

## Article

# An Intervention into Imagery and Self-Efficacy: Enhancing Athletic Achievements of Alpine Skiers

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**Abstract:** Psychological preparation has taken on a crucial role in today's sports practice. Effective resolutions to the challenges inherent in athletes' psychological preparation require a comprehensive understanding of the key components that constitute the psychological preparation process. This quasi-experimental study aims to first, assess the interrelationships among imagery abilities, physical self-efficacy, and sport performance among a sample of alpine skiers. Secondly, this study sought to assess the effect of a psychological intervention on imagery and self-efficacy, and its impact on their task performance. The proposed hypothesis suggests that integrating imagery and self-efficacy interventions into the training process of alpine skiers will enhance athletes' achievements on the slalom ski track. Seven leading Latvian youth alpine skiers with an average age of  $M = 17.14$  ( $SD = 1.77$ ) participated in a three-month psychological skill intervention targeting imagery and self-efficacy enhancement, alongside control training sessions on a slalom ski track to evaluate its effectiveness on sport performance. Pre- and post-intervention assessments were conducted using questionnaires, revealing significant improvements in imagery abilities and self-efficacy ( $p < 0.05$ ). Notably, positive interrelationships between imagery abilities, self-efficacy, and sport performance were observed. These findings underscore the efficacy of integrating psychological interventions into the athlete training process and highlight the importance of psychological readiness in optimizing athletic achievements, particularly in dynamic sports like alpine skiing. The study results provide novel theoretical and practical psychological insights into the training process of athletes in sports.

**Keywords:** imagery ability; physical self-efficacy; athletic achievements; psychological preparation; psychological interventions



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## 1. Introduction

The psychological skills of athletes and the concept of psychological training have earned a recognized and important place in the literature of sports sciences as an important element of sports success. The interplay between sports success and performance is profoundly influenced by the psychological states and cognitive processes of athletes, with one such pivotal factor being imagery [1,2]. Imagery is a powerful cognitive tool that can help athletes improve both their physical and psychological abilities. Employing imagery for refining physical skills is manifest in actions like mentally rectifying learned techniques and rectifying errors [3]. Similarly, psychological skills are improved through mental practice, for example, maintaining control, heightening concentration, and fostering self-confidence in one's abilities [4,5]. Previous research highlights the critical importance of athletes using their imagery to create positive and triumphant scenarios. Such scenarios constructively affect not only the athletes' behavior, but also their sense of physical self-efficacy [6,7]. Based on the existing scientific literature, this study seeks to provide empirical evidence to understand how psychological skill interventions, specifically targeting athletes' imagery

and physical self-efficacy, can enhance athletes' athletic performance. Through conducting pre- and post-intervention assessments and incorporating control training sessions, the study can provide insight into the effectiveness of psychological skill intervention in enhancing athletes' psychological preparation.

### 1.1. Literature Review

The influence of imagery and physical self-efficacy on athletes' performance and their improvement has been widely studied in the scientific literature [8–10]. Nonetheless, comparatively less research has been performed describing how to improve the psychological skills of athletes. There are many variables that influence athletes' benefits from different psychological skill training programs, among them athletes' imagery, the vividness of imagery, and their control over it, which are determinants for evaluating the effects of a psychological skill training program on the psychological preparedness of athletes [11].

Evidenced by numerous research studies, the international recognition of the imperative to impart psychological skill training to athletes has grown significantly. A prevailing belief underscores that a diversity of psychological skills is requisite to enable athletes to perform optimally. The effectiveness of imagery is affected by several contributing factors, and one of them is the type of tasks; notably, cognitive tasks wield the most considerable influence upon imagery [12]. Moreover, the level of athletes' preparedness is also an important contributing factor. Imagery can help experienced athletes as well as beginners or athletes with little experience, but it will give the most effective result to athletes who have a lot of experience and appropriate physical, technical, and tactical preparation [13]. The effectiveness of the imagery is equally dependent on the vividness of the athlete's imaginative powers—the more vivid and exciting the athlete can create events in his mind, the stronger the resulting effect [14,15]. It is essential to combine imagination with physical training in these processes, and not separate it as a separate training.

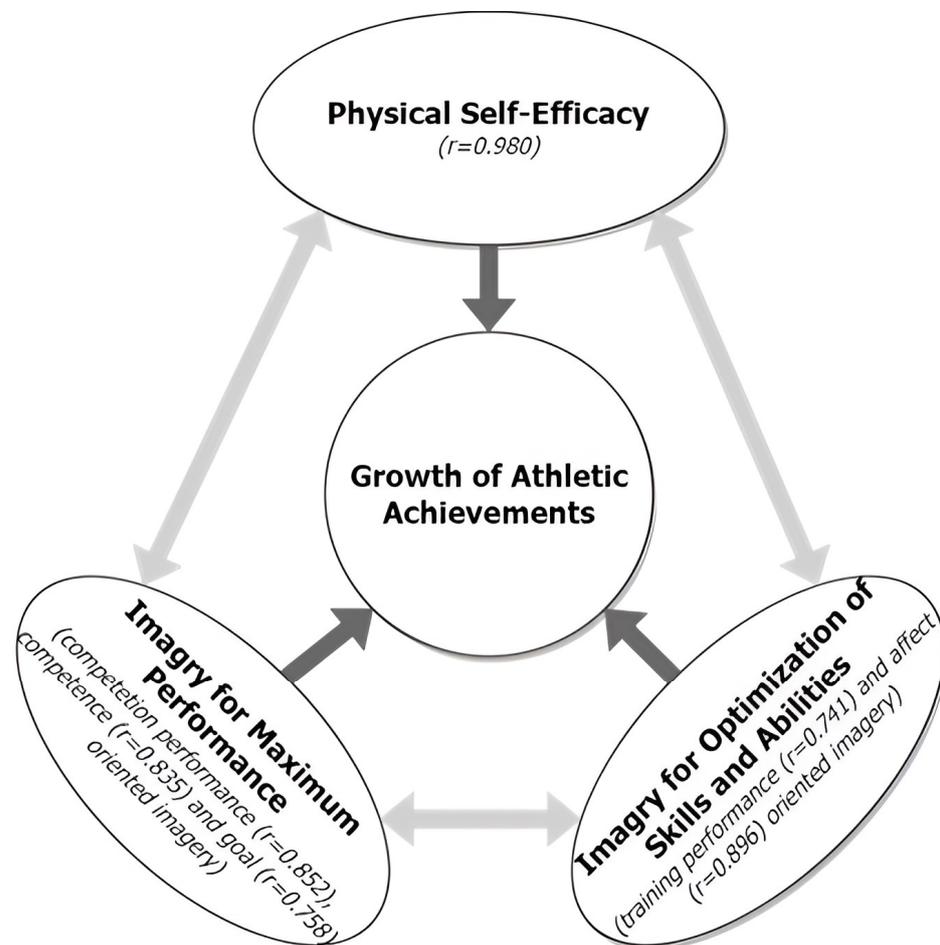
### 1.2. Study Aims and Hypothesis

The aims of this study were twofold: Firstly, it was to assess the interrelationships among imagery abilities, physical self-efficacy, and sport performance among a sample of alpine skiers. Secondly, this study sought to assess the effect of a psychological intervention on imagery and self-efficacy, and its impact on their task performance. The proposed hypothesis for this study suggests that integrating imagery and self-efficacy interventions into the training process of alpine skiers will enhance athletes' achievements on the slalom ski track. Previous research, as outlined in the "Improvement of Athletes' Imagery Ability and Physical Self-Efficacy for the Growth of Athletic Achievements in Sport Model" [16], laid the groundwork for this hypothesis (see Figure 1).

In constructing this model, the authors synthesized insights from the existing literature and findings from prior studies. The model was developed through factor analysis, utilizing data from a diverse sample of athletes ( $n = 207$ ), including both (male and female) genders and various sports, with an average age of 20.37 years ( $SD = 3.21$ ) and an average of 9.39 years of experience in sports ( $SD = 4.58$ ). The factor analysis was conducted on the results obtained from the Sport Imagery Ability Questionnaire [17] and Self-Efficacy to Regulate Exercise Scale [18], allowing for a comprehensive exploration of the underlying factors influencing athletes' imagery ability and physical self-efficacy.

Through factor analysis, the authors identified a three-factor structure within the model. The first factor, "Imagery for Maximum Performance", focuses on aspects related to maximizing performance outcomes. The second factor, "Imagery for Optimization of Skills and Abilities", emphasizes the enhancement of skills and abilities through imagery techniques. The third factor, "Physical Self-Efficacy", highlights the role of belief in one's physical abilities. Expanding upon this groundwork, we incorporated the "Growth of Athletic Achievements" component into the model. This addition underscores the pivotal role of imagery ability and physical self-efficacy in fostering athletes' overall performance and success, as depicted in Figure 1. Numerous sources have highlighted the signifi-

cant relationship between athletes' imagery ability, physical self-efficacy, and their sports achievements. Furthermore, evidence suggests a positive correlation between athletes' imagery ability and their levels of physical self-efficacy [9,19,20].



**Figure 1.** The “Improvement of Athletes’ Imagery Ability and Physical Self-Efficacy for the Growth of Athletic Achievements in Sport Model”.

The model’s factors align closely with the aim of this study’s intervention. The identified factors provide a theoretical framework for understanding how interventions targeted at enhancing imagery ability and self-efficacy can lead to improved athletic achievements. For example, interventions focusing on strengthening athletes’ belief in their physical abilities (physical self-efficacy) may result in increased motivation, persistence, and ultimately, enhanced performance outcomes on the slalom ski track. By targeting specific components of imagery ability and self-efficacy identified in the model, interventions can be tailored to meet the individual needs of athletes and maximize their potential for improvement. Additionally, understanding the interrelationship between imagery ability, self-efficacy, and athletic achievements can inform the development of holistic training programs that promote athletes’ overall growth and success in sport. This research will bring a new theoretical and practical approach to the psychological preparation training process in sport by demonstrating the significant relationship between imagery, physical self-efficacy, and sport performance through a psychological skill intervention targeting alpine skiers. By targeting specific components of imagery ability and self-efficacy identified in the previously mentioned model, interventions can be developed to meet the individual needs of athletes. Additionally, understanding the interrelationship between imagery ability, self-efficacy, and athletic achievements can inform the development of holistic training programs that promote athletes’ overall growth and success in sport.

## 2. Materials and Methods

### 2.1. Participants

The study sample used in this research comprised seven Latvian youth alpine skiers, aged  $M = 17.14$  ( $SD = 1.77$ ) years. The selection process for the research group was carried out, focusing not only on the athletes' mastery but also considering their sports background to minimize potential extraneous influences on the results. The equality of the athletes' level of experience in sports, the narrow age range and the equal nature of the training process and load are the additional factors that were considered when selecting the research sample with the aim of reducing possible external influences on the research results. All the study participants had a minimum of 10 years of experience and an average starting age in alpine skiing of  $M = 6.86$  ( $SD = 1.25$ ) years old. Athletes had at least four alpine skiing trainings per week during the winter season. These athletes brought a wealth of expertise, having actively participated in national and international competitions in alpine skiing. The limitation of the small sample size may have impacted the generalizability of the findings to a larger population in sport. The work of psychological preparation with athletes must be very carefully planned and carried out based on the characteristics and individual needs of the athletes. With a large number of athletes, it can be very challenging to ensure it in an effective way.

### 2.2. Measures

The psychological variable of imagery ability and physical self-efficacy were assessed using the Self-Efficacy to Regulate Exercise Scale (SERE), originally developed by Bandura [18] and adapted into Latvian by Upesleja [21], and the Sport Imagery Ability Questionnaire (SIAQ), developed by Williams and Cumming [17] and adapted into Latvian by Volgemute et al. [22].

The SERE questionnaire consists of 18 items, designed to measure individuals' levels of physical self-efficacy. Each item was rated on a 100-point Likert scale, ranging in 10-unit intervals from 0 ("Cannot do") to 100 ("Certain can do"). This scale reflects participants' belief in their abilities regarding physical tasks. The SERE questionnaire has demonstrated acceptable internal consistency with Cronbach's alphas 0.94 [21].

To assess imagery abilities, the SIAQ was employed, consisting of a 15-item self-assessment tool. The items are grouped into five scales: skill (training-oriented imagery abilities), strategy (competition-oriented imagery abilities), goal (goal-oriented imagery abilities), affect (emotion-oriented imagery abilities), and mastery (mastery-oriented imagery abilities) imagery abilities. Participants were asked to rate each statement of SIAQ on a 7-point scale, with responses ranging from 1 ("rarely") to 7 ("often"). The adapted version of the SIAQ questionnaire in the Latvian language demonstrated good internal consistency and reliability, with Cronbach's alphas ranging from 0.66 to 0.87 [22].

To provide a comprehensive assessment of changes in both psychological and athletic achievement indicators among athletes, two control training sessions were conducted. During these sessions, the time required for each athlete to complete the skiing slalom course on the slope was measured using a Microgate Pro Kit Timing device (Microgate Srl, Bolzano, Italy).

### 2.3. Design and Procedures

This study employed a quasi-experimental design, involving manipulation of the independent variable. However, participants were not randomly assigned. Athletes participating in this study engaged in an imagery and self-efficacy intervention, which comprised psychological skill training (see Table 1) integrated into their training process. This assessment involved conducting initial and final measurements of imagery abilities and physical self-efficacy indicators for the skiers, both before and after they were exposed to the imagery and self-efficacy intervention during their training process. Furthermore, two control training sessions specific to skiing slalom on the training slope were carried out, one before the study began and another after its completion, to gauge the psychological

skill intervention influence on the athletes' performance progression. During these control training sessions, the athletes completed two runs on the same slalom skiing course. It is important to note that all training sessions on the slope took place in a closed ski arena, ensuring consistent conditions for each control training allowing for the same parameter setting of the ski course for each run. This consistency was crucial for the control training sessions because in sport, athletes compete for their results in hundredths of a second, and even the smallest unit of time can make a significant difference. All seven selected athletes participated in research and psychological skill training sessions. Over the course of the study, the athletes incorporated the imagery and self-efficacy intervention into their training routines in the 2021/2022 skiing season. The intervention content was developed by incorporating the principles outlined in the previously mentioned "Improvement of Athletes' Imagery Ability and Physical Self-Efficacy for the Growth of Athletic Achievements in Sport Model". Table 1 provides an overview of 12 psychological skill training sessions.

**Table 1.** Imagery and self-efficacy intervention protocol.

Sessions	Content
Session 1	Initial assessment Creating a performance profile and setting sport performance goals
Session 2	Aim setting (I) and imagery (I) Setting season goals An introduction in the use of imagery in sport: what imagery is and how to apply it
Session 3	Imagery (II) Learning imagery skills—progressive imagery
Session 4	Self-regulation (I) Introduce self-regulation skills: relaxation and breathing exercises for self-regulation
Session 5	Imagery (III) and self-talk (I) Creating positive scenarios and inner speech in the process of imagery.
Session 6	Imagery (IV) Developing imagery skills for skiing technique improvement and error correction. Drawing a ski training course on paper Correcting technical errors in imagery
Session 7	Imagery (V) Transferring imagery skills to physical training: combining imagery skill training and physical training
Session 8	Creation of competition and training plans (I) Introducing the process of creating training and competition plans and their essence in sports and creating your own plan.
Session 9	Imagery (VI) Learn to manipulate the content of imagery Use internal and external imagery perspectives
Session 10	Imagery (VII) and self-regulation (II) Engaging the senses and sensations in imagery: progressive imagery
Session 11	Imagery (VIII) Movement imagery
Session 12	Final assessment

This study was conducted after receiving ethical committee approval from the Latvian Sport Education Academy (Ethical Committee Approval No. 4/51813). The psychological intervention was systematically delivered in 12 sessions, each lasting approximately 30 to 40 min once a week with athletes over the three-month period. Psychological preparation sessions were thoughtfully designed to include essential skills. Each of the sessions began with an introductory part, in which the aims of the session, the theoretical basis, and the

importance of the psychological skill to be learned in sports were emphasized to the alpine skiers. This introductory part was aimed at ensuring clarity and motivation among the alpine skiers. The sessions were conducted in both individual and group settings, providing a balanced approach to skill development. The main part of each session was dedicated to a series of exercises and tasks to enhance athletes' imagery skills and physical self-efficacy. As the sessions approached their conclusion, a reflection was integrated through interactive discussions. These discussions served as a valuable platform for participants to share their insights, address queries, and gain additional perspectives.

Following the implementation of the imagery and self-efficacy intervention, a re-evaluation was carried out (in session 12: Final assessment) to determine and analyze any changes in the indicators of imagery ability and physical self-efficacy. This assessment provided valuable insights into the effectiveness of the approach and its impact on the targeted psychological skills. The time gap between the initial assessment, each psychological skill session, and the final assessment was carefully managed to ensure consistency and accuracy in the data collection process.

#### 2.4. Statistical Analysis

Upon collecting all data, study variables were scored according to the instructions provided by the authors of the SIAQ and SERE. Data from control training sessions with alpine skiers were collected and analyzed.

Initially, descriptive statistics were analyzed for the questionnaire variables and control training data both before and after the implementation of imagery and physical self-efficacy interventions. Subsequently, the Kolmogorov–Smirnov test was employed to assess whether the data corresponded to a normal distribution. Since the assumptions for parametric statistics were not met, non-parametric tests were utilized for further analysis.

The Wilcoxon signed-rank test was employed to evaluate the reliability of changes in imagery ability and self-efficacy scores before and after the interventions. Results from the Wilcoxon signed-rank test were interpreted in terms of  $p$ -values, with a significance level of  $p \leq 0.05$  being applied [23]. For statistical analysis, SPSS 29 for Windows was used.

### 3. Results

The data analysis was conducted based on a sample of seven alpine skiing athletes (comprising both males and females), with an average age of  $M = 17.14$  ( $SD = 1.77$ ). These athletes possessed a correspondingly high level of experience in competitive sports, both nationally and internationally.

Before introducing the intervention, the average score for alpine skiers' physical self-efficacy was  $M = 7.14$  ( $SD = 0.65$ ). In contrast, the scores across the scales of imagery abilities ranged from  $M = 4.8$  ( $SD = 0.81$ ) to  $M = 5.99$  ( $SD = 0.71$ ). Higher scores emerged in the affect ( $M = 5.99$ ;  $SD = 0.71$ ) and skill ( $M = 5.46$ ;  $SD = 0.86$ ) imagery scales, collectively constituting the "imagery for optimization of abilities and skills" factor. The "imagery for maximum performance" factor, including the goal ( $M = 5.44$ ;  $SD = 1.06$ ), mastery ( $M = 5.2$ ;  $SD = 0.51$ ), and strategy ( $M = 4.8$ ;  $SD = 0.81$ ) imagery scales, exhibited slightly lower levels. Based on the obtained scores for imagery ability scales, it can be concluded that alpine skiers possess higher-level imagery abilities that are more applicable to training activities. Additionally, athletes have a lower level of imagery abilities when it comes to envisioning competition-related scenarios. This suggests that athletes use their imagery much less in the competition and the preparation process.

Upon concluding the study and implementing the developed intervention, positive changes in the imagery abilities and physical self-efficacy indicators among alpine skiers were observed (see Table 2). The average score for physical self-efficacy at the study's conclusion was  $M = 8.21$  ( $SD = 0.70$ ). In the context of imagery abilities, the highest mean scores were recorded in the affect ( $M = 6.26$ ;  $SD = 0.64$ ) imagery scale. Scores for goal ( $M = 6.17$ ;  $SD = 0.78$ ), mastery ( $M = 6.10$ ;  $SD = 0.62$ ), and skill ( $M = 6.07$ ;  $SD = 0.65$ ) imagery

scales were comparable with minor deviations. The lowest mean in the imagery scale was on the strategy (M = 5.79; SD = 0.97) scale

**Table 2.** Alpine skiers' imagery ability and physical self-efficacy scores before and after the implementation of the imagery and self-efficacy intervention ( $n = 7$ ).

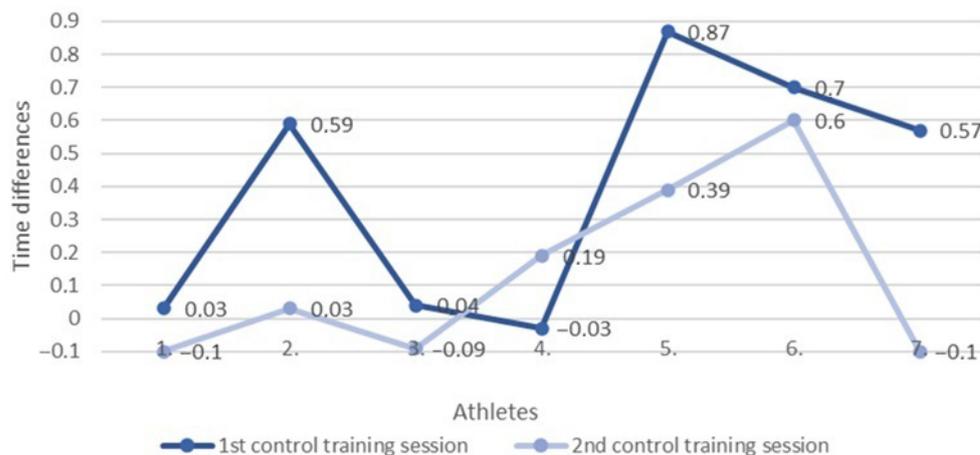
Indicators	Before		After	
	M	SD	M	SD
Physical self-efficacy	7.14	0.65	8.21	0.70
Skill imagery ability	5.46	0.86	6.07	0.65
Strategy imagery ability	4.8	0.81	5.79	0.97
Goal imagery ability	5.44	1.06	6.17	0.78
Affect imagery ability	5.99	0.71	6.26	0.64
Mastery imagery ability	5.2	0.51	6.10	0.62

Before further analysis of the results, the collected data were checked to see whether they corresponded to a normal data distribution using the Kolmogorov–Smirnov test. The outcomes suggested that the data did not conform to a normal distribution and in further analysis the data were processed with non-parametric methods. To assess the reliability of changes in imagery abilities and physical self-efficacy, the Wilcoxon signed-rank test was employed (see Table 3). Analysis of the collected data on the research variables revealed statistically significant correlations between athlete imagery (skill imagery ( $p$ -value = 0.047), strategy imagery ( $p$ -value = 0.043), goal imagery ( $p$ -value = 0.024), affect imagery ( $p$ -value = 0.039), mastery imagery ( $p$ -value = 0.018) abilities) and physical self-efficacy ( $p$ -value = 0.018) indicator scores before and after the implementation of the intervention (see Table 3) in the athletes' training process. Analyzing the dynamics of the athletes' imagery ability scales and physical self-efficacy scale, it can be concluded that the average increase in the psychological indicators was reliable ( $p \leq 0.05$ ) and the group's indicators changed positively.

**Table 3.** Assessments of differences in imagery ability and physical self-efficacy before and after intervention.

Pair Scores before and after Content Implementation	Wilcoxon Signed Rank Test
Physical self-efficacy	0.018
Skill imagery ability	0.047
Strategy imagery ability	0.043
Goal imagery ability	0.024
Affect imagery ability	0.039
Mastery imagery ability	0.018

To assess the efficacy on athletic achievements of the imagery and self-efficacy intervention, control training sessions on a ski slalom course were implemented at the beginning and conclusion of the study. The athletes' ski course performances were recorded using the "Microgate Pro Kit Timing" time recording device. In control training sessions, slalom discipline tracks of the same complexity and parameters were provided, which helped to exclude the influence of other factors on the results as much as possible. Each control training session consisted of three runs. The experiment involved analyzing the time difference between the athletes' first and second successful runs (see Figure 2). Using imagery and its abilities, alpine skiers could effectively prepare and familiarize themselves with the gate placements along the slope. Conversely, physical self-efficacy empowered athletes to approach the ski course with unwavering confidence, aiming for a flawless completion during the initial attempt. This synergy enables athletes to realize their full potential right from the outset.



**Figure 2.** The results of the control training sessions conducted before and after implementing the imagery and self-efficacy intervention.

Based on the results from the control training sessions, discernible alterations in athletes' performances have emerged. Figure 2 visually presents the time differential between the athletes' first and second successful runs in the control training sessions. In this representation, a time differential denoted with a "+" sign indicates that the second run was slower than the first run, while a "-" sign signifies that the first run was completed faster than the second.

The range of time deviations in the first round of testing was from  $-0.03$  s (indicating a quicker first run) to  $+0.87$  s. In the context of the second control training session, the time variance between the first and second runs was within the range of  $-0.1$  to  $+0.6$  s. Comparing the results of control training sessions, it can be concluded that mostly positive changes in results could be observed among athletes. These results provide insight into positive performance improvement, particularly significant in alpine skiing where athletes strive to improve their results on the ski track for each hundredth of a second, where every fraction of time counts and can play a significant role.

Upon a comprehensive analysis of the athletes' athletic achievements across the control training sessions within the study, it has been shown that the increase in mean values of performance indicators lacks statistical reliability (Wilcoxon criterion is 0.09, where the significance threshold is set at  $p \leq 0.05$ ). However, an observable trend emerges when evaluating the average metrics. After the study, after the integration of the imagery and self-efficacy intervention with alpine skiers, there is a discernible enhancement in the athletes' results.

The study results suggest the practical efficacy of the 12 developed psychological skill sessions. By enhancing athletes' levels of imagery ability and physical self-efficacy, the intervention provides a clear pathway for athletes to enhance their athletic achievements as well as improve their psychological preparedness.

Interestingly, it is often observed that alpine skiers do not achieve their optimal performance time during the first run, despite having the opportunity to preview and familiarize themselves with the ski race course setting. A marginal time disparity between runs could potentially signify that the athlete is not fully leveraging their physical, technical, and tactical skills, thereby hinting at inadequate psychological readiness.

#### 4. Discussion

The obtained results demonstrated statistically significant improvements in both athletes' imagery ability and physical self-efficacy indicators following the intervention. This suggests a positive impact of the imagery and self-efficacy intervention on these key psychological factors. Moreover, the analysis of the results revealed a notable association between imagery, physical self-efficacy, and athletic performance, indicating a relationship between these factors. Such findings support the notion that enhancing athletes' psycho-

logical skills can lead to improvements in athletic achievements. This evaluation aimed to measure the impact of the 12-psychological-skill session on athletes' imagery abilities, physical self-efficacy, and athletic achievements. The utilization of a quasi-experimental design in this study holds significant value. Given the complexity of exploring imagery and self-efficacy interventions among athletes, such research benefits from the structure provided by quasi-experimental designs. While acknowledging the inherent complexities, it is essential to recognize the proven value of such research designs in previous studies focused on athletes' psychological preparation [24,25]. Therefore, leveraging quasi-experimental designs in investigating interventions related to imagery and self-efficacy can provide valuable insights for enhancing athletes' mental skills and overall performance readiness.

Furthermore, the intervention involving imagery and physical self-efficacy demonstrated a positive impact on the outcomes of alpine skiers' control training sessions. This suggests that athletes' imagery ability and physical self-efficacy play a significant role in improving athletes' performance. Overall, these findings underscore the importance of psychological interventions in fostering athletes' mental skills and subsequently enhancing their performance in training settings. The results obtained in the study suggest that the developed content of the imagery and self-efficacy intervention has a statistically significant and positive influence on athletes' imagery ability and physical self-efficacy ( $p < 0.05$ ). In line with the imagery and self-efficacy intervention, the results of the control training sessions showed noticeable positive enhancements in achievement indicators. However, it should be noted that these results were not statistically significant ( $p > 0.05$ ). This lack of significance is likely attributed to the relatively small sample. In the following research, it is crucial to conduct more investigations into the imagery and self-efficacy intervention impact on athletes' sports achievements on a larger sample and over a longer intervention period to establish more robust conclusions.

In a previous study that investigated the correlation between imagery ability and physical self-efficacy among athletes, the findings underscored a distinct relationship. Specifically, athletes displaying greater imagery ability also exhibited high levels of physical self-efficacy [16]. Nonetheless, our study lacked a comparison of psychological indicators with physical measures or outcome assessments. A study by Ardiyanto et al. (2021) came to significant conclusions, highlighting that the inclusion of imagery in athletes' training processes is particularly effective for those with higher imagery abilities, and they also identified a notable disparity in the effects of internal versus external imagery training methods on forehand serve accuracy among table tennis athletes [26]. These research results point to the importance of imagery and its relationship with athletes' achievements in physical results. In a separate investigation, Tabassum et al. (2020) explored the influence of imagery and its application on the performance of hockey players. Their findings revealed a compelling connection: sports imagery ability, the utilization of imagery, and performance exhibited a notable and positive correlation. Moreover, the study established that both sports imagery ability and the active incorporation of imagery exerted a significant impact on the overall performance of hockey players [27].

Similarly, research has been undertaken to explore the relationship between physical self-efficacy and athletes' achievements. Khodabandelou and Salehian (2023) investigated the influence of psychological resilience and self-efficacy on the mastery of a martial arts leg kick skill, finding significant contributions of both factors to combat athletes' ability in executing the martial arts leg kick [28]. These findings underscore self-efficacy as key attributes of successful athletes. The enhancement of self-efficacy can positively impact an athlete's performance, highlighting the potential for athletes to elevate their achievements through the cultivation of these traits.

Collectively, these studies underscore the vital significance of both imagery and physical self-efficacy in shaping athletes' performance and accomplishments. A comprehensive literature review reveals a close interrelation between imagery ability, self-efficacy, and athletes' performance [8–10]. The findings of the present study affirm the connection between imagery, physical self-efficacy, and athletes' achievements in sports. The developed

content of 12 psychological skill training sessions has suggested a positive impact, leading to improvement in imagery abilities and enhanced physical self-efficacy among alpine skiers following its integration into their training process. These results were statistically significant ( $p < 0.05$ ). Additionally, the study revealed that the psychological skill training sessions exerted a favorable influence on the outcomes of alpine skiers' control training sessions. While the increase in control training sessions did not reach statistical significance ( $p > 0.05$ ), there was an observable positive trend in achievement growth. This limited impact could potentially be attributed to the relatively small sample size ( $n = 7$ ). This study lays the groundwork for future research, aiming to delve deeper into the relationship between imagery ability, physical self-efficacy, and athletes' achievements, employing a larger sample size including athletes from different sports. Such an approach would facilitate a more comprehensive comprehension of the intricate interplay among these psychological factors within the context of sports.

Research in the field of sports highlights the importance of athletes' psychological readiness and the cultivation of high-level psychological skills, with numerous studies emphasizing imagery as a key construct [1,2,29]. Similarly, sport science research has underscored the importance of physical self-efficacy [9,10,28]. The investigation of these psychological factors of athletes' preparation continues to be of paramount importance for the development of athletes and sports participants. Gaining a deeper understanding of these psychological factors has the capacity to shape the development of targeted interventions and training programs aimed at increasing athletes' psychological preparedness, thereby enhancing mental resilience and overall efficacy.

#### *Limitations of the Study and Further Research*

Although this study carefully followed a sequential set of activities and the intervention protocol was carefully designed by integrating the principles outlined in the "Improvement of Athletes' Imagery Ability and Physical Self-Efficacy for the Growth of Athletic Achievements in Sport Model", as well as based on previous research and theoretical foundations, it is important to acknowledge and discuss several key limitations. The main limitation of this study is that the testing of the imagery and self-efficacy intervention was carried out on small sample size of alpine skiing athletes, and there was a lack of competition data. Further research presents an opportunity to broaden its application across a more extensive spectrum of athletes encompassing diverse sports disciplines. The application of this imagery and self-efficacy intervention within the framework of the study has undeniably delivered positive outcomes. Such psychological preparation methodologies could likewise be adapted for use with other athlete populations, including those of younger age groups. This could facilitate the early development of both imagery ability and physical self-efficacy, proving beneficial for their athletic pursuits. The implementation of the developed imagery and self-efficacy intervention holds the potential to cultivate athletes' growth. Therefore, the integration of imagery and physical self-efficacy assumes a significant role in psychological preparation, meriting its inclusion in the training process.

The importance of this study resides in its invaluable contribution to comprehending athletes' imagery ability and physical self-efficacy, along with their role in athletic achievements. The findings solidify the significance of these psychological variables within the sporting context and underscore their relevance in the psychological preparation of athletes. These results emphasize the potential advantages of directing attention toward and nurturing imagery ability and physical self-efficacy in athletes, ultimately fostering their sustained growth and success in the long term. Future studies should consider conducting research in competition environments to further validate these findings.

#### **5. Conclusions**

This research aimed to understand the core components of the psychological preparation process that are crucial for effective solutions to athletes' psychological preparation process. According to the aims of the study and through result analysis and investigation,

the study revealed significant findings regarding the interrelationship of imagery abilities, physical self-efficacy, and sport performance among alpine skiers. The results underscored the importance of these psychological factors in shaping athletes' achievement outcomes.

The outcomes indicate the psychological intervention positive and statistically significant enhancements ( $p < 0.05$ ) to athletes' imagery ability and physical self-efficacy. The control training sessions underscored that positive changes in athletes' performance are evident. Although statistical reliability is not fully established in the average indicator increases (0.09,  $p < 0.05$ ), a clear tendency is shown—athletes' results suggest discernible improvement after the study integrated the imagery and self-efficacy intervention into the training process. The study's hypothesis was confirmed.

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