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The Effects of Imagery Interventions on Track Start Performance in 14–16-Year-Old Swimmers: A Pilot Study

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Abstract

This study aimed to determine the effects of a four-week imagery intervention on track start performance and imagery levels in swimmers. A total of 20 licensed athletes, consisting of 10 girls (mean age 15.6 ± 0.7 years) and 10 boys' swimmers (mean age 15.8 ± 0.5 years), who train for 120 minutes per day, five days per week, voluntarily participated in the research. Prior to the imagery intervention, the athletes' track start performances were recorded as a pre-test using a GoPro Hero5 camera (GoPro, Inc., San Mateo, CA). The athletes' imagery levels were measured with the Sport Imagery Questionnaire for Children (SIQ-C) developed by Hall et al. (2009) and adapted to Turkish by Kafkas (2011). Subsequently, athletes were guided through 15-minute imagery sessions, focusing on both internal and external perspectives, with the support of expert trainers before their daily training sessions for four weeks. In these sessions, video footage of freestyle world record holder Caeleb Dressel's track starts was utilised as an imagery tool. Based on these examples, the athletes were instructed to perform internal and external imagery exercises. Following the intervention, the pre-test protocol was repeated as a post-test. The data were analyzed using a paired-sample t-test and independent sample t-test in SPSS 26. The results revealed a statistically significant improvement in the distance measurements of the athletes' track start performances and imagery levels.
Keywords: Swimming, Imagery, Track start, Performance, Athlete

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INTRODUCTION

Swimming is defined as one of the primary sports disciplines performed against water resistance, requiring all muscles to work in harmony and balance while providing both physiological and psychological benefits to the body (Gökhan et al., 2011; Işıldak et al., 2020). Examples of these benefits include skills such as endurance, coordination, mobility, and speed, as well as psychological effects like self-confidence, competitiveness, relaxation, and happiness (Deck et al., 2023). Particularly for children, swimming promotes self-development by fostering responsibility, rule compliance, social adaptation, and cooperation (Özyürek et al., 2015). Despite these numerous benefits, swimming in Türkiye does not receive the attention and importance it deserves. Although significant investments have been made in recent years, the number of elite swimmers remains insufficient, as evidenced by the limited participation of national swimmers in the Tokyo 2020 Olympics (Akgün, 2021). Physiologically, improving swimming performance requires maintaining regular training both in water and on land (Lin, 2024). To tolerate the fatigue caused by such training loads, proper rest, balanced nutrition, and adherence to pre-competition programs are crucial (Surala et al., 2023). In addition to these factors, psychological methods and techniques serve as complementary elements supporting athletes on their path to success. The literature includes many psychological concepts that positively influence performance, such as self-confidence, motivation, concentration, and mental toughness (Sagar & Patil, 2024). Mental training methods have gained attention among the practices that enhance psychological performance (Toth et al., 2020). One such method frequently mentioned in the literature is imagery (Lindsay et al., 2023).

In general, imagery is defined as mental visualisation, rehearsal, or simulation. It involves performing a visual rehearsal of a specific training scenario in sport using all sensory modalities (Çil & Kayışoğlu, 2022). The literature suggests various approaches to imagery. Athletes may visualise a skill from their perspective as if performing it flawlessly or from an external viewpoint, as if observing themselves from someone else's perspective (Murphy et al., 2008). Additionally, imagery can be employed by mentally rehearsing the successful performances of others (Weinberg & Gould, 2023).

Orlick and Partington (1987) revealed that 99% of Canadian Olympic athletes used imagery as a preparatory tactic. Greg Louganis, who won multiple gold medals in the 1980s and 1990s, consistently reported using imagery before every dive. World-renowned athletes like Rafael Nadal also use imagery to enhance their performance (Uludağ, 2021). Imagery allows athletes to visualise their past successful performances, boosting motivation and enabling them to analyse which movements were executed optimally and which physical strategies were most effective (Vashisht et al., 2024). Furthermore, Lin et al. (2021) reported that strategic and technical imagery training with fin swimmers can help them achieve higher levels of performance and increase their overall satisfaction with their performance. Rhodes et al. (2024) conducted functional imagery training with 27 athletes with weak imagery skills and identified significant improvements in overall imagery ability. In imagery exercises, it is essential to stimulate the central nervous system to send activation signals to the muscles and replace negative visuals with positive ones (Karageorghis & Terry, 2011).

In swimming, repetitive skills, focus, and mental resilience are key to success (Miguel-Ortega et al., 2024). Imagery can support these elements by fostering strong and dominant feelings, allowing athletes to mentally recreate the sensations of taste, smell, sound, and movement, activating their muscles in a real-life scenario (Janjigian, 2024). The initial phase of swimming competitions, the track start, involves sequential steps: assuming the starting position, pulling oneself forward, launching off the block, flight, and water entry (Veiga et al., 2024). Each step must be executed flawlessly for sprint events, where races are completed quickly, and differences between competitors are measured in milliseconds. Evidence from major international competitions indicates a significant relationship between faster start times and overall race times (Mason et al., 2006).

When entering the water, maintaining an angle of approximately 30–35 degrees between the body and the water surface is essential as it reduces surface tension and helps the swimmer maintain the correct depth (Cortesi & Gatta, 2015). Therefore, the more standardised a swimmer's launch from the block, the better their performance will likely be. However, the preparation position, pulling, launching, flight, and water entry are instantaneous actions that occur in very short durations, making it nearly impossible for coaches to provide feedback for each step individually. By repeatedly visualising a correct example through imagery, athletes receive feedback for each step, which can lead to performance improvements. In light of this information, raising awareness of imagery practices among swimmers and promoting the regular application of these practices as part of mental training could contribute significantly to the literature. This research aims to investigate the effectiveness of regularly imagery training in improving a crucial aspect of swimming performance, while also considering the specific age group and performance criteria.

METHOD

Research Model

The study employed a quasi-experimental design using a single-group pre-test and post-test design. The scarcity of clubs and performance athletes aged 14-16 in the city where the study was conducted posed challenges in recruiting participants. Consequently, instead of establishing a control group, a pilot study was designed in which all participants were included in the experimental group, and the results were compared with those of similar groups.

Research Groups

The study involved 20 licensed swimmers aged 14–16 years who have participated in competitions organized by the Turkish Swimming Federation for at least four years and currently train five days a week for 120 minutes daily. Based on Simonsmeier et al.'s (2020) meta-analysis on imagery interventions in sports, a G*Power analysis (3.1.9.7) with ηp^2 =

0.934, α = 0.05, and 1-β = 0.95 determined the required sample size to be 17. A convenience sampling method was used to select the study group.

Table 1. Participants according to demographic characteristics

	Gender	N	$\bar{X}$	S
Height (cm)	Girls	10	161.1	3.38
	Boys	10	168.2	4.10
Weight (kg)	Girls	10	52.40	5.77
	Boys	10	63.00	2.53
Age (years)	Girls	10	15.60	0.71
	Boys	10	15.80	0.52
Sport Experience (years)	Girls	10	5.10	1.19
	Boys	10	6.10	0.73

Table 1 indicates the participant's (mean ± SD) characteristics are boys (n = 10, age: 15.8± 0.5 years, height: 168.2± 4.10 cm, weight: 63.0± 2.53 kg, sport experience: 6.1± 0.7 years) and girls (n = 10, age: 15.6± 0.7 years, height: 161.1± 3.38 cm, weight: 52.4± 5.77 kg, sport experience: 5.1± 1.2 years).

Inclusion Criteria: Participants aged 14-16 must possess a minimum of four years of competitive swimming experience, engage consistently in track starts, and be enrolled in a systematic swim training regimen (at least thrice weekly), while also being free from injuries or medical conditions that may impede their participation; furthermore, any prior structured imagery training is prohibited to guarantee the precise evaluation of the intervention's outcomes.

Exclusion Criteria: Participants who fail to comply with the intervention schedule or did not complete the required assessments excluded from the study.

Data Collection Tools

Descriptive Information Form: This form, prepared by the researchers, consists of seven questions designed to collect descriptive data about the participants, such as gender, age, education level, and years of sporting experience.

The Sport Imagery Questionnaire for Children (SIQ-C): The Sport Imagery Questionnaire for Children (SIQ-C) was developed by Hall et al. (2009) and adapted into Turkish by Kafkas (2011). While the original scale consists of 21 items and five subdimensions, the adapted version includes 15 items across three subdimensions: Cognitive-Motivational Specific, Cognitive General, and Motivational General Mastery. The scale does not contain any reverse-scored items and is structured using a 5-point Likert scale. The total possible score ranges from a minimum of 11 to a maximum of 75. The score ranges for each subdimension are as follows: *Cognitive-Motivational Specific*: 8–40; *Cognitive General*: 3–15; *Motivational General Mastery*: 4–20

Track Start Performance Measurement: Measurements were taken in lane one of a semi-Olympic pool measuring 12.5 meters by 25 meters. Reflective markers were strategically placed at the pool edges, where the 5-meter markers intersected with the pool. A GoPro Hero5 (GoPro, Inc, San Mateo, CA) camera was positioned 2.5 meters behind the short and long edges of the pool and 60 centimetres height from the floor to ensure capture of all markers at a resolution of 1080p and a frame rate of 120 frames per second. Using the Kinovea (Opensource software version 1.2), a 12.5 by 5-meter perspective grid was established and calibrated to analyze the data. The horizontal distance between the point of the hand's farthest contact with the water surface and the starting point of the movement was measured as the movement length. The entry angle was determined as the articular angle formed by the hip joint and the water surface when the hand first made contact with the water surface.

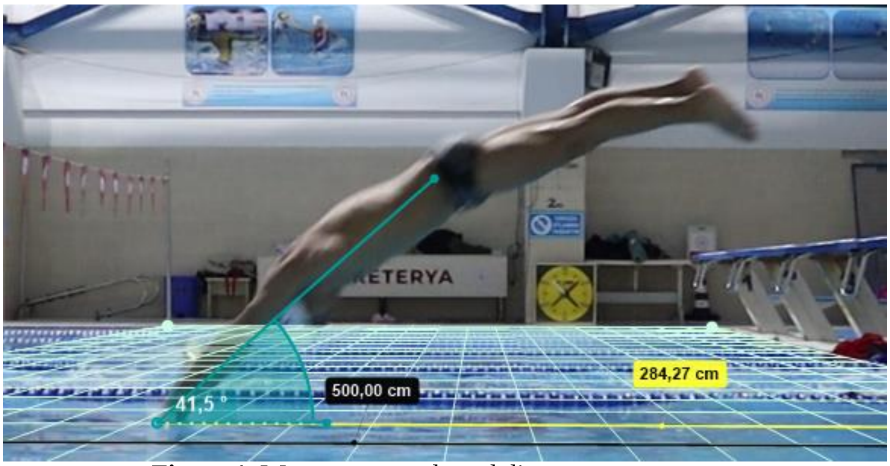

Figure 1. Water entry angle and distance measurement

Ethics Approval

The study was approved by the Ethics Committee for Medicine and Health Sciences-2 (Sports and Health) at Mugla Sıtkı Kocman University (Approval No: 129, Date: 29 October 2024).

Collection of Data

Participants and their families were contacted through club coaches, and a brief introductory meeting was held to explain the study's content and process. Voluntary consent forms were signed. Participant height was determined using a Seca model HR-222 stadiometer (SECA GMBH & Co., Hamburg, Germany), with measurements accurate to 0.1 cm. Weight was assessed using a calibrated Seca 901 scale (SECA GMBH & Co., Hamburg, Germany), with measurements recorded to the nearest 0.1 kg. Before the pre-test, all participants underwent the same warm-up procedure and were asked to perform three jumps each. Full rest periods were provided between jumps to ensure participants felt ready. Based on the longest water entry distance, the best performance was used for analysis. The camera position remained consistent for all measurements. After the pre-test jump measurements were taken, the participants completed the SIQ-C, and their imagery levels were assessed.

After the pre-test, imagery sessions were conducted in a quiet swimming pool meeting room for 15 minutes before each training session over four weeks. Considering the age-specific characteristics of the participants, video footage of world record holder Caeleb Dressel's freestyle start performance (link) was used as a visual tool for imagery exercises. Two experts supported the sessions, using internal and external imagery techniques to enhance skill execution and routine movement patterns. In swimming, start performance was assessed by separately evaluating the three phases: departure from the starting block, flight, and water entry skills. Participants were also encouraged to practice imagery exercises at home (Schuster et al., 2011; Wood &Wilson, 2011).

Imagery Exercise Intervention Phases

<u>Phase1: Starting Block</u>

As you look forward, you can see the target lane in the 50-metre pool. Breathe in the familiar scent of the pool, which helps you feel calm and relaxed. Approach the starting block and gently tap it a few times as part of your preparation. Then, take a deep breath, allowing yourself to feel relaxed and ready for the dive. Step onto the starting block. Lean forward and let your arms hang freely in front of you. Position one foot at the front of the block with the heel firmly in contact while placing the other foot back on the wedge with the heel lifted. Ensure there is a 30–50 cm gap between your feet. Shift your weight forward and position your hands on the edges of the starting block. Firmly grip the block with your front toes. Your hips should be placed higher than your head. Use your hands to slightly lift your hips upwards while keeping your head relaxed at this stage.

<u>Phase 2: Take-off Command</u>

Upon hearing the take-off command, push off forcefully using your hands and feet. Ensure your feet point as they leave the block and maintain a 40–50 cm gap between your legs. Quickly kick back with your rear foot. Simultaneously, lift your head and look forward, bringing your hands together in front of your head. While airborne, hold a streamlined position and extend as far as possible towards the furthest point.

<u>Phase 3: Water Entry</u>

Enter the water with your hands first, then your head, and lastly, your torso at an angle of approximately 30–40 degrees. Feel the water's temperature and focus on the sensation it creates in your body. Maintain your position underwater and continue swimming with dolphin kicks. Exit the water and perform with clarity and confidence. As you execute your strokes, maintain the same level of focus and calmness, performing each one deliberately. Conclude the activity by acknowledging and embracing your strong performance. At the end of four weeks, post-test measurements were taken following the same protocol as the pre-test.

Analysis of Data

For parametric tests to be valid, data must exhibit normal distribution, and the sample size should ideally exceed 10 participants (Alpar, 2016). The skewness and kurtosis values for the dataset obtained from the 20 participants ranged between -2 and +2, indicating acceptable levels of normal distribution (Hatem et al., 2022). Data were analyzed using SPSS 26.0 software. Descriptive statistics were calculated, paired samples t-tests were performed to compare pre-test and post-test results and independent sample t-test was performed to analyze the differences between girls and boys.

FINDINGS

Table 2. Comparison of pre-test and post-test scores of the SIQ-C

SIQ-C Dimension	Group	N	X̄	S	t	p
Cognitive-Motivational Spesific	Pre-test	20	30.250	5.838	-11.300	**.000*** **
	Post-test	20	34.500	4.957		
Cognitive General	Pre-test	20	11.500	2.164	-6.941	**.000*** **
	Post-test	20	13.050	1.731		
Motivational General Mastery	Pre-test	20	15.900	3.416	-6.760	**.000*** **
	Post-test	20	17.950	2.605		

*****p < 0.001**

According to Table 2 the post-test mean score in the cognitive-motivational specific sub-dimension (X̄=34.500±4.957) was significantly higher than the pre-test mean score (X̄=30.250±5.838), with a statistically significant difference (p<.001). A significant increase was also observed in cognitive general sub-dimension, where the post-test mean (X̄=13.050±1.731) was higher than the pre-test mean (X̄=11.500±2.164), indicating a meaningful improvement (p<.001). Similarly, post-test scores in Motivational General Mastery (X̄=17.950± 2.605) were significantly higher than pre-test scores (X̄=15.900±3.416), with a statistically significant difference (p<.001). These findings suggest that the 4-week imagery training program had a significant positive impact on participants' imagery abilities across all three dimensions.

Table 3. Comparison of pre-test scores of the SIQ-C by gender

SIQ-C Dimension	Group	N	X̄	S	t	p
Cognitive-Motivational Spesific	Girls	10	32.900	4.458	-2.232	**.039***
	Boys	10	27.600	6.040		
Cognitive General	Girls	10	11.600	1.837	-.201	.843
	Boys	10	11.400	2.547		
Motivational General Mastery	Girls	10	16.800	2.616	-1.191	.249
	Boys	10	15.000	4.000		

***p < 0.05**

Before the imagery practice, girls and boys were compared in terms of their imagery levels across the subdimensions of Cognitive-Motivational Specific, Cognitive General, and Motivational General Mastery. A statistically significant difference was found only in the Cognitive-Motivational Specific subdimension (p < 0.05).

Table 4. Comparison of post-test scores of the SIQ-C by gender

SIQ-C Dimension	Group	N	X̄	S	t	p
Cognitive-Motivational Spesific	Girls	10	36.900	3.381	-2.428	**.026***
	Boys	10	32.100	5.258		
Cognitive General	Girls	10	13.600	1.429	-1.463	.161
	Boys	10	12.500	1.900		
Motivational General Mastery	Girls	10	18.700	1.418	-1.312	.206
	Boys	10	17.200	3.326		

***p < 0.05**

After the 4-week practice program, girls and boys were compared again in terms of imagery, and once again, a statistically significant difference was found only in the Cognitive-Motivational Specific subdimension ($p < 0.05$).

Table 5. T-test results for girls' pre-test and post-test performance scores in starts

Performance Measure	Group	N	X̄	S	t	p
Distance (cm)	Pre-test	10	281.95	45.34	-5.473	**.000*** **
	Post-test	10	287.32	47.35		
Angle (º)	Pre-test	10	39.86	3.68	3.020	**.014***
	Post-test	10	39.20	3.47		

*****p < 0.001, *p<0.05**

Table 5 presents pre-and post-test scores for distance and angle measurements. A statistically significant difference was observed for the distance variable, with post-test measurements demonstrating an increase compared to pre-test measurements ($p < .001$). This result suggests that the intervention positively impacted performance by enhancing jump distance. Furthermore, a statistically significant difference was also found for the angle variable, with post-test measurements indicating a decrease compared to pre-test measurements ($p < .05$). As increased distance and decreased angle are potentially indicative of improved performance, these findings suggest that the implemented intervention contributed to performance enhancement.

Table 6. T-test results for boys' pre-test and post-test performance scores in starts

Performance Measure	Group	N	X̄	S	t	p
Distance (cm)	Pre-test	10	304.06	37.16	-2.792	**.021***
	Post-test	10	306.78	38.63		
Angle (º)	Pre-test	10	39.49	2.81	.486	.639
	Post-test	10	39.40	2.90		

*****p < 0.001, *p<0.05**

Table 6 presents pre-and post-test scores for distance and angle measurements in male participants. A statistically significant difference was observed for the distance variable, with post-test measurements demonstrating a statistically significant increase compared to pre-test measurements ($p < .05$). This result suggests that the intervention had a positive, albeit modest, effect on performance by enhancing jump distance. Conversely, no statistically significant difference was found for the angle variable, as pre- and post-test measurements remained relatively consistent ($p = .639$). This indicates that the intervention did not elicit a statistically significant change in angle.

Table 7. T-test table according to the gender of the participants' pre-test and post-test performance scores in starts

Performance Measure	Group	N	X̄	S	t	df	p
Distance Pre-Test (cm)	Girl	10	281.95	45.34			
	Boy	10	304.05	37.16	-1.192	18	.249
Distance Post-Test (cm)	Girl	10	287.32	47.35			
	Boy	10	306.78	38.63	-1.007	18	.327
Angle Pre-Test (º)	Girl	10	39.860	3.68			
	Boy	10	39.490	2.81	.252	18	.804
Angle Post-Test (º)	Girl	10	39.205	3.47			
	Boy	10	39.400	2.90	-.136	18	.893

$p>0.05$

Table 7 indicates no statistically significant difference between groups in pre-test distance scores and angle values. Post-test distance scores showed a slight increase in the mean score for both girls and boys, but this difference was not statistically significant. Similarly, while post-test angle scores showed a slight decrease in the mean score for both groups, no statistically significant difference was observed.

DISCUSSION and CONCLUSION

The findings from the pilot study on the effect of imagery interventions on track start performance in 14–16-year-old swimmers reveal significant improvements in performance metrics, specifically in distance and angle measurements from the dives. The statistically significant differences between pre-test and post-test scores for both girls and boys ($p < .05$) indicate that the imagery interventions had a measurable impact on the swimmers' performance. The increase in post-test distance measurements suggests that the swimmers could execute their dives more effectively, likely due to enhanced mental rehearsal and visualization techniques employed during the imagery training sessions. Optimising performance output can improve a swimmer's speed and efficiency by reducing water resistance (Qiao et al., 2023). This study aligns with previous research indicating that imagery techniques can improve athletic performance (Simonsmeier et al., 2017; Wakefield et al., 2009; Vashisht et al., 2024). In swimming, the coordination of movements, such as the timing of the dive and the transition to swimming strokes, plays a crucial role in optimising performance (Khatkar et al., 2024). Consequently, the entry angle into the water influences the distance covered underwater and the frictional force exerted on the swimmer (Collings et al., 2024). In the study by Van Dijk et al. (2020), which involved athletes from the same age group as in our study, the swimmers' entry angles ranged from 35 to 39 degrees. Similarly, the entry angles for girls were measured at 39.86±3.68 degrees, while the entry angles for boys were measured at 39.49±2.81 degrees within our participant group. The entry angle is a critical factor in determining the efficiency of the swimming start. Van Dijk et al. (2020) found that a flatter entry angle, closer to horizontal, significantly reduced start times, with a one-degree flatter entry angle improving the swimming start by 0.5 seconds. In our study, the imagery training reduced the entry angle for girls from 39.86 degrees to 39.20 degrees, resulting in a statistically significant change. In contrast, the entry angle for boys decreased from 39.49 degrees to 39.40 degrees, which was not statistically significant.

In our study, the imagery training resulted in a statistically significant reduction in the entry angle for girls, decreasing from 39.86 degrees to 39.20 degrees. This finding, supported by a paired sample t-test, indicates that the imagery training was effective in enhancing the technical execution of the girls. In contrast, while boys experienced a decrease in their entry angle from 39.49 degrees to 39.40 degrees, this change was not statistically significant; suggesting that the imagery training may not have influenced their performance to the same extent.

These results highlight the potential for imagery training to positively affect girls' sports performance, while also indicating the need for further exploration into the factors influencing boys' responses to similar interventions. Future research could investigate tailored imagery techniques that may better support boys in achieving statistically significant improvements in their performance. Additionally, the fact that girls have a larger entry angle can be seen as an indication of greater openness to development. The cognitive-specific component of the Motivational-Cognitive Specific imagery dimension aids an athlete in skill acquisition and development while working on skill execution. In contrast, the Motivational Specific component focuses on enhancing motivation through goal setting and achieving those goals. When examining imagery levels, it is notable that girls scored significantly higher than boys in Motivational-Cognitive Specific imagery. Therefore, the improvement observed in girls can be regarded as an expected outcome. In the study by Doğaner et al. (2020), which examined the perception of imagination in children in terms of sports activities, it was found that girls had significantly higher scores in cognition- specific, motivation- specific, and motivational-general-arousal compared to boys. In the literature, there are various studies indicating that the use of imagery and imagery skills vary by gender or that there are no differences between genders (Mendes et al., 2015; Veraksa et al., 2014).

In another aspect, imagery training led to swimmers entering the water at a greater distance. Imagery, which involves mentally visualising a skill with all related senses without physical practice, has been shown to have a significant effect on performance. In a study by Robin et al. (2024), the effects of motor imagery training focused on movement and target achievement on tennis performance in young athletes were assessed. They found that success-oriented motor imagery, applied after errors, positively impacted shot quality, reducing the number of mistakes made by tennis players without exerting undue effort. In this context, athletes can gain awareness of technical errors and perform better with imagery exercises. In the study conducted by Uyaroğlu (2024), it was observed that imagery exercises performed prior to training the non-dominant leg contributed to various football skills involving the dominant leg in young football players. Furthermore, it was found that the effects of video-based imagery exercises were more pronounced. Similarly, in our study, images of freestyle swimming world record holder Caeleb Dressel's exit performance were used as a video-based imagery exercise. Conversely, the decrease in angle measurements may reflect a more streamlined and efficient diving technique, as athletes often aim for a more horizontal entry into the water to minimize resistance and maximize speed, which is crucial in competitive swimming (Simonsmeier et al., 2020).

The results align with existing literature that emphasizes the efficacy of imagery interventions in enhancing athletic performance. Studies have shown that imagery can significantly improve motor performance across various sports, including swimming, by allowing athletes to visualize and mentally rehearse their movements, refining their technique and execution (Isar et al., 2022; Simonsmeier et al., 2020). The medium effect size reported in meta-analyses of imagery interventions ($d = 0.431$) supports the notion that mental practice can substantially improve physical performance, particularly when combined with physical training (Simonsmeier et al., 2020). Furthermore, the specific application of imagery techniques, such as the PETTLEP model, which emphasizes the importance of physical context and emotional engagement during imagery practice, may have contributed to the positive outcomes observed in this study (Wright et al., 2014).

Interestingly, the study also found no significant differences in start performance based on gender ($p > .05$). This finding suggests that the imagery interventions were equally effective for both male and female participants, which is consistent with previous research indicating that imagery skills do not significantly differ between genders in athletic contexts (Schuster et al., 2011). This lack of gender disparity in response to imagery training underscores the universal applicability of psychological skills training across diverse athlete populations. Moreover, it highlights the importance of focusing on the individual athlete's psychological readiness and skill development rather than preconceived notions about gender differences in performance (Volgemute et al., 2024).

The implications of these findings extend beyond the immediate context of swimming. The positive effects of imagery interventions on performance metrics can be generalized to other sports and athletic disciplines, as evidenced by studies demonstrating similar outcomes in archery, golf, and resistance training (Richlan, 2023; Simonsmeier et al., 2020). Integrating psychological skills training, including imagery, into regular training regimens can enhance athletes' self-efficacy, reduce competitive anxiety, and improve performance outcomes (Ndakotsu, 2023). The motivational general mastery (MG-M) imagery within the PETTLEP Model significantly predicts self-confidence and self-efficacy in recreational and competitive athletes. These findings suggest that if a young athlete wishes to enhance their self-confidence or self-efficacy through imagery, regardless of their level of competition, the MG-M function should be emphasized (Munroe-Chandler et al., 2008). For instance, enhanced self-efficacy through imagery has been documented to correlate with better performance in various sports, suggesting that athletes who engage in mental rehearsal are more likely to experience increased confidence in their abilities (Hammond et al., 2012).

Furthermore, the study's results contribute to the growing evidence supporting using imagery as a critical component of athlete training programs. The systematic incorporation of imagery techniques can facilitate not only performance improvements but also the development of coping strategies for competition-related stress and anxiety (Ndakotsu, 2023; Williams & Cumming, 2015). As athletes learn to visualize successful performances and rehearse their techniques mentally, they may also cultivate a more resilient mindset, which is essential for navigating competitive environments' pressures (Hammond et al., 2012; Isar et al., 2022).

CONCLUSION AND RECOMMENDATION

In conclusion, the findings from this pilot study strongly support the efficacy of imagery interventions in enhancing track start performance in young swimmers. The significant improvements in performance metrics, including distance and angle measurements, demonstrate the potential of mental rehearsal and visualization techniques in optimising athletic performance. These results align with existing literature highlighting imagery interventions' positive impact across various sports disciplines. Furthermore, the absence of gender-based performance differences suggests that these psychological strategies are universally applicable, making them valuable tools for athletes of all backgrounds. To effectively enhance swimmer performance, coaches and sports psychologists should consistently provide feedback, video analysis, and performance evaluations while implementing imagery techniques into training programs. The findings suggest that imagery training significantly enhanced performance in this age group. This can be attributed to factors such as adolescents' ability to learn new skills more rapidly. However, the results of this study are limited to the 14-16 age group. Further research is needed to examine the generalizability of imagery techniques across different age groups and sports. Additionally, future studies should include a control group to more clearly demonstrate the effectiveness of imagery training.

Conflicts of Interest: There are no personal or financial conflicts of interest related to this study.

Authorship Contribution Statement: Research Design – SUU; LYÇ, Data Collection – US; İÜ, Statistical Analysis – MC; SUU, Manuscript Preparation US; LYÇ; MC. All authors read and approved the final manuscript.

Ethics Approval

Ethics Committee: Muğla Sıtkı Koçman University Medical and Health Sciences Ethics Committee-2

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