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Examining the factors determining the success of handball players

Theses of the doctoral (PhD) dissertation

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1. Introduction

In recent years, the transformation of sport to become a strategic sector has boosted Hungarian sports life. This change has transformed and also presented new challenges to professionals working in all areas of sport. The increased demands and expectations have opened up new areas for professionals and created new possibilities in preparing athletes. Tools and methods have become available in the sports profession and various scientific fields that were possible previously to be implemented with much less intensity in the preparation of athletes. This level of transformation has also significantly affected handball. In terms of the results and traditions of domestic handball, it is a leading team sport, known and recognized both at the sports organization and national team level in our country and in international sports life as well.

1.1. Justification for the choice of topic

It is very difficult to determine the challenges of the future in an exact form, since we do not know today what professional and environmental conditions our youth athletes will have to meet – in eight to ten years – among adults, where everything is “only about winning”. However, we already know in the present that full-spectrum preparation of athletes (professional, pedagogical, psychological) can help them meet the challenges of the future. In addition to professional content, contemporary training models cannot do without personality testing of sports participants, where the quality of intellectual, emotional, conduct and behavioural factors can be determined. At least as important a factor for us is the system of relationships between sports professionals and athletes. The responsibility of coaches and sports professionals is becoming increasingly valued, as the coach is in almost daily contact with his student, which after a while becomes a relationship of trust (Gombocz, 2005; Bognár, 2023; Révész et al., 2013; Révész, 2023).

A central role in the process of becoming an athlete is played by parents. The role of parents cannot not be disputed, but it is necessary to examine in which areas they have a strong or a lesser influence on their athlete child. Appropriate parental behavior can support long-term participation in sports and may reduce premature abandonment of sports (Géczi and Baji, 2016; Kovács et al. 2024; Gyömbér, 2018).

Sports professionals used to focus primarily on physical abilities when selecting young players. Today, in addition to the role of sports competitions and physical characteristics,

psychological and pedagogical factors are receiving increasing attention (Frenkl, 2003; Ráthonyi – Odor et al., 2012), the predictive function of which, helping in selection, is not yet exploited in sufficient depth by most sports (Oláh et al., 2012).

The aim of my dissertation is to examine the environmental factors necessary for handball players to succeed. The results of the study will be used in developing professional strategic directions in the sport and incorporating them into coaching education as well.

1.2. Problem statement

Encouraging the choice of sport, selection, talent management and then success should be basic in the everyday work of sports professionals. These activities form the basis of elite sports.

Professionals working in sports have long been looking for objective measuring tools for sports aptitude, the most appropriate methods of selection and the most effective form of talent management, since the effectiveness of the process of finding outstanding athletes and talents, training and talent management determines its success (Nádori, 1985).

However, for success in adulthood, a systematically developed and implemented preparation system is necessary, including selection and talent management (Williams and Hodges, 2004). In addition to searching for talents, competitive sports also require continuous measurement of the development of young athletes in order to effectively facilitate the process of selection and talent management. It is well known that athletes with the best abilities are needed to achieve peak performance, but it is also undisputed that the quality, quantity and environment of training are also decisive factors in the process (Morris, 2000).

In domestic handball, this research is being implemented as a unique task, attempting to address the issue of preparation and success with a holistic approach and to search for results, or at least to highlight those ability and skill factors that can make the difference between young athletes in terms of success.

We intend to map the talent traits necessary for successful compliance in the sport of handball, as well as to explore those factors that can help determine the attributes and acquired qualities necessary for success in adulthood concerning the U18 age group.

The research cannot do without analyzing the strategy of the Hungarian Handball Association for talent development and approaching it from the perspective of sports

professionals. After analyzing the information received, we look for those important elements and tools that can be available to sports professionals in their daily practical work.

1.3. Questions of our research

Q1. How do sports strategic guidelines support youth development and talent development in sports?

Q2. What are the most important factors in talent development and success according to the opinions of athletes and coaches?

Q3. What differences can be found between national and non-national handball players in the following areas:

- psychomotorous,
- pedagogical
- psychological?

Q4. How different are the characteristics of success in case of men and women?

1.4. Our hypotheses

H1. We assume that in the strategy of the professional association, youth education operates systematically, meeting primarily sports professional tasks.

H2. We assume that, based on the opinions of athletes and coaches, the most important components in terms of success will be sports professional views – mainly related to internal factors.

H3. We assume that there are differences between selected and non-selected youth handball players in the

- psychomotor
- pedagogical and
- psychological areas.

H4. We assume that the characteristics of success will be different in the case of selected and non-selected men and women.

2. Methods

In the case of the research, we used a complex methodology providing us with the widest possible information for the selected sample in order to answer our research questions and hypotheses, as follows:

- Document analysis (sports strategy)
- Structured interviews (sports professionals, athletes)
- Examination of conditional and structural parameters
- Examination of personality characteristics measured by the Vienna Test System
- Sports pedagogical questionnaire for the examination of external and internal factors
- Examination of sports psychological factors (motivation, self-evaluation)
- Behavior, treatment, relationship factors (coaches, parents)

2.1. Introduction to the sample selection

Participants of the in-depth interviews:

During the in-depth interviews, athletes, coaches, spot managers – 4 selected and 4 non-selected athletes (N=8) and sports professionals – 1 selected coach, 1 sports organization coach, 1 sports manager (N=3) – were selected for the sample.

Selected and non-selected athletes:

Selected/proven women (N=20), Selected/proven men (N=21). Non-selected women (N=20), Non-selected men (N=21).

The total sample was 82 people (N=82)

2.2. Data collection

2.2.1. Document analysis

The focus of our study is the analysis of the professional pillar of the sports strategy, as well as the examination of the pillar's connections with other areas. During the analysis, the target area for us is the characterization of the interdependence of age-group preparation, as well as the existence and operational level of environmental conditions supporting individual talent development and success.

2.2.2. Interviews

In the interview questions, we asked about the combined role of the abilities and skills necessary for success, as well as the environmental factors supporting them, from the perspectives of the coaches and the athletes. The interviews took place in the form of personal meetings, which were audio-recorded.

2.2.3. Tests for assessing motorous and physical abilities

Within the framework of the research, the assessment of the examined athlete groups was based on the federal protocol for assessing youth national teams, with the following exercise material:

- Measurement of body height (cm), Measurement of body weight and body composition (kg), (% - index).
- Professional training history (years), Strength training history (years).
- Vertical jump, Measurement of sprint ability (5, 10, 20 m), Maximum strength tests (bench press - squat), YoYo Intermittent Recovery I test.

2.2.4. A Vienna Test System (VTS)

In our study, we assessed only the level of personality functions from the functions that can be measured by the tool. Within the five dimensions of the “Big Five” personality test we used the method of measuring twelve personality traits that are also decisive in sports.

2.2.5. Data collection of questionnaires and tests

A questionnaire method was chosen to survey the views of the athletes. The content of the questionnaires concerned the athlete's motivation, the coach-athlete relationship, the coach's attitude, behavior, the athlete's environment (in relation to coach-parents) and the quality of stress experienced before matches, as well as the pedagogical environment surrounding the athletes. The questionnaires contained closed-ended questions with different value scales. The questionnaires used by us were the following:

- Athletes' Sports Pedagogy Questionnaire
- Questionnaire for assessing the psychological state of athletes before the match (CSAI-2)
- Perceived Autonomy Support, Sports Environment Questionnaire (Coaches) (SCQ – H)
- Perceived Autonomy Support, Sports Environment Questionnaire (Parents) (PASSES – H)
- Questionnaire for exploring the coach-athlete relationship (CART -Q)
- Coaching behavior (CBQ)
- Sports motivation questionnaire (H-SMS)

2.2.6. Data processing

During the qualitative study of the document analysis, we used the non-reactive (non-interventional, non-consequence) method of content analysis. The internal content elements of the document were categorized in order to qualify the most important points of connection in the sports field. In the case of the interviews, we performed text analysis and correlation analyses.

After the results of the motorous, VTS and questionnaire tests were available, descriptive statistical procedures were used to analyze the data for the entire population. A two-sample t-test was applied to compare the different groups formed from the sample and to determine their content differences. In addition, we also performed discriminance analysis in order to determine the characteristic differences between the groups, and a Pearson correlation test was used to examine the correlations as well. The statistical analyses were performed using the SPSS 28.0

program. The significance level was based on the margin of error used in researches ($p=5\%$), and in the case of examining correlations, values above the ($r=0.5$) level were used.

3. Results

3.1. Analysis of the strategy of the Hungarian Handball Association (2022-2028)

Key findings on the strategy:

- The periodization of the strategy is well-defined and sets clear, unambiguous goals for implementation.
- The models and tasks of preparation typical of different age groups build on each other and are strongly related in terms of content.
- The majority of the content parts of the sports professional strategy deal primarily with the sports profession.
- The priority of adult success and the performance delivered there emerged as an important basic thesis during the analysis.
- It mentions the environmental factors affecting athletes – especially the quality of the relationship between the coach and athlete –, thereby strengthening the importance of the pedagogical and psychological training of coaches as a task to be solved in the future.
- In the strategy the analysis of environmental conditions and its development lacks the examination of parental influences, or any reference to them.

3.2. The opinion of the participants

Athletes:

Summarizing the athlete interviews, the national and non-national handball players expressed the same opinion in many cases. They all considered genetic and inherited factors important in their success, as well as the presence of appropriate self-confidence. In the case of coaching and parental relationships, positive treatment and an atmosphere of trust were important factors in both cases. The motivational base shifted more towards internal motivation, but the successful players also mentioned external motivation as an influencing factor regarding the success of their careers.

Sports professionals:

In addition to the sports movement material and psychomotor skills, having the right personality and its development were mentioned as key factors during the interviews. Among the coaching competencies – in addition to professional knowledge – communication skills, self-training and high workload ability were mentioned as expected ability-skill factors. In the case of the motivational base, the primacy of internal motivation, respect, honesty and an atmosphere of trust in the coach-athlete relationship emerged as expectations in the interviews.

3.3. Examination of the results of motor tests and structural parameters

In the case of men the two groups most strongly could be distinguished by the results of the selected athletes. Based on these, the best distinguishing ability between the two groups was the *Backsquat test* ($F(1,2)=21.112$; $p<.001$). This was followed by the body parameters *Height* ($F(1,2)=17.911$; $P<.001$) and *Weight* ($F(1,2)=6.131$; $p=0.018$), then *Benchpress* ($F(1,2)=4.452$; $p=0.041$).

In the case of women, the *Backsquat test* ($F(1,2)=21.525$; $p<.001$) distinguished the two groups best. The second most demarkating ability was the *Squat (Relative) test* ($F(1,2)=19.066$; $p<.0.01$), followed by the *Height parameter* ($F(1,2)=11.757$; $p=0.002$). The least distinguishing ability in the sample was the *Endurance test* ($F(1,2)=10.449$; $p=0.003$).

3.4. Presentation of Vienna Test System (VTS) personality test results

There was a significant difference between the two groups in terms of personality traits, so we were able to discriminate between the male selected and non-selected sample based on the personality traits of the selected handball players. The most distinguishing personality trait between the two study groups was *Ambition* ($F(1,2)=17.841$; $p=0.001$). The second most distinguishing personality trait was *Discipline* ($F(1,2)=17.189$; $p=0.001$), which was followed by *Sense of Duty* ($F(1,2)=14.646$, $p=0.001$), *Self-confidence* ($F(1,2)=14.399$; $p=0.001$),

Emotional strength ($F(1,2)=12.125$; $p=0.001$), *Energetics* ($F(1,2)=9.863$; $p=0.003$), *Calmness* ($F(1,2)=6.983$; $p=0.012$). The least distinguishing characteristic between the two groups was *Assertiveness* ($F(1,2)=6.204$; $p=0.017$) and *Helpfulness* ($F(1,2)=6.167$; $p=0.017$).

We did not find any differences between the two analyses for the female national team and non-national team so we did not perform a discriminancy analysis.

We were able to distinguish the two genders most in the case of the *Self-Confidence* ($F(1,2)=10.556$; $p=0.002$) factor, in favor of the male players. This was followed by *Emotional Strength* ($F(1,2)=10.027$; $p=0.002$), also in favor of the male players. The third distinguishing factor, - in favor of the female players - was *Emotional Openness* ($F(1,2)=9.772$, $p=0.002$). The least distinguishing personality trait was *Calmness* ($F(1,2)=4.31$; $p=0.333$).

3.5. Examination of the participants of the study from a sports pedagogical aspect

Tactical skill ($F(1,2)=7.297$; $p=0.01$) was the most significant difference between the selected and non-selected male players. In second place was *the moral behavior of the coach* ($F(1,2)=0.023$, $p=0.023$), third was *the lifestyle* (nutrition, rest, nightlife – avoiding harmful habits) ($F(1,2)=5.329$; $p=0.026$), fourth was *the pedagogical preparedness of the coach* ($F(1,2)=4.355$; $p=0.043$), while the answers the least differentiating the two study groups were the ones related to *the professional staff* (strength coach, rehabilitation manager) ($F(1,2)=4.241$; $p=0.046$). The views of the female national and non-national players on *Body Composition Parameters* ($F(1,2)=16.775$; $p<.001$), *Professional Workshop at the Club* ($F(1,2)=15.69$; $p<.001$) and *Cognitive Factors* ($F(1,2)=12.667$; $p=0.001$) differ the most significantly while the factors *Teammates' cooperation* ($F(1,2)=4.56$; $p=0.039$) and *Social relations, cooperation* ($F(1,2)=4.586$; $p=0.039$) are the least in their influencing role.

The strongest differences between men and women - based on the views of female handball players - were found in the responses to *Tactical skills* ($F(1,2)=19.381$; $p<.001$) and *Inspiring environment at the club* ($F(1,2)=18.476$; $p<.001$). The least distinguishable responses were the responses to the questions on *School academic achievement* ($F(1,2)=4.23$; $p=0.043$) and *Coach's motivational base* ($F(1,2)=4.017$; $p=0.048$).

3.6. Examination of the psychological state of the athletes participating in the study regarding self-assessment before the match

In the case of examining the differences between men, we were able to distinguish the two groups best based on *Self-confidence* ($F(1,2)=22.371$; $p<.001$) according to the responses of the national team players. *Cognitive anxiety* ($F(1,2)=4.406$; $p=0.042$) was the second distinguishing characteristic based on the responses of the unsuccessful handball players. When processing the results of the national team and non-national team female sample, we found no significant difference between the two groups, so we did not perform a discriminancy analysis.

When examining the main differences between the two genders, the strongest difference was the *Cognitive Anxiety* factor ($F(1,2)=27.114$, $p<.001$) based on the higher value responses of female handball players. We were also able to differentiate the genders in favor of women based on the *Somatic Anxiety* factor ($F(1,2)=16.656$; $p<.001$), while the third differentiating factor in favor of men was the *Self-Confidence* factor ($F(1,2)=15.309$; $p<.001$).

3.7. Examining environmental influences related to coaching treatment

Analyzing the results of the male sample, the response - *My coach makes sure that I actually understand the goals related to the sport and what I need to do for it* ($F(1,2) = 9.869$, $p = 0.003$) - was the strongest differentiator between the two groups, followed by the responses *My coach trusts my abilities to do the sport well* ($F(1,2) = 8.464$; $p = 0.006$) and *I feel that my coach provides me with the opportunity to choose* ($F(1,2) = 4.763$; $p = 0.035$). In the case of women, the strongest differentiating response was the response to the question *Before suggesting a new method, my coach tries to understand how I see things* ($F(1,2)=14.035$, $p<.001$), followed by the responses to the questions *My coach listens to how I want to do things* ($F(1,2)=10.106$; $p=0.003$) and *I feel that my coach cares about me as a person*.

($F(1,2)=4.171$; $p=0.048$) based on the opinions of the national handball players.

Between the two genders, the biggest difference was represented in the response of men to *Before suggesting a new method, my coach tries to understand how I see things* ($F(1,2)=19.382$; $p<.001$). The second strongest difference also reflected the opinion of men, *My coach listens to how I want to do things* ($F(1,2)=9.767$; $p=0.002$), while based on women's responses, the answer to the question *My coach encourages me to ask questions* ($F(1,2)=9.143$; $p=0.003$) showed the third strongest difference between the two groups.

3.8. Examining environmental factors in relation to parental support

Based on the results of the discriminancy analysis, the strongest difference between the two groups was found in the responses *I can talk to my parents about competitive sports* ($F(1,2)=12.308$; $p=0.001$), *I feel that I can share my experience and experiences related to competitive sports with my parents* ($F(1,2)=10.906$; $p=0.002$), *My parents praise me when I do competitive sports* ($F(1,2)=9.897$; $p=0.003$), while the least distinctive response was *I feel that my parents create the opportunity for me to do competitive sports* ($F(1,2)=6.541$; $p=0.014$), in each case reflecting higher statistical values of the selected male handball players. When

processing the results of the selected and non-selected female sample, no differences were found between the two groups. There was no significant difference, so we did not perform discriminancy analysis.

When processing the results of the male (selected and unselected) and female (selected and unselected) samples, we found no significant difference between the two groups, so we did not perform a discriminancy analysis.

3.9. Examining the relationship between coach and athlete from the athlete's perspective

In the analysis of the differences between the two groups, the responses to the questions belonging to the *Commitment* subscale distinguished the given sample the most ($F(1,2)=17.281$; $p<.0010$), followed by the *Closeness* subscale ($F(1,2)=8.21$; $p=0.007$) and the *Coaching Behavior* subscale ($F(1,2)=6.836$; $p=0.013$) in all three cases based on the opinions of the selected handball players. In the case of the responses of the successful and unsuccessful female handball players, no significant difference was found between the subscales, so we did not perform a discriminancy analysis.

When examining gender differences, the most significant difference between men and women was found in the responses to the *Coaching Behavior* subscale ($F(1,2)=7.748$; $p=0.007$), while the second difference was found in the responses to the *Closeness* subscale ($F(1,2)=4.267$; $p=0.046$) based on women's responses.

3.10. Results of coaching behavior based on athletes' views

In our study of the results of coaching behavior based on the athlete's views we found no significant differences in either group, so we did not perform a discriminancy analysis.

3.11. Analysis of athlete motivation test results

Among men, the discriminatory difference was represented by *Cognitive Intrinsic Regulation* ($F(1,2)=11.752$; $p=0.001$). The second strongest difference was observed in the case of *Effective Intrinsic Regulation* ($F(1,2)=10.592$, $p=0.002$) in both cases in favor of the selected handball players. The third strongest difference occurred in the case of *Amotivation* ($F(1,2)=8.252$; $p=0.006$), in this case based on the responses of the non-selected handball players. The least discriminatory variant between the two groups was *Identified Regulation* (F

(1,2)=4.928; $p=0.032$). In the case of differences between female samples, the strongest value was for *Effective Intrinsic Regulation* ($F(1,2)=14.389$; $p<.001$), followed by *Integrated Regulation* ($F(1,2)=6.446$; $p=0.015$). The least distinguishing variable was *Cognitive Intrinsic Regulation* ($F(1,2)=6.276$; $p=0.017$), with the values of the experienced handball players being higher in all three cases.

Based on the results of the male (selected and non-selected) and female (selected and non-selected) samples we found no significant differences between the subscales, so we did not conduct a discriminancy analysis.

3.12. Examining the relationships between factors affecting performance

In the case of the male national team sample, we were able to establish a moderately strong relationship ($r=0.571$) when examining the *athlete's commitment* to his coach and the *supportive approach* of the coach. In the case of examining the athlete's *closeness* to his coach, the relationship with coach support was also moderately strong ($r=0.563$). In the case of the *intrinsic motivation* of the national team men and the experience related to their coach, however, *cognitive intrinsic* motivation and the *experience related to coaches* showed a moderately strong relationship ($r=0.571$). During the study *Integrated internal regulation* and *experience related to coaches* also reflect on a moderately strong relationship ($r=0.579$). When analyzing the pre-match state analysis and the commitment, closeness and behavior felt towards the coach, we found a moderately strong correlation in the case of the national team men for *self-confidence* and *commitment* ($r=0.555$).

The value indicating the strength of the relationship in the case of *integrated regulation* and *parental support* was ($r=0.516$), and in the case of introjected regulation and parental support ($r=0.673$). The sample of selected women also produced similar results in the areas examined. The athlete's *commitment* to their coach and the coach's *supportive approach* showed a moderately strong relationship ($r=0.555$), and the athlete's *closeness* to their coach and the coach's *supportive behavior* ($r=0.621$) also resulted in a moderately strong relationship.

In the case of the women's national handball team, however, *external regulation* and *amotivation* had a moderately strong relationship ($r=0.561$). Analyzing the results of the women's national team, we found a moderately strong relationship in two cases, for *somatic anxiety* and *negative treatment by the coach*, and we experienced a moderately strong correlation ($r=0.569$) between the motivational base and parental support.

4. Discussion

Our results in many cases have confirmed the relevance of the questions we asked during our research regarding the preparation and success of athletes. We were able to see how sports-related factors can directly and indirectly influence the success of youth handball players at different quality levels, and we also gained an idea of the psychological and pedagogical environment in which youth handball players can safely operate. Our results have highlighted that planning the preparation of handball players requires a very versatile knowledge and expertise from the professionals involved in preparation. Possession of this knowledge can create a professional and trusting atmosphere that can greatly contribute to the qualitative development of handball players. We also received an answer that the role of parents is important, but as the athlete's life path progresses, this role changes at every level of success. As for the factors influencing success, the role of genetic and inherited factors continues to be important for athletes, but this alone is not enough for success. The value of the quality of relationship systems (coach, parent) has increased in the field of sports in recent years, which has also been proven by our research. The continuous performance pressure in sports has a strong impact on its participants, which only individuals with the right personality can adapt to. The research has proven the existence of differences between the levels of success in the case of psychological and motivational background. The examination of the differences between the two sexes has proven the importance of different preparation of the genders, primarily in the fields of pedagogy and psychology.

H1 has been clearly been proven, as the national professional association's 2022–2028 strategy includes the education of young athletes at a systemic level. Different age groups operate in different - but mutually reinforcing - training and competition structures by using professional materials prepared by the association. Training and competition play a central role in the content of the professional pillar of the strategy, but – especially in the lower age groups – the role of education and personality development is mentioned. In terms of the environmental factors surrounding the athletes analyzed in our research, in the strategy only the coach and their training appear in a systemically organized framework, mostly limited to professional content.

H2 was not confirmed, because according to the athletes' opinions, handball players considered important not only factors directly related to the sport, but also other external environmental factors that could affect their success, such as the pedagogical and psychological preparedness of coaches. Our research also demonstrated the strong influence of environmental

factors surrounding athletes, as well as the importance of interpersonal relationships for achieving success in sports.

H3 was partially confirmed, as in the case of men we were able to statistically distinguish selected and non-selected handball players in all three areas examined, while in the case of women this was not possible in all cases.

Our H4 hypothesis was proven, as we found differences in all areas in the characteristics determining success between the selected men and women.

The most significant result of our research could be if – in addition to the findings confirmed by science – we could also provide guidelines for daily practical work with our suggestions. For this, we consider it necessary for the sports association to become familiar with the results of our research through various publications and educational lectures and also further training in coaching, which could initiate a new world approach regarding the compilation of the preparation and training programs of domestic sports professionals.

4.1. Limitations of the study, further research possibilities

During our study, in the case of sample selection, the number of elements was strongly determined by the number of selected handball players belonging to the proven group, as we had to determine the number of elements of the unproven/non-selected players accordingly.

Starting from the analysis and evaluation carried out with the current age group, it could be an exciting topic in the future, if we assessed not only the youth age group, but also the junior and adult age group sample above them. The results obtained and their evaluation could represent a serious added value in the future for the harmonious and effective operation of the triple unit of selection, preparation and performance in handball, which could further increase the effectiveness and competitiveness of the sport in domestic and international sports life.

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