

The improvement of athletes' imagery ability and physical self-efficacy for the growth of athletic achievements in sport model

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Abstract

Finding successful solutions to the problems of psychological preparation of athletes is not possible without an understanding of the defining components of the psychological preparation process. Practice and research show that insufficient attention is paid to promoting the psychological preparation of athletes during the training process. It is one of the most important contradictions affecting the psychological preparation of athletes. The development of the psychological training model - Improvement of Athletes' Imagery Ability and Physical Self-Efficacy for the Growth of Athletic Achievements in Sport Model is expected to have positive effects on athletes' psychological preparation, development of imagery ability and physical self-efficacy and help them achieve higher success in sports. The purpose of the developed model is to improve the level of imagery ability and physical self-efficacy of athletes, which will improve their achievements. This model can be used by sports coaches, sports psychologists, athletes, as well as other sports specialists in the training process to promote the growth of athletes. Several methods were used in the process of developing the model: research and analysis of literature sources, Sport Imagery Ability Questionnaire (SIAQ), Self-Efficacy to Regulate Exercise Questionnaire (SEREQ), and mathematical and statistical methods. The sample of respondents consisted of 207 athletes (women and men) aged 18 to 34 years, who represented individual and team sports. The Improvement of Athletes' Imagery Ability and Physical Self-Efficacy for the Growth of Athletic Achievements in Sport Model is based on scientific findings, the results of factor analysis, as well as evaluation of the statistically significant correlation between athletes' imagery ability, physical self-efficacy, and sports achievements. The model consists of interrelated factor structures and five variables. The "Psychological preparation" factor is the overarching factor that combines the following internal factors of the model: "Imagery for Maximum Performance"; "Imagery for Optimization of Skills and Abilities"; "Physical Self-Efficacy", while the "Growth of Athletic Achievements" variable is influenced by all factors of the model.

Keywords: imagery ability, physical self-efficiency, athletic achievements, psychological preparation

Introduction

Scientific literature, as well as previous studies, confirm that there is a close relationship between athletes' imagery and physical self-efficacy. Imagery is an important component for physical self-efficacy mechanism, aspect indicated by Bandura (1997) in his works. The use of effective imagery can increase athletes' self-confidence and physical self-efficacy, which are essential conditions for an athlete's achievements. Based on the findings of Bandura (1997), it can be concluded that individual's experience during imagery is one of the most important sources of self-efficacy. Seeing other athletes' successful actions in real life or visualising them in the imagery can promote the athlete's self-confidence and the ability to learn similar actions. Creating positive images and scenarios of successful actions in one's imagery can develop and promote the physical self-efficacy of athletes. One of the prerequisites for the effective use of imagery is the inclusion of the senses, as well as emotions and feelings. If this is implemented in the process of imagery, then this kind of imagery will be an even stronger source of self-efficacy. In previous studies, it has been found that seeing oneself as a winner in the imagery contributes to the athlete's physical self-efficacy, as well as increases in physical endurance indicators (Kuan et al., 2018; Anstiss, et al., 2020). For this reason, physical self-efficacy is more studied in endurance sports and less in technical sports (this does not mean that physical self-efficacy is less important in technical sports).

Research in sport psychology proves that self-efficacy is closely related to athletes' performance and achievements (Beauchamp et al., 2012; Haight et al., 2020; Shearer et al., 2018; Rogowska et al., 2022). Confidence in one's abilities is one of the most important factors that separates successful athletes from less successful athletes. Confidence in one's abilities contributes to the growth of athletes' self-efficacy. Often, the reason for this increase can also be found in the positive and effective use of imagery, which also gives a positive

result in the performance of athletes (Kocaekşi et al., 2020). According to Bandura's (1997) self-efficacy theory, it can be concluded that imagery has a positive effect on athletes' physical performance.

Today's research on the relationship between imagery and physical self-efficacy is based on the psychological states of athletes. By imagining ourselves successfully performing a specific task, athletes' physical self-efficacy and expectations for success are encouraged. Every athlete has the desire to be efficient and achieve the highest possible results (Hepler et al., 2021).

With the help of imagery, athletes can improve their physical and psychological skills. For example, improving physical skills already learned or correcting mistakes can be done. The use of imagery makes it possible to improve physical activity indicators (Aparicio-Flores et al., 2020; Spino & Straub, 2014). Athletes can achieve positive results thanks to changes made through imagery. Psychological skills training and their techniques are related to the promotion of a positive attitude of athletes towards themselves. As a result of a positive attitude, athletes' self-confidence, self-efficacy, as well as their performance increase (Moraru et al., 2015). A similar claim has been made by Rogowska et al. (2022) that there is a correlation between physical self-efficacy and performance. Imagery, which is based on positive inner speech and involves accessing an altered state of consciousness, brain activity being changed from the left to the right hemisphere (Predoiu et al., 2020), positively increased athletes' self-efficacy and achievements (Rogowska et al., 2022). This indicates that positive self-talk is a critical enabling component of imagery and physical self-efficacy.

Successful use of imagery in the training process can have a positive effect on athletes' general and physical self-efficacy. Sports scientists and researchers have conducted studies that have done impressive research to explain the role of imagery in improving self-efficacy. These studies have produced interesting results and findings. For example, Munroe-Chandler et al. (2008) investigated the interrelationship between the use of imagery, self-confidence and self-efficacy in soccer players. They appreciated that comparing the functions of imagery, imagery that fulfils the motivational general function and is focused on competence-oriented imagery abilities is the most powerful source for promoting self-efficacy and self-confidence in sports. This type of mental training is characterized by images that represent the effective handling of difficult, unusual or even unsuccessful situations. Athletes, using competence-oriented imagery, can imagine scenarios where they see themselves performing successfully in competitions. It significantly promotes self-confidence as well as increases and supports physical self-efficacy in training, learning and competition environments. Munroe-Chandler et al. (2008) emphasize that it is the motivational general function of imagery, which focuses on the imagery of competence, that can be used to help athletes perform various skills with greater confidence and self-efficacy. O et al. (2014) implemented an imagery program in the training process of squash players as part of the study, in which very different and individualized imagery scenarios were developed for each athlete, according to the needs of each one. In this study, the authors emphasized and considered the fact that each athlete is different and has his or her individual needs concerning the athlete's psychological preparation. In the course of the research, the athletes performed the individualized imagery tasks independently, as well as once-a-week imagery training took place under the supervision of the coach. The authors were interested in how self-efficacy indicators would change under the influence of imagery. A total of five squash players participated in the study, and as a result, three of the athletes showed positively improved levels of self-efficacy. The results of this study indicated and confirmed that imagery has a positive relationship with self-efficacy. Wesch et al. (2012) conducted an intervention study considering imagery and physical self-efficacy. This study aimed to evaluate guided imagery and relaxation programs in improving functional outcomes after injury. The developed program was carried out in nine individual sessions as an aid to standard rehabilitation. Sports scientists and researchers have directly or indirectly tried to determine the factors influencing the achievements of athletes. Much research on the biomechanical, physiological, nutritional, and psychological parameters of sports is aimed at enabling athletes to reach their peak performance.

In the above-mentioned studies, it has been repeatedly confirmed that imagery influence the physical self-efficacy of athletes and vice versa - physical self-efficacy affects imagery, and also that imagery and physical self-efficacy have positive correlations with the achievements of athletes. Researchers emphasized that competence-, emotion-, and goal-oriented imagery abilities are positively correlated with the level of physical self-efficacy.

Materials and methods

The sample was made up of 207 athletes (females and males) with ages ranging from 18 to 34 years (20.37±3.21). Athletes represented the different teams and individual sports. They were involved in organized sports forms for an average of 9.4±4.58 years.

The Improvement of Athletes' Imagery Ability and Physical Self-Efficacy for the Growth of Athletic Achievements in Sport Model was developed in several stages. The following research tools and methods were used in the development of the model: the Latvian version of Sport Imagery Ability Questionnaire (SIAQ, Williams & Cumming, 2011; adaptation in Latvian by Volgemute et al., 2019) and Self-Efficacy to Regulate Exercise Questionnaire (SEREQ, Bandura, 1997; adaptation in Latvian by Upesleja, 2017), mathematical statistics methods (factor analysis, varimax rotation were used to determine the structure of the model, KMO

Measure of Sampling Adequacy Tests and Bartlett Sphericity Test was used before factor analysis to determine research groups match with factor analysis) (see table 1).

Table 1. Development of the Improvement of Athletes’ Imagery Ability and Physical Self-Efficacy for the Growth of Athletic Achievements in Sport Model

Stage	Analysis	Data Source
One	Literature review	Scientific literature sources
Two	Research and analysis of athletes’ imagery ability and physical self-efficacy	SIAQ and SEREQ
Three	Kaiser-Mayer-Olkin (0.782> 0.7) and Bartlett criteria (p=0.000) The principal component analysis, varimax rotation	A sample group of athletes
Four	Development of the model structure	A sample group of athletes

In the first stage of the modelling, an analysis of the scientific literature on the interrelationships between imagery, physical self-efficacy and achievements in sports was carried out. The analysis of the scientific literature provided an understanding of the research problem. *In the second stage* of modelling, the research and analysis of athletes’ imagery ability and physical self-efficacy were performed. Using the SIAQ, the athletes’ imagery ability was determined and using the SEREQ - the athletes’ physical self-efficacy. *In the third stage* of modelling, the obtained data were processed using methods of mathematical statistics and the correlations between imagery ability and physical self-efficacy were determined. *In the fourth stage* of modelling, the structure of the model was developed. The structure of the developed model was based on the results of the SIAQ and the SEREQ, on the interrelationships between athletes’ imagery ability and physical self-efficacy indicators, and the analysis of scientific literature sources. The structure of the model factors was determined with the help of factor analysis.

Results

It has been argued in the scientific literature that there is a clear interrelationship between imagery and athlete achievements as well as between physical self-efficacy and athlete achievements. Similarly, the interrelationship between imagery and physical self-efficacy has been argued (see table 2).

Table 2. Interrelationships between imagery ability, physical self-efficacy and athletic achievements in sports (Volgemute, 2022)

Relationships between imagery and physical self-efficacy in sport	
Visualizing previously experienced situations affects athletes’ physical self-efficacy	Abma et al., 2002; Bandura, 1997; Nordin & Cumming, 2005
Visualizing the movements to be performed and their technical and tactical aspects, as well as competition strategies, plans and techniques, promotes athletes’ physical self-efficacy	Beauchamp et al., 2012; Hepler & Chase, 2008; Moraru et al., 2015; Kocaekşi et al., 2020; O et al., 2014; Williams et al., 2017
Imagery has a positive effect on the physical self-efficacy of athletes	Callow et al., 2017; Duncan et al., 2012; Kocaekşi et al., 2020; Nordin & Cumming, 2005; Watt & Morris, 2020
Affect-oriented imagery ability promotes the physical self-efficacy of athletes	Rogowska et al., 2022; Watt & Morris, 2020
Goal-oriented imagery ability promotes the physical self-efficacy of athletes	Abma et al., 2002; Nordin & Cumming, 2005; Schunk & Zimmerman, 1997; Williams & Cumming, 2016
Relationships between imagery and athletic achievement in sports	
Imagery has a positive effect on athletes’ achievements, physical performance and psychological factors	Frank et al., 2016; Fekih et al., 2020; Nordin & Cumming, 2005
Competition performance-oriented imagery ability has a positive effect on athletes’ achievements	MacIntyre & Moran, 1996; Rushall, 1988; White & Hardy, 1998
Training performance-oriented imagery ability has a positive effect on athletes’ performance of motor skills	Abma et al., 2002; Aikawa & Takai, 2021; Callow et al., 2019; Karabulut et al., 2022
Competence-oriented imagery ability improves the performance of athletes	Aikawa & Takai, 2021; Mills et al., 2001; Watt & Morris, 2020; Williams et al., 2021
Relationships between physical self-efficacy and athletic achievements in sports	
Physical self-efficacy is positively correlated with athletes’ achievements and improves athletes’ performance	Bandura, 1997; Beauchamp et al., 2012; Đurović et al., 2021; Haight et al., 2020; Shearer et al., 2018; Rogowska et al., 2022
Competence-oriented imagery ability contributes to athletes’ physical self-efficacy	Aikawa & Takai, 2021; Beauchamp, et al., 2012; Kocaekşi et al., 2020; Watt & Morris, 2020; Williams et al., 2021

A factor analysis was performed to determine the dominant components of imagery ability and physical self-efficacy for the group of athlete respondents (n=207). Before conducting the factor analysis the suitability of the sample of respondents for its performance was checked with the Kaiser-Meier-Olkin (KMO) and Bartlett criteria. According to the obtained Kaiser-Mayer-Olkin criterion, it can be concluded that the sample of research participants has a satisfactory fit for factor analysis, because the criterion is greater than the value of 0.6 (0.782>0.7). Bartlett's criterion level is less than 0.05, which also confirms that the sample data of the study is suitable for factor analysis (p=0.000).

In the further process of development of the model, it was determined how many factor analyses can be used. The Principal Component Analysis pointed out that the developed model has a three-factor structure. The first factor explains 48.96% of the total variance and its content includes the scales of competition performance-oriented imagery ability, competence-oriented imagery ability and goal-oriented imagery ability. The second factor explains 16.13% of the total variance and it includes the affect-oriented imagery ability and training performance-oriented imagery ability scales, while the third factor is referring to the physical self-efficacy dimension, which explains 13.5% of the total variance. All three components together account for 78.59% of the total variance (see Table 3). The results indicate that a three-factor structure is obtained.

Table 3. The total variance of imagery ability and physical self-efficacy indicators (n=207)

Extraction Sums of Squared Loadings		
Total	% of Variance	Cumulative %
2.938	48.959	48.959
.968	16.127	65.086
.810	13.500	78.586

Further factor analysis used the selection method: The Principal Component Analysis and rotation method Varimax with Kaiser normalization, which also confirmed that the developed model has a three-factor structure. Table 4 below shows how closely each scale score correlates with each of the factors.

Table 4. Matrix of Components of Imagery Ability and Physical Self-Efficacy Indicators

Scale Indicators	Components		
	1	2	3
Competition performance-oriented imagery ability	.852		
Competence-oriented imagery ability	.835		
Goal-oriented imagery ability	.758		
Affect-oriented imagery ability		.896	
Training performance-oriented imagery ability		.741	
Physical self-efficacy			.980

According to the results of the factor analysis, it can be concluded that three components of imagery ability are positively closely correlated with the first factor: competition performance-oriented imagery ability (r=0.852), competence-oriented imagery ability (r=0.835) and goal-oriented imagery ability (r=0.758). Two components of imagery ability are positively and closely correlated with the second factor: affect-oriented imagery ability (r=0.896) and training performance-oriented imagery ability (r=0.741). One component is positively closely correlated with the third factor, which is physical self-efficacy (r=0.980).

Based on all previously obtained results The Improvement of Athletes' Imagery Ability and Physical Self-Efficacy for the Growth of Athletic Achievements in Sport Model structure was created, which consists of three interrelated factor structures: "Imagery for Maximum Performance", "Imagery for Optimization of Skills and Abilities" and "Physical Self-Efficacy".

The "Imagery for Maximum Performance" factor consists of three components of imagery ability: competition performance-oriented imagery (r=0.852), competence-oriented imagery (r=0.835) and goal-oriented imagery (r=0.758), where the weights of all three factors are above 0.7.

The "Imagery for Optimization of Skills and Abilities" factor consists of two components of imagery ability: training performance-oriented imagery (r=0.741) and affect-oriented imagery (r=0.896), where the weights of both factors are above 0.7.

The "Physical Self-Efficacy" factor consists of the physical self-efficacy indicator, which weight is 0.980.

Scientific literature has strongly argued and indicated that there is a significant interrelationship between imagery ability and the achievements of athletes, as well as between physical self-efficacy and the achievements of athletes (see Table 2). Previous research indicates that there are positive correlations between imagery and physical self-efficacy. Reproducing previously experienced situations and emotions in one's imagery affects physical self-efficacy (Bandura, 1997), and visualization of the technical and tactical aspects of sports movements, strategies, plans and techniques promotes athletes' self-efficacy (Simonsmeier et al., 2021; Hepler & Chase, 2008). A stronger and more pronounced positive correlation has also been demonstrated for certain imagery abilities, for example, competence-oriented imagery ability (Williams et al., 2021; Kocaekşi et

al., 2020; Mills et al., 2001; Beauchamp et al., 2012; Watt & Morris, 2020), affect-oriented imagery ability (Watt & Morris, 2020; Rogowska et al., 2022) and Goal-oriented imagery ability (Abma et al., 2002). Based on these findings and the evidence of the conducted research results, The Improvement of Athletes' Imagery Ability and Physical Self-Efficacy for the Growth of Athletic Achievements in Sport Model can include the component entitled "Growth of Athletic Achievements", which confirms that both imagery ability and physical self-efficacy have a interrelationship with athletes' achievements (see Figure 1).

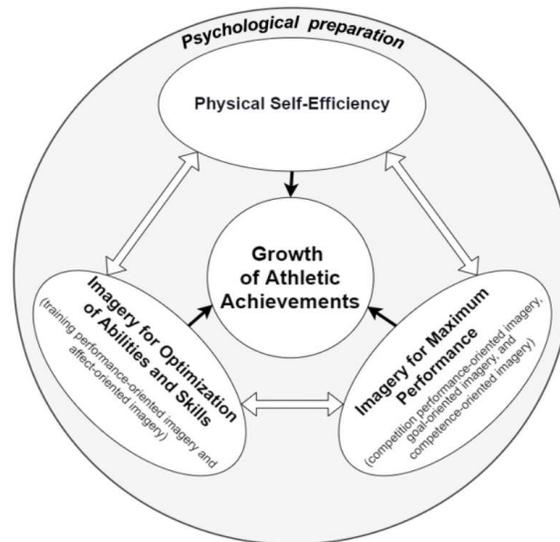


Figure 1. The Improvement of Athletes' Imagery Ability and Physical Self-Efficacy for the Growth of Athletic Achievements in Sport Model (Volgemute, 2022)

The Improvement of Athletes' Imagery Ability and Physical Self-Efficacy for the Growth of Athletic Achievements in Sport Model consists of five variables. The "Psychological preparation" variable is the overarching dimension that combines all three internal factors, and the "Growth of Athletic Achievements" variable is influenced by all factors of the model and is, therefore, an integral quantity.

1) The "Imagery for Maximum Performance" factor consists of three imagery ability scales: competition performance-oriented imagery, goal-oriented imagery, and competence-oriented imagery.

2) The "Imagery for Optimization of Skills and Abilities" factor consists of two imagery ability scales: training performance-oriented imagery and affect-oriented imagery.

3) The "Physical Self-Efficacy" factor consists of the physical self-efficacy indicator.

According to the obtained results, the content of the Improvement of Athletes' Imagery Ability and Physical Self-Efficacy for the Growth of Athletic Achievements in Sport Model was summarized and tested. The developed model aims to promote imagery ability, the level of physical self-efficacy and the growth of athletic achievements.

Discussion

There is an undeniable correlation between imagery and physical self-efficacy in sports. Well-developed imagery abilities in athletes help to promote their physical self-efficacy as well, while high physical self-efficacy helps the athlete to create the most productive imagery scenarios possible. An essential prerequisite for both imagery and physical self-efficacy is self-belief and confidence in one's abilities to perform specific tasks. Imagery is interconnected with athletes' physical self-efficacy and achievement growth. Developed imaginative abilities contribute to the physical self-efficacy of athletes. Physical self-efficacy helps athletes create productive and powerful imaginative content. Many studies show that both imagery and physical self-efficacy are strongly interrelated with the success of athletes, and imagery is also closely related to physical self-efficacy (Beauchamp et al., 2012; Rogowska et al., 2022; Haight et al., 2020; Shearer et al., 2018; Bandura, 1997; Callow et al., 2017).

The dynamic environment of modern sports requires athletes to be both psychologically and physically strong for a successful sporting life. Scientific literature indicates that imagery allows athletes to overcome obstacles in their sports careers. Physical self-efficacy in sports contributes to athletes' confidence in their ability to achieve high results and complete specific tasks. In sports psychology field, the relationship between athletes' self-efficacy level and imagery has been analysed in various studies, taking into account their relationship with sports success (Callow et al., 2017; Duncan et al., 2012; Williams & Cumming, 2016; Shearer et al., 2018; Volgemute et al., 2021).

The Improvement of Athletes' Imagery Ability and Physical Self-Efficacy for the Growth of Athletic Achievements in Sport Model is based on scientific findings and the results of factor analysis, as well as on the evaluation of statistically reliable interrelationships between athletes' imagery ability, physical self-efficacy and sports achievements. The model consists of interrelated factor structures: "Imagery for Maximum Performance" factor (competition performance-oriented, competence-oriented, and goal-oriented imagery ability); "Imagery for Optimization of Skills and Abilities" factor (training performance-oriented and affect-oriented imagery ability) and "Physical Self-Efficacy" factor. The purpose of the developed model is to promote the growth of athletes' imagery ability, level of physical self-efficacy and athletes' achievements. The model can be applied and implemented in the training process of athletes.

Research indicates that with the help of imagery, athletes' physical self-efficacy can be increased with various imagery ability tasks that promote a sense of competence and successful performance of physical skills (Callow et al., 2019). In addition, imagery effectively helps reduce negative competition anxiety and allows athletes to regulate their arousal levels, the efficacy of imagery being determined by positive images that promote positive emotions (Anuar et al., 2017). Imagery that has negative content, such as falling during competition, can negatively affect athletes' performance (Guillot & Collet, 2008). In a competitive setting, anxiety can be both enabling and debilitating, meaning that athletes must be able to adjust the content of their imagery so that imagery helps regulate anxiety at a level that helps improve performance and achieve high results. Researchers are still looking for the most effective and best approaches to improving imagery and its ways of expression. It can be very difficult for athletes to maintain concentration when they begin imagery ability training, which is a very important prerequisite for the effective use of imagery (Guillot & Collet, 2008). In this context, self-efficacy plays a very important role.

Conclusions

Based on the results of the factor analysis, the developed model has a three-factor structure consisting of: "Imagery for Maximum Performance"; "Imagery for Optimization of Skills and Abilities" and "Physical Self-Efficacy". The purpose of the "Imagery for Maximum Performance" factor is to promote the ability of athletes to create strategies and plans in imagery, the ability to self-regulate, the ability to set goals and achieve them, self-belief, as well as the ability to correct technical errors through imagery, manage and manipulate the content of the imagery. The purpose of the "Imagery for Optimization of Skills and Abilities" factor is to promote the ability of athletes to use their imagery in the training and learning process, to feel body sensations through imagery, to improve physical abilities and technical skills, as well as to experience emotions in their imagery, which help to get in the mood for the activity to be performed. The purpose of the "Physical Self-Efficacy" factor is to promote athletes' confidence in themselves and their abilities, motivation, as well as awareness of their abilities.

The content of the model is created based on scientific findings and the results of factor analysis, as well as evaluating statistically reliable interrelationships between athletes' imagery ability, physical self-efficacy and achievements in sports (see, also, Volgemute et al., 2021). The Improvement of Athletes' Imagery Ability and Physical Self-Efficacy for the Growth of Athletic Achievements in Sport Model consists of five variables. The "Psychological preparation process" variable is the comprehensive factor that combines all internal factors of the model: "Imagery for Maximum Performance", "Imagery for Optimization of Skills and Abilities", respectively "Physical Self-Efficacy", while "Growth of Athletic Achievements" variable is influenced by all factors of the model, therefore, it is an integral quantity.

The purpose of the developed model is to promote the level of imagery ability and physical self-efficacy of athletes, because of which athletes' achievements will also be promoted. The model can be used by sports coaches, sports psychologists, and specialists in the training process of athletes.

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