ethical responsibility and duty of care for trainers, physicians and other caregivers who minors trust with their possibly full-time sporting career and their health. In this context we have chosen a study sample of young competitive athletes. Using basketball as an example, this study tests the hypothesis that it is possible to identify both internal (socio-demographic and psychological) and external (social and structural) determinants, which play a role in an athlete's willingness to “play hurt”.

## Material and Methods

### Study Sample and Procedure

The Adolescents' and Children's Health in Elite Basketball - Study (ACHE-Study) was conducted in accordance with the current version of the Helsinki Declaration and an unconditionally positive vote was obtained from the relevant ethics committee at the ATOS Clinic Heidelberg, Germany (AZ4/16). Basketball enjoys great popularity in Germany. Almost every gym is equipped with a basketball hoop and public spaces boast a countless number of basketball courts. The German Basketball Federation (DBB) has more than 200,000 members (203,028; Status 2017; DBB e.V. (2)). The youth division of the DBB is organized into traditional regional leagues. At the highest national level, the best teams compete in three inter-regional leagues in the German championships. These include: the male under-16 teams (U16) in the Youth Basketball League (JBBL), the male under-19 teams (U19) in the Junior Basketball League (NBBL), and the female under-17 teams (U17) in the Female Junior Basketball League (WNBL).

As part of the ACHE study we surveyed young basketball players from these leading German leagues about the six-month incidence of injury, corresponding treatment and their willingness to play in basketball matches despite being in pain and

experiencing physical symptoms or illness. Players were also asked about the contextual circumstances surrounding their decisions on the micro, meso and macro level.

We contacted the official team managers or coaches of these leagues and informed them about the study. Subsequently the players were informed about the independent study via an online link, and invited to participate. Written declaration of informed consent was obtained from all participating players (or from their guardians, if the players were minors). The survey took place 2016 in the form of a standardized online questionnaire using the software package SoSci Survey.

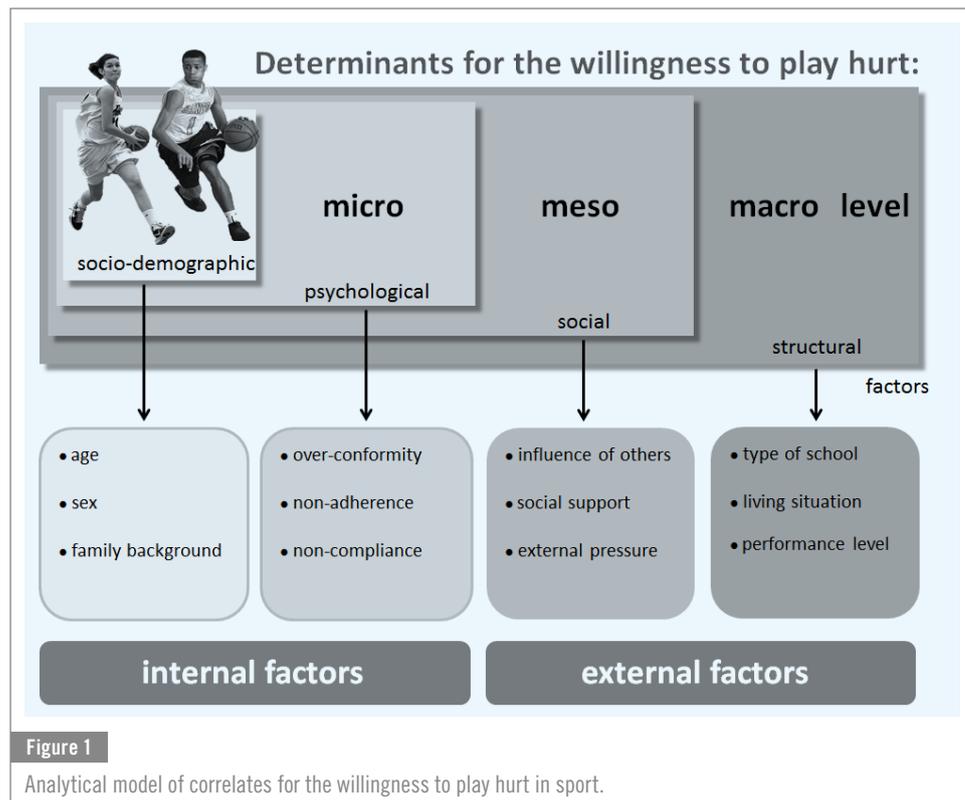
Questions were taken from a previously validated and field-tested standardized questionnaire – all variables used in this publication were taken from the Germany-wide study ‘German Young Olympic Athletes’ Lifestyle and Health Management Study’ (GOAL Study), which

the corresponding author was involved in as PI. Details about the methodology and validation of the scales and variables developed in German in relation to competitive sports in Germany have already been published elsewhere (5, 6, 15). The variables necessary for the operationalization of an athlete’s willingness to play hurt and the determinants thereof were copied word for word into the ACHE online questionnaire. This comprised a total of 216 questions and was split up into the sub-sections ‘Personal Details’, ‘State of Health’, ‘Incidence of Injury’, ‘Medical Treatment’ and ‘Individual Health Behaviour’. (For interested readers, the questionnaire is also available as an online supplement.) Before launching the questionnaire, it first underwent an expert review process involving experts from the fields of medical sociology, orthopaedics and epidemiology. Following this, a classic pre-test was carried out at a part-time basketball boarding school, in order to receive feedback from young basketball players regarding the comprehensibility of the questions, the scope of the survey and the practical relevance of the response categories (pre-test conducted in Langen, Germany; n=22).

### Collection of Information on the Willingness to Play Hurt

In accordance with Mayer and Thiel (6), information on the “willingness to play hurt” was collected using the following five items: “I forgo competing...” (a) “when I don’t feel physically resilient/fit” (b) “when I feel joint pain at rest”, (c) “when I have to take painkillers”, (d) “when I have a cold with a fever” or, (e) “when my physician tells me to”.

The questions regarding various health-related reasons, and the five ordinal answer categories ranging from “completely agree” (value 1), “tend to agree” (2), “neither agree nor disagree” (3), “tend to disagree” (4), to “completely disagree” (5), allowed for the differentiated collection of information on the phenomenon. A factor analysis showed that all items were weighted by one factor. Therefore, an unweighted and almost normally distributed sum score was calculated for these five items with a possible value range between 5 and 25, whereby a high value represented a high “willingness to play hurt.”



### Operationalization of Socio-Demographic Determinants

In addition to being asked about their age and sex, all athletes were asked if there were other competitive athletes in their family (parents or siblings) to using the question: “Does anyone in your family apart from you participate in competitive sports or did so at some point in the past?”

### Operationalization of Psychological Determinants

**Over-conformity to sports ethic:** A total of five questions aimed to collect information on the reasons why athletes participate in basketball matches despite being in pain or experiencing physical symptoms or illness were asked. The exact questions were: “I participate in competitions despite experiencing physical symptoms because...” (1) “competition is very important to me,” (2) “otherwise all my training would have been for nothing,” (3) “pain is part of sport,” (4) “I was put under a lot of pressure,” and (5) “I don’t want to be considered a weakling.” The five ordinal answer categories reflected those used for the collection of information on the “willingness to play hurt.” A factor analysis identified two factors. The first three items were weighted by the first factor, which we analogously Jessiman-Perreault and Godley (3) labelled “over-conformity to sports ethic.” In this manner it was possible to calculate an unweighted sum score. This resulted in a metric sum score with a value range between 3 and 15. A median split led to an alternative dummy variable with the characteristics “low” (3-9 points) versus “high” (10 – 15 points). In comparison, the second factor reflected more negative “external pressure” from the social environment, so this factor was taken into consideration in the social determinants group.

**Adherence and Compliance:** The attitudes of the athletes towards physicians were assessed using the items “Instead of relying on one physician, one should ask several different physicians for advice”, “I only go to a physician if I can no longer train due to pain”, and “I always follow the advice of my physician.”

To maintain the consistency of the approach, the ordinal answer categories previously outlined were used and a factor analysis was carried out. The established differentiation between >

Table 2

Bivariate and multiple analyses on the importance of socio-demographic determinants for the willingness to play hurt among young basketball players from the highest German leagues. Note: AM: arithmetic mean; SD: standard deviation.

VARIABLE	BIVARIATE ANALYSIS		MULTIPLE ANALYSIS	
	AM ( $\pm$ SD) OR COEFFICIENT	P-VALUE	REGRESSION COEFFICIENT (95% KI)	P-VALUE
<b>Age</b>				
17 years and older	14.20 (4.14)	0.008	N.A.	
16 years	13.65 (3.90)		N.A.	
15 years	12.73 (4.17)		N.A.	
14 years and younger	11.35 (3.26)		N.A.	
Metric values	Kendall's $\tau_b$ 0.139	0.001	0.738 (0.293, 1.183)	0.001
<b>Sex</b>				
Female	13.53 (3.73)	0.191	N.A.	
Male	12.67 (4.14)		N.A.	
<b>Competitive athlete(s) in family</b>				
Yes	13.02 (3.90)	0.663	N.A.	
No	12.75 (4.29)		N.A.	
Model constant			1.544	
Model $r^2$			.057	0.001

“adherence” – the process by which the patient largely determines the consultation and negotiation process - and “compliance” – the strict compliance with medical advice and prescriptions (17), is reflected in the empirical analysis. The factor analysis showed that the first two items made up the factor “adherence” and that the third made up the factor “compliance.” The resulting factor values were dichotomised along the zero value into the dummy variables “non-adherence” and “non-compliance”.

### Operationalization of Social Determinants

**Influence of others:** To operationalise the influence of “significant others” (11, 12), participants were asked which of the following third parties were involved in a total of seven decision-making areas, which are typical for competitive sport: parents, trainers, physiotherapists, club physicians, family physicians and teachers. The decision-making areas included participating in training and competition while ill or injured, taking medication when in pain, planning leisure time and visiting physicians, and setting standards for nutrition and body weight. Depending on how many of these decisions the respective third parties were involved in, a sum score between 0 – 7 was generated.

**Social support:** Two questions assessed the athletes’ level of social support. The first question was “Without the support from which person would you be unable to participate in competitive sport?” and the second was “Who would support you if you seriously injured yourself and were unable to play for a longer period of time?” More than one person could be selected from the following: “home trainer”, “club trainer”, “physiotherapist”, “physician”, “team mates”, “parents, family, siblings”, “friends from outside the team”, “teachers”, and “other people”. Based on the results, an unweighted sum score with a value range from 0 – 18 was calculated.

**Negative external pressure:** Using the two items already described under psychological determinants, an unweighted sum score was calculated and multiplied by the factor 1.5 to ensure better comparability with the “over-conformity to sports ethic” score, which was calculated using three items. This resulted also in a metric sum score with a value range from 3 – 15.

### Operationalization of Structural Determinants

The athletes were asked if they were attending a gymnasium (the type of school that provides the highest level of secondary education in Germany), or another type of school. Additionally, it was possible to separately assess whether the athlete was attending a specialist sporting school. In Germany specialist sporting school curriculums focus on gym classes and training. They allow young athletes to combine training and education and exist as so-called “elite schools of sport”, “partner schools of competitive sport”, “sport-focused schools”, “sports boarding schools” or “sporting gymnasiums”. The athletes were also asked to provide information on their current living situation. Finally, the four highest German competitive squads (A-, B-, C- or D/C-squad) were defined as the highest performance level.

### Statistical Analysis

The ACHE-Study was analysed using classic descriptive and inferential statistics. Bivariate group differences were investigated in the case of nominal and categorical independent variables using unpaired t tests or ANOVA, in the case of metric data with more than 12 units and approximate normal distribution using Pearson's  $r^2$ , and if not, with Kendall's  $\tau_b$  coefficient. All determinants that indicated a significant association with the main outcome were subsequently analysed in linear regression models. To do this, individual models were first calculated for each of the four factor groups. In addition to this, all bivariate significant determinants were integrated into an overall model. In so doing, the preset option ‘remove’ in SPSS was selected for an F value of  $<0.010$ . In an initial overall model – not depicted here in tabular form – three of the seven bivariate significant determinants did no longer show significance. The final complete model (depicted in Table 6) thus only shows four determinants. All the analyses were carried out with IBM SPSS Statistics 24.0.0 (IBM Corp., Armonk, USA). Because of the exploratory design of this study, all tests were conducted without alpha adjustment. All the tests were two-sided and the significance threshold was a priori set at  $p \leq 0.05$ .

Table 3

Bivariate and multiple analyses on the importance of psychological determinants for the willingness to play hurt among young basketball players from the highest German leagues. Note: AM: arithmetic mean; SD: standard deviation.

VARIABLE	BIVARIATE ANALYSIS		MULTIPLE ANALYSIS	
	AM ( $\pm$ SD) OR COEFFICIENT	P-VALUE	REGRESSION COEFFICIENT (95% KI)	P-VALUE
<b>Over-conformity to sports ethic</b>				
Low	11.11 (3.39)	$\leq 0.001$	N.A.	
High	14.68 (3.82)		N.A.	
Metric score	$r^2$ 0.519	$\leq 0.001$	0.638 (0.456, 0.820)	$\leq 0.001$
<b>Adherence to medical advice</b>				
Adherence	11.27 (3.59)	$\leq 0.001$	Reference category	0.181
Non-adherence	13.95 (3.97)		0.754 (-0.355, 1.863)	
<b>Compliance with medical advice</b>				
Compliance	12.20 (3.70)	$\leq 0.001$	Reference category	0.001
Non-compliance	15.48 (4.19)		2.180 (0.928, 3.431)	
Model constant			6.128	
Model $r^2$			.337	$\leq 0.001$

## Results

In total, 182 junior competitive athletes from 46 teams in the highest youth leagues in Germany (NBBL, JBBL, and WNBL) took part in the ACHE study. The response rate was 26.4% and the collective had an average age of  $15.5 \pm 1.3$  (min: 13; max: 19); 70.9% of participants were male.

76.9% of all participants indicated that they had suffered from an injury on at least one day in the last six months. The most common treatment methods were cooling ( $n=49$ ), rest ( $n=43$ ), physiotherapy ( $n=27$ ), sports taping ( $n=25$ ) and orthotic supports ( $n=23$ ).

The items of the primary outcome demonstrated that a medical ban on playing sport is most likely to prevent young athletes from competing; in the event of a medical-related ban on playing sports, 6% of all young athletes surveyed said they would still play in a competition (Table 1). In contrast, 39% of all participants said they would still play, even if they did not feel physically fit, 36% if they were having to take painkillers and 34% if they were experiencing acute joint pain (Table 1). The sum score calculated based on these items was on average  $12.92 \pm 4.04$  points. The value of our primary outcome ranged from 5-23 points, whereby a high value was equated with high "willingness to play hurt".

With regard to the socio-demographic backgrounds of the athletes, it is notable that the willingness to play while hurt, sick or in pain increases significantly with age. The regression coefficient shows an increase in the score value of 0.7 points per year of age. The scores for female athletes and those who have other competitive athletes in their family tend to be minimally, but not significantly, higher than for the respective reference group (Table 2).

Basketball players with a high "over-conformity to sports ethic" demonstrate significantly higher score values for the main outcome. This is also true for athletes who can be characterised as "non-adherent" and "non-compliant". The multiple linear regression shows that, with regard to the attitude towards physicians, "non-compliance" demonstrates a predictive effect for the "playing hurt" phenomenon (Table 3).

Only seven athletes reported that teachers had any sort of influence on their sport-related decision-making process. The correlation coefficients indicated a relatively low level of influence from external actors such as family physicians and above all parents. In contrast, the athletes tended to be more willing to "play hurt" the more intensively sport-internal actors were involved in their decision-making processes (Table 4). The young athletes' parents were the most important of all significant others in influencing the athletes' decision to play when sick or injured.

It appeared to play a role whether a young competitive athlete attended a normal school or a school with a specific sporting focus. In the latter case, the athletes self-reported a significantly higher score value for the primary outcome (Table 5).

All bivariate variables which had previously been shown to be significant were included in a final regression analysis (Table 6). The four variables with the highest predictive effect that remained in the final model were: age, the indicators "over-conformity to sports ethic" and "non-compliance", and attending a school with a specific sporting focus.

## Discussion

### Main Results

The willingness to play while ill or in pain is widespread among young elite basketball players: 39% of all participants said they would still play, even if they did not feel physically fit, 36% if they were having to take painkillers and 34% if they were experiencing acute joint pain (Table 1). 21% of participants said they would still participate in matches if they were suffering from an acute fever and 6% said they would still participate even if they had been banned from doing so by their doctor. This shows that a medical professional is most likely to be able to prevent underage athletes from making this risky decision.

Those who are most at risk of playing despite having symptoms include older players and players who assign more importance to participating in competitions and training, and those who attend a school with a specific sporting focus and thus come into contact with other competitive athletes. The regression

Table 4

Bivariate and multiple analyses on the importance of social determinants for the willingness to play hurt among young basketball players from the highest German leagues.

VARIABLE	BIVARIATE ANALYSIS		MULTIPLE ANALYSIS	
	KENDALL'S $\tau_b$	P-VALUE	REGRESSION COEFFICIENT (95% KI)	P-VALUE
<b>Influence of others</b>				
Influence of parents	Kendall's $\tau_b$ -0.140	0.011	-0.417 (-0.733, -0.101)	0.010
Influence of trainers	Kendall's $\tau_b$ 0.075	0.177	N.A.	
Influence of physiotherapists	Kendall's $\tau_b$ 0.070	0.248	N.A.	
Influence of club doctors	Kendall's $\tau_b$ 0.122	0.047	0.523 (-0.215, 1.261)	0.164
Influence of family doctors	Kendall's $\tau_b$ -0.027	0.648	N.A.	
Social support	$r^2 = -0.032$	0.668	N.A.	
Negative external pressure	Kendall's $\tau_b$ 0.099	0.080	N.A.	
Model constant			14.242	
Model $r^2$			.049	0.011

coefficients of multiple linear regression analyses showed that older players (+0.493,  $p=0.006$ ), players with a strong over-conformity in relation to sports (+0.660,  $p\leq 0.001$ ), with a high degree of non-compliance regarding medical recommendations (+2.218,  $p\leq 0.001$ ) and players from specialist sport-focussed boarding or similar schools (+1.897,  $p\leq 0.001$ ) were particularly prone to playing while suffering from pain or injury.

### Positioning Results in the Wider Research Field

According to our data, the older the player, the higher the willingness for self-exploitation and self-endangerment, reflected in an individual's "willingness to play hurt". Socialisation and selection effects may also play a role. Socialisation theory suggests that the willingness to engage in risky behaviour generally increases during adolescence (1). This effect can be extenuated by sporting-specific socialisation, whereby pain and physical complaints are internalised over time as being "part of the game" (5, 8). It is important to consider the selection process which makes it possible for only athletes who demonstrate the highest ability to withstand suffering to remain in the highest sporting leagues. It is commonly quoted that, in comparison to women, men are tougher and more willing to torture themselves for their sport (3, 10). This was not confirmed by our data or that of other studies (on presenteeism in sports (6); on asking for help in sport (9)). Nixon suggested that a gender difference identified in a study on pain tolerance "may disappear" (10) in the subsequent years as a result of the increasing professionalization of women's sports.

In contrast, assessment of the adjusted regression coefficients highlight the central importance of internalised norms. Sporting-, competitive sports-, discipline- and team-specific norms collate to form the sports ethic. Over-conformity to this norms, which are generally internalised by athletes over many years, is a central risk factor for playing hurt and was recently reported by a Canadian study (3). To our knowledge, this is the first time the specific attitude towards physicians was taken into consideration with regard to this research question.

An individual's psychological attitude and their interaction with their environment are related. Nixon emphasised that a purely quantitative assessment of the number of social contacts within and outside the sporting environment is inadequate (8). Whereas it is generally accepted that the trainer plays a key

role within an athlete's wider social network (6), other third parties could play an even more important role in the event of illness or injury. Therefore, we differentiated several social actors. Our regression coefficients (Table 4) suggest that the willingness to play hurt is lower among athletes whose parents more often play a role in their decision-making processes, and higher when the club physician is often involved. It seems that in the event of illness, socialisation agents from outside the sporting environment (parents and family physicians) are more likely to recommend not taking part in competitions. In contrast, socialisation agents from within the sporting environment (club representatives such as trainers, physiotherapists and club physicians) seem to encourage athletes to play under these circumstances.

The structural context conditions appear to play a role in the decision to play while in pain or experiencing physical complaints. The typical context of a sporting school (the constant interaction with other athletes over a longer period of time, sometimes in a boarding school setting) seemed to facilitate playing hurt the most.

### Strengths and Weaknesses of the Study

When interpreting the results of the ACHE-Study, it is necessary to consider the possible selectivity of the study sample, a potential social desirability bias, the lack of consideration of situation-specific determinants, and the assumed connection between stated intention and actual behaviour.

As with any epidemiological study, the question of the selectivity of the collective studied is also raised here. In this regard, the approximate structural equality of our sample with the overall collective of all players from the three leagues concerned is reassuring. The sample varies neither in terms of its regional distribution (Western states – the former Federal Republic of Germany (FRG) versus Eastern states – the former German Democratic Republic, (GDR)), nor its age distribution (under 15 years versus 15 years and older), from the actual structure of the leagues ( $p>0.05$ ). Only the sex ratio could not be exactly represented (proportion of male players – league structure: 81% vs. ACHE study: 71%,  $p\leq 0.05$ ). An additional variance analysis (ANOVA) indicated that there were no significant differences between early, medium and late responders with regard to the main outcome of "sum score of willingness to play hurt"

Table 5

Bivariate and multiple analyses on the importance of structural determinants for the willingness to play hurt among young basketball players from the highest German leagues. Note: AM: arithmetic mean; SD: standard deviation.

VARIABLE	BIVARIATE ANALYSIS		MULTIPLE ANALYSIS	
	AM ( $\pm$ SD)	P-VALUE	REGRESSION COEFFICIENT (95% KI)	P-VALUE
<b>Level of secondary school</b>				
High	12.93 (3.97)	0.948	N.A.	
Low	12.88 (4.412)		N.A.	
<b>Sporting School</b>				
Yes	14.54 (4.37)	$\leq 0.001$	2.337 (1.102, 3.573)	$\leq 0.001$
No	12.20 (3.67)		Reference category	
<b>Living situation</b>				
Boarding school or own apartment	14.59 (3.57)	0.073	N.A.	
Parental home	12.75 (4.05)			
<b>Performance level</b>				
D-squad or less	13.08 (4.03)	0.757	N.A.	
A-/B-/C- or DC-squad	12.87 (4.13)			
Model constant			6.128	
Model $r^2$			.072	$\leq 0.001$

( $p=0.213$ ). The main aim of this study was, however, not to achieve the highest possible level of representativeness, but to analyse the correlations to better understand the phenomenon.

Second, as is typical for all questionnaire-based study, the possibility of a social desirability bias cannot be disregarded. The possibility that the participants provided socially desirable answers must always be taken into consideration when interpreting genuinely subjective and behavioural-related outcomes. To this end, the software package SoSci Survey checks the logical plausibility of numerical answers as the questionnaire is completed and, at minimum, prevents accidental or intentionally incorrect entries outside of the value range. In addition, the data analysis following the field-test phase of the study showed no logical anomalies or inconsistencies.

Third, the relevant literature suggests that there may be situation-specific determinants (6). If a decision to play is made ad hoc, the number of fit players available to the manager, the size of the first team squad, and the significance of the match can also play a role (12). However, as our survey is intended to be generalizable, we did not carry it out in the wake or in the context of a specific match. To gather situation-specific information related to actual behaviour, enough currently sick or injured players would have to be surveyed, also including those who did not take part in the game in question. Unlike in individual-athlete sports (such as track and field athletics, swimming or tennis), these situation-specific aspects (e.g. because the game is important, not wanting to disappoint fellow team members and/or not wanting to diminish the available squad by not taking part) are very typical among team sports such as basketball and can further increase pressure on individual decision-making. A fourth limitation of the study concerns the relation between attitude and behaviour: Analog to comparable studies and in line with current psychological health research (e.g. 13), we assumed that a high willingness to play hurt determined behaviour.

The strength of this study lies in the differentiated assessment – using a nationwide sample – of a phenomenon which is obviously common in competitive sport, but which to date

Table 6

Multiple linear analysis to identify significant determinants for the willingness to play hurt among young basketball players from the highest German leagues.

VARIABLE (SCALE LEVEL)	REGRESSION COEFFICIENT (95% KI)	P-VALUE
Age (metric)	0.493 (0.144, 0.842)	0.006
Over-conformity (nominal)	0.660 (0.496, 0.824)	$\leq 0.001$
Non-compliance (nominal)	2.218 (1.103, 3.333)	$\leq 0.001$
Sporting school (nominal)	1.897 (0.919, 2.875)	$\leq 0.001$
Model constant	-1.764	
Model $r^2$	.438	$\leq 0.001$

has rarely been considered and even more rarely studied with a quantitative approach. The fact this phenomenon is prevalent among young athletes emphasises the ethical necessity of such consideration and study. The fact that, in this context, we took both internal and external factors into consideration is a further strength of our study. Following the socioecological approach, we thus simultaneously looked at the micro, meso and macro levels to do justice to the complexity of the phenomenon.

## Conclusions

Nixon points to the fact that the risks related to competitive sport are often transferred completely to the athletes themselves. This has the effect that the athletes themselves have to take on the risks of the game, rather than the sport system (particularly the management; (8)). Our data underlines the fact that those in positions of responsibility need to leave this comfortable position and better recognise their ethical responsibility- ➤

ties. Physicians in particular play a central role (7). Concretely, responsible physicians – including the athletes' family physicians – should recognise how to deal with conditions of pain and health complaints. Both club and family physicians should proactively and regularly ask the athletes about their state of health and inform them about the possible consequences of returning to training too early. Trainers, clubs and parents should be included early on during decision-making processes in the case of illness. In light of the fact that many athletes have already internalised a certain toughness toward themselves, when in doubt, the athlete has to be protected from themselves (16). Maintaining social contacts outside of the sporting environment could counteract the development of a warped perception of social norms and could have a stabilising effect on the athlete, especially in the event of illness or injury-related breaks from active participation in sport.

Similar to case conferences in the medical field (e.g. in trauma surgery or in orthopaedics), we raise the idea of "athlete conferences" at which athletes meet to discuss their health and the development of their sporting career with sports orthopaedists, pain therapists, team physicians and other involved parties (sport psychologists, physiotherapists, teachers, and friends). All those involved, including media and the public, can help to make sure that toughness, injury and suffering in sport are not glorified (3). A particularly negative example of this behaviour is the reaction of the press when the world-class gymnast Andreas Toba completed his pommel horse routine in extreme pain during the 2016 Olympic Games - despite having suffered a serious cruciate ligament rupture during his floor routine - thereby securing his team's progression to the finals. In the media he was acclaimed as "the Hero de Janeiro" and "The German Hero in Rio" (4). In reality, however, he was risking ending his career and facing a future as an invalid. ■

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### Conflict of Interest

*The authors have no conflict of interest.*

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