National and international comparison of gymnastics-specific attitude and personality characteristics of youth and adult national selected female gymnasts

Abstract of PhD thesis

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Introduction

The research herein was based on the regular observation of elite female gymnasts. Observations were based on the author's own competition experiences, coaching-teaching activity and on international judging experiences. These experiences made it possible to analyse the performance of elite European female gymnasts at an empirical level and evaluate the parameters of the Hungarian female gymnasts in relation to their training and competition based on their competition results between 2009 and 2013. It can be stated that the performance of current Hungarian gymnasts – when compared to their previous success – lags behind. This may be due to several reasons,; it can be concluded that the lack of success is not because of a failure in professional training preparation, but rather the lack of usage of such equipment that opponents have been using for a long time.

Nowadays Hungarian coaches mostly deal with the teaching and **innervating** of movements during the training and deliberate regulation, self-control, self-regulation formation and other psychic viewpoints play a smaller role. Efforts should be made regarding the operation and improvement of a series of mostly psychological skills, as they are responsible for the proper "quality" of the exercises, besides aiding the physical execution. Unfortunately these movement-regulating exercises are mostly missing from the preparation. Thus, it is worth implementing newer viewpoints in the development program from which the improvement of successfulness can be expected.

While defining the parameters of the research topic, the psychological approach proved to be too broad when we outlined the problem of attitudes, motivations, personality features and strategy through literary review. Finally, psychological skills and their strategic diagnostic evaluation were focused on and the researches were launched in these fields.

Aim and Hypotheses

The exact aim of the research is the psychological regulation of performance, which justifies, first of all, the examination of performance behaviour components, the psychological skills. After that, two domains must be outlined: The field of training and the field of competition– and within that–the works referring to the measuring methods of psychological regulation. After that, a comparison of the measured results (of several gymnast groups) is carried out. The aims are tasks to which expectations, namely hypotheses, are connected. These are as follows:

1. It is controlled and expected that the applied questionnaire is applicable to the Hungarian sample as well with respect to (a) objectivity, (b) reliability and (c) validity. Accordingly certain test-adaptation work has to be carried out. It is supposed that the questionnaire will be suitable for the Hungarian sample as well.

2. It is supposed that well-defined differences will be found between the tested groups as far as the levels of the applied test variables are concerned. Divergences are expected both in (a) training and in (b) competition. The level values are considered as a component of the performance strategy of the gymnast.

3. It is also supposed that as the variables are present at the same time in the "reality" of training and competition, they will show an integrated activity of interactions. This information is expected to be gained from the inter-correlation of the whole sample studied by the author. It can also be expected that differing correlation patterns will be observed in each gymnast group, and it is expressed both in (a) training and (b) competition.

4. Those psychological skills which are developed during training will have an effect during competitions as well, with a modified intensity. It is supposed that the differences between training and competition (in the identical measured parameters) will characterise certain gymnastic groups if they are compared to the others.

Methods

- On-site observations in trainings and competitions (to find the topic of the thesis);
- analysis of international competition results (to analyse the performance rank),
- application of Performance Strategy Test (PST).

The Performance Strategy Test (PST) – description

Structure of the test

The level of 16 different psychological skills can be measured. This is a unique process among the questionnaires, with the help of which skill-levels can be measured parallel to training sessions and competitions. Seven variables are identical, but certain variables are related only to training sessions or to competitions. The original test (Test of Performance Strategies TOPS) was elaborated by Thomas et al.

The measured variables:

In training (T)	Sign	In competition (V)
activity	a	activity
relaxation	r	relaxation
imagery	i	imagery
goal-setting	c	goal-setting
control of emotion	e	control of emotion
self-talk	b	self-talk
automation	t	automation
attention control (only during training sessions)	f or g	negative thinking (only at competitions)

SPSS 20.0 software was used in evaluating the statistical data: descriptive statistics (mean and scatter), two-way T-test (Student test in case of a non-equal variance) for demonstrating differences, the Pearson-type correlation and significance measurements, and the Cronbach alpha correlation and its significance measurements.

Sample

The research sample was comprised of (N=183) elite gymnasts from the national teams of 12 European countries. The average age is 16.4 years (2.4 scatter).

Parts of the sample: Austrian (AUT) 14; Spanish (ESP) 9; Finnish (FIN) 12; British (GBR) 17; Greek (GRE) 10; Hungarian (HUN) 34;Icelandic (ISL) 13; Italian (ITA) 15; Norwegian (NOR) 7;Portuguese (POR) 13;Rumanian (ROU) 11; Swiss (SUI) 19 gymnasts.

Data were collected in the training camps organised by the European Gymnastics Federation before greater international competitions. They were mostly between national competitions and they aimed to prepare the athletes for the Olympic Games. The testing was strictly in accordance with the rules and regulations of human researches outlined in the EU ethical standards.

Results

1. **Results of the methodological research:**

The requirements of testing and evaluation were fulfilled.

The reliability of time-related stability was ensured by the high correlation coefficients in the 3-week test – re-test surveys in the n=34 Hungarian sample. The correlations were between R=0.63 and 0.89 during training. The received results for the components showed the following: activation 0.55; relaxation 0.68; imagery 0.89; goal setting 0.63; emotional control 0.72; self-talk 0.78; automation 0.70; and concentration 0.72. The average was 0.72. The correlation coefficients of the repeated competition scale were between 0.63 and 0.87, and the components were: activity 0.66; relaxation 0.68; imagery 0.78; goal-setting 0.87; emotional control 0.63; self-talk 0.80; automation 0.80 and negative thinking 0.72. The average was 0.74, which can be said to be considerable regarding the 3 week testing.

The coherence of test variables is justified by the high values of Cronbach alpha. The alpha coefficients related to the scales of training were between 0.74 and 0.93. The factors had the following values: activity 0.89; relaxation 0.81; imagination 0.91; and goal-setting 0.74; emotional control 0.88; self-talk 0.93; automation 0.90 and attention control 0.85; the average was 0.86. The scale results of the competition between 0.73 and 0.88 showed the following: activity 0.88; relaxation 0.84; imagination 0.83; goal-setting 0.88; emotional control 0.86; self-talk 0.86; automation 0.73 and negative thinking 0.84. The average is 0.84. The surveyed questionnaire can be accepted as reliable.

The validity of the test was controlled by the method of constructive validity. This means that if the higher values of certain variables promote a better sport performance (and inversely: lower values promote a poorer performance), then it can be expected that the variables will show well-expressed positive (in some cases, negative) correlations. The evaluation is given by the correlation between the variables (inter-correlation), the measurement of which was separately elaborated for the training sessions and competitions in the whole sample.

As far as the training is concerned, 13 significant correlations were found. It was only the attention variable that had values near 0, so it fell out of the correlation pattern. In relation to the competition, 14 significant correlations were found, three of which were negative, because the low level of negative thinking is in opposition to the high level of the other variables. In

this case it was automation that fell out from the correlation pattern, which is understandable as automatic solutions are not important at the competitions, but at training sessions. The results of the constructive validity process reinforce the validity of the original test.

It can be stated that the first hypothesis related to the applicability of the Performance Strategy Test deals with both reliability and validity.

2. Comparative analysis of level values of variables

The descriptive statistics of the total sample (mean, scatter, minimum and maximum values) were created, which formed the basis and the international standard. The descriptive statistics were also created for the female national team member gymnasts of the examined 12 European countries. It can be stated that the values of these partial samples were scattered around the values of the total sample. Thus, it can be said that the groups can be well-differentiated as far as the level values of the psychological skills are concerned. (This fact is presented in the table of statistics.) Then the mean values of all 16 variables received from comparing the countries were described with the help of histograms (altogether 16). The figures well represent the differences existing between the studied groups in all variables.

Statistical evaluation was carried out in relation to the performance ranking and competition-related psychological skill levels based on the competitions of European groups between 2009 and 2012. Significant differences were found in the total values of the first three countries (Romania, Britain and Italy) and the last three ones (Portugal, Norway and Iceland). In competition imagery (Vi, $p<0.001$) and self-talk (Vb, $S<0.05$) the first best groups significantly surpassed the last groups. The results indicate that imagination and self-convincing talk have a direct correlation with the performance of the gymnast.

Then the examination of the level values were submitted to a detailed statistical analysis in comparing the Hungarian (N=16, age: 15.8+2.4 year) and British (N=17, age: 15.7+2.5 year) groups. The reason the British group was chosen was due to the fact that Britain was to organize the Olympic Games in London, for which the British team had been preparing intensively for years and showed considerable improvement.

During the training sessions the British group used relaxation ($p<0.05$) and emotional regulation ($p<0.05$) on a significantly higher level, while the skills of the Hungarian group in self-talk were significantly higher ($p<0.001$). During the competition the British gymnasts applied imagery significantly more frequently ($p<0.001$), but negative thinking was also

significantly more frequent (p<0.05). The Hungarian group showed a significantly higher value in self-talk here as well (p<0.001). These differences are considered characteristic features from a strategic point of view.

It can be stated that the second hypothesis was validated, according to which the psychological skills appear with a high level of variability in each group, providing the basis of the performance strategic characteristics of certain groups.

3. Comparison of correlation patterns of variables

The results of constructive validity for the total sample have already shown that psychological skills show remarkable correlations. Thus, the question arises as to whether these correlations can be shown in smaller samples as well, and if there are differences between the British and Hungarian groups in this field.

During training activation and imagery have a significantly high (p<0.05) correlation and a significant correlation with emotional control and attention control (p<0.05). There is a very strong relationship between imagery and goal-setting (p<0.01), which shows that Hungarian female gymnasts strongly focus their attention on the execution of certain elements. On the other hand, in the British group, the activation has low correlations, while at the same time there is a significant correlation between relaxation and imagery (p<0.05), but there is a significantly negative correlation with emotional control (p<0.05). Automation has two significant correlations with goal-setting (p<0.05) and self-talk (p<0.05). The highest significant correlation can be found between self-talk and goal-setting (p<0.01); this means that the British gymnasts strongly support the aims set in training sessions with self-talk.

Different correlations can be observed at competitions compared to training sessions. Activation has an extremely high level in the Hungarian group, and significant correlations can be found with regard to goal-setting (p<0.05) and automation (p<0.05). An extremely high correlation (p<0.01) can be found between goal-setting and self-talk, which is of great importance in terms of duties being carried out at a competition. In the British group, negative thinking has a positive correlation (p<0.01) with activation; in other words, negative thought encourages a higher level of activity while having a significantly negative correlation (p<0.05) with relaxation. This latter fact is related to the antagonism of activation and relaxation. There is a negative correlation between emotional control and self-talk (p< 0.05) as well. Therefore, it can be deducted that there is a strongly differing correlation pattern

between the Hungarian and British female gymnasts in relation to both training and competition.

The investigated total pattern and the results of the correlation analysis of the Hungarian and British groups have validated the third hypothesis, according to which psychological skills act in a different way based on the correlation patterns characteristic for the group, and thus prescribe the direction and course of performance strategy. These results surpass the quantitative differences and step over to the domain of qualitative types of differences. This means that the gymnast activates one or more skills with greater intensity, which has an influence on the whole strategy.

4. Differences between training and competition

Psychological skills become more intensive during competition, so their values change compared to the ones measured during training. In the case of a competition, activity is higher ($p < 0.001$), goal-setting is more accurate ($p < 0.001$), imagery is more effectively used ($p < 0.001$) and relaxation rises remarkably ($p < 0.001$). On the other hand, the decrease in automation can also be determined ($p < 0.001$) for competition. Emotional control is much less used ($p < 0.001$); the most probable cause of it is – as the gymnasts say– that the level of anxiety decreases as soon as the competition starts. Self-talk and the level of positive, self-motivating encouraging skills does not change. So it seems that self-talk has greater stability than the other parameters, which is why it is extremely important how high its level is in certain groups.

The more detailed analysis of the Hungarian and British gymnasts points out how they follow the results of the total sample, and that the two groups differ from each other. When comparing the two groups, it turns out that the activity increases significantly in both groups ($p < 0.001$) during the competition, which can be said about relaxation as well ($p < 0.001$). There is no difference between the two groups. The groups follow the results of the total sample.

However, the British group show a significant increase in imagery in competition situations ($p < 0.001$), while the result of the Hungarian group stays at the same level. The drawback is obvious, as it is imagery, the mental imagining of movements, which might be an important performance increasing factor. In this case, only the British sample follows the total sample.

The clear setting of goals also has a positive effect on performance (goal motivation). The Hungarian group shows significantly higher values in competitions ($p<0.01$) than in training sessions, so here the Hungarians have an advantage. Both groups follow the total sample in goal-setting.

As far as the other variables are concerned, the differences between training and competition show statistically the same picture. Emotional control is a bit stronger in the Hungarians ($p<0.001$), but the decrease is also significant with the British group ($p<0.01$), which matches the total sample. There is no considerable change in self-talk. The Hungarian group has high values in both situations. Finally, automation significantly decreases in both groups ($p<0.01$) in competition compared to training. This corresponds to the result of the total sample.

The analysis of the total sample and the above-mentioned two (British and Hungarian) sub-samples makes it possible to draw positive conclusions between competition and training from the point of view of differences. The fourth hypothesis is validated as the expectations of differences between competition and training was observed. The divergences show differences in imagery and goal-setting.

Conclusions and suggestions

The basis of the research in this thesis is the performance-strategic approach. This means that an answer was expected to show what a preparation strategy (training) is and what a strategy is for the execution (competition). In both fields we have to talk about the mutual plan of the coach and competitor for the period of the joint work, which is why it is a necessity in the pedagogical approach of the coach.

In the research those components of performance were studied which sensitively regulate and characterize the strategy. The regulations were found in the 16 psychological skills. It was especially important to find adequate research methods, the usage of which provide answers to our questions. The Performance Strategy Test, as a questionnaire process, was adapted and proved to be suitable. The adaptation of the Hungarian test suited all the test criteria, and therefore was appropriate for use in comparing gymnast groups.

At the moment we now have statistical results suitable for international comparisons and the characteristics of elite female gymnasts from 12 European countries. Any of the country samples can be compared to the others and can show the "strengths" and "weaknesses" of

certain groups compared to the others. It can be shown what characteristics a certain national team can rely on and which have to be strengthened.

The main strength of the Hungarian gymnasts is: a high level of positive self-talk, goal-setting, emotional regulation, and a low level of negative thinking. The maintaining and further improving of these skills are the aim. The improvement of activity, especially at training sessions, should be improved as it is a weakness; it can be achieved through the use of motivated training sessions. It is also important to develop the skills of imagery and relaxation, as they have a lower level than average. The use of a psychologist is authorized. They all have important roles in the successful execution of a routine. Their development is detailed in the thesis.

Based on our results, we suggest using the above-mentioned methods in the preparation of female gymnasts as a means to successfulness, but they can be also used with male gymnasts.

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