

SPORT IMAGERY ABILITY IN RHYTHMIC GYMNASTICS: DIFFERENCES BY AGE AND COMPETITIVE EXPERIENCE USING SIAQ

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Abstract. Sport imagery is an essential cognitive skill in high-performance sports, has been associated with technical execution, emotional regulation, and self-confidence. The aim of this study was to analyze differences in sport imagery ability among competitive rhythmic gymnasts with varying levels of competition experience, using the Sport Imagery Ability Questionnaire (SIAQ). The sample consisted of 18 gymnasts, divided into two groups: Group J3-2 (ages 9–12) and Group J1-S (≥ 13 years). Data analysis included descriptive statistics and independent samples *t*-tests, with the Mann-Whitney *U* test applied when the assumption of homogeneity of variances was not met. The results revealed statistically significant differences between the two groups in both the global score ($t(16) = -4.46, p < .001$) and three of the five subscales: Skills ($t(16) = -3.95, p = .001$), Affective Imagery ($t(16) = -4.47, p < .001$), and Mastery Imagery ($t(16) = -4.17, p = .001$). No significant differences were found for the strategy imagery ($p = .064$) and goal imagery ($U = 33.00, p = .53$) subscales. More experienced gymnasts demonstrated a superior ability in mental representation of performances, affective regulation, and management of challenging competition situations. The findings suggest that sport imagery ability may be associated with age, competitive experience, and athletic development. This study highlights the need to integrate mental imagery training into the preparation of competitive gymnasts as a complementary tool for enhancing mental self-regulation and expressiveness in competitions.

Keywords: sport performance, rhythmic gymnastics, ideomotor representation, mental imagery training.

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Introduction

In recent decades, the study of mental representations and motor imagery has gained considerable interest in the field of sport psychology, due to the significant role these processes play in athletes' training and performance (Cumming & Williams, 2012; Morone et al., 2022; Delavari et al., 2025). The ability to construct, visualize, and mentally experience complex motor actions has been associated with the optimization of technical execution, emotional regulation, and increased self-confidence (Balint & Mijaică, 2013). This ability, known as sport imagery, is considered one of the essential cognitive skills in high-performance sports (Di Corrado et al., 2019; Jose & Joseph, 2018; Volgemute et al., 2025).

To assess this ability, Williams and Cumming (2014) developed the Sport Imagery Ability Questionnaire (SIAQ), a scientifically validated instrument designed to measure athletes'

capacity to imagine sport-specific content such as technical skills, competition strategies, goals, emotional experiences, and coping with difficult situations. The factorial validity and internal consistency of the questionnaire have been confirmed through multiple studies, and its use has been extended to applied, educational, and clinical contexts (Cumming & Williams, 2012; Cumming & Williams, 2013).

Recent studies have reported positive effects of imagery training on selected aspects of athletic performance, especially in individuals with initially low imagery abilities (Liu et al., 2025; Simonsmeier et al., 2020). Supporting this claim, Rhodes et al. (2024) reported significant improvements in both visual and kinesthetic imagery following a structured training program, suggesting that imagery ability can be developed even in athletes who do not initially possess strong mental visualization skills. Similarly, imagery-based interventions, including virtual reality-assisted techniques, have been associated with improvements in visualization abilities and performance-related skills (Frank et al., 2022; Ross-Stewart et al., 2024).

In the context of rhythmic gymnastics - a sport characterized by the high complexity of motor, cognitive, and aesthetic demands - the ability of sport imagery becomes a fundamental component in the training and performance process. Gymnasts are required to execute highly precise movements in a choreographed sequence, synchronized with music and in constant interaction with specific apparatuses (ball, ribbon, hoop, clubs, or rope) (Esposito, 2024). These demands involve not only refined motor skills but also a strong mental capacity for anticipation, coordination, and visual-kinesthetic representation.

With rhythmic gymnastics gaining increasing global visibility and participation, as evidenced by the development of psychometric identification tools in diverse countries (Sulistyowati et al., 2025), and with the current lack of standardized psychological monitoring tools even at elite level (Sterkowicz-Przybycien & Purenovic-Ivanovic, 2024), the need for valid and reliable psychological assessment instruments is greater than ever - for both talent identification and the optimization of elite training programs (Koopmann et al., 2020).

Beyond rhythmic gymnastics, sport imagery techniques have been shown to benefit athletes in a wide range of disciplines - covering individual and team sports, as well as performing arts such as dance and music (Mao et al., 2022; Simonsmeier et al., 2020). This broad applicability supports the relevance of investigating imagery ability in rhythmic gymnastics, where technical precision, expressiveness, and emotional control are closely intertwined.

In this regard, the mental representation of movements is not merely a passive visualization exercise, but an active process that enables athletes to rehearse, correct, and consolidate movements in the absence of physical execution (Simonsmeier & Frank, 2016). By mentally visualizing a routine, the gymnast can adjust body positions, internalize the musical tempo, anticipate transitions, or reduce competitive anxiety. Studies have shown that mental training can activate brain regions similar to those involved in actual movement, thereby supporting motor learning and execution efficiency (Di Rienzo et al., 2016; Guillot & Collet, 2008).

From a neuro-ideomotor perspective, motor imagery engages many of the same neural substrates as physical execution. Functional neuroimaging and EEG studies show that kinesthetic imagery modulates sensorimotor rhythms in primary motor (M1) and premotor cortices, effectively “priming” the motor system for subsequent performance (Sugino & Ushiyama, 2021). Thus, stronger imagery ability across the SIAQ subscales may be associated with more efficient motor planning and error correction during complex rhythmic sequences.

Empirical evidence in rhythmic gymnastics specifically confirms these mechanisms. A recent Thai study found that incorporating imagery with music into training over six weeks produced significantly larger gains in ball-apparatus technique compared to imagery alone (Prawatyotin et al., 2022). Music may contribute to affective imagery by providing emotional and temporal cues, which in turn anchors precise timing and expressivity. Similarly, a study of Taiwanese rhythmic gymnasts demonstrated that mastery imagery – visualising successful navigation of difficulty – predicted competitive performance more strongly than purely skill-based imagery (Wu et al., 2023).

Use of the SIAQ in diverse languages and cultures underscores its robustness: Spanish, Polish, Japanese, and other adaptations consistently report five clear factors corresponding to the SIAQ subscales (Arruza-Gabilondo et al., 2017; Lee & Horino, 2023). This validates the questionnaire's cross-cultural applicability to rhythmic gymnastics, where athletes' imagery abilities interact with both technical mastery and aesthetic evaluation.

Taken together, these findings suggest that imagery ability may be influenced by both developmental factors and competitive experience. Older and more experienced gymnasts may possess stronger imagery abilities as a result of repeated exposure to training, competition, emotional regulation demands, and technical refinement. Therefore, examining differences in SIAQ scores across age and experience categories may provide useful information regarding the development of imagery ability in rhythmic gymnastics.

Methodology

The aim of this study was to examine differences in sport imagery ability between two groups of performance-level rhythmic gymnasts differing in age and competitive experience, using the SIAQ questionnaire.

Hypothesis

Gymnasts in the J1–S group were hypothesized to obtain higher SIAQ scores across all five subscales (skill, strategy, goal, affect, and mastery) compared to gymnasts in the J3-2 condition.

Participants

The sample comprised 18 rhythmic gymnasts registered with a private sports club affiliated with the Romanian Rhythmic Gymnastics Federation (FRGR). They were divided into two groups based on age category and level of competitive experience:

- Group 1 – 8 gymnasts aged between 9 and 12 years (with a mean age of 10.625 years), competing in Junior Categories III and II (code J3–2).
- Group 2 – 10 gymnasts aged 13 years or older (with a mean age of 16.2 years), competing in Junior Category I and Senior Category (code J1–S).

This age-group classification follows the Internal Regulations of the Romanian Rhythmic Gymnastics Federation (FRGR, 2022), and in this study, we adhered to the current national regulations. The participants trained in rhythmic gymnastics at a performance level, with a training frequency of 3–5 sessions per week.

The inclusion criteria were: at least one year of competitive participation in rhythmic gymnastics, participation in national competitions, and informed parental consent for underage participants. The exclusion criteria were: less than one year of competitive training, no participation in official competitions organized by the FRGR in the season prior to the questionnaire administration, incorrectly or incompletely filled questionnaires, and lack of informed consent from parents or legal guardians in the case of underage participants.

Regarding competitive experience, the gymnasts in the J3–2 group had between 1 and 3 years of participation in official competitions organized by the FRGR, while the gymnasts in the J1–S group had between 4 and 8 years of competitive experience, including participation in multiple national competitions and, in some cases, international events.

Instruments

The original version of the Sport Imagery Ability Questionnaire (SIAQ) (Williams & Cumming, 2014) was used, translated and adapted into Romanian for the context of rhythmic gymnastics. The questionnaire contains 15 items, distributed across 5 subscales:

- Skill imagery
 - Item 3: I can imagine how I perform specific technical movements in rhythmic gymnastics.
 - Item 8: I can imagine my body executing basic elements with correct technique.
 - Item 12: I can see myself performing a routine correctly, as I have learned it.
- Strategy imagery
 - Item 1: I can imagine how I approach my routine tactically.
 - Item 6: I can imagine how I solve a difficult situation during my routine.
 - Item 13: I can see how I apply a certain tactic in the exercise.
- Goal imagery
 - Item 5: I can imagine myself achieving my proposed goal in rhythmic gymnastics.
 - Item 9: I can imagine how I achieve a particular result in competition.
 - Item 14: I can imagine fulfilling my ambitions in rhythmic gymnastics.
- Affect imagery
 - Item 4: I can imagine the emotions I feel during a successful routine.
 - Item 7: I can imagine the joy I feel after a good performance.
 - Item 11: I can mentally relive the emotional satisfaction after a successful exercise.
- Mastery imagery
 - Item 2: I can imagine how I overcome a mistake in my routine.
 - Item 10: I can imagine how I control my emotions in stressful competition moments.
 - Item 15: I can see myself managing to keep calm and focused in tense situations.

The items are rated on a 7-point Likert scale, ranging from 1 (“very difficult to imagine”) to 7 (“very easy to imagine”). Each subscale score was calculated as the arithmetic mean of its

three constituent items, in accordance with the scoring procedure described by Williams and Cumming (2014). The global SIAQ score was calculated as the arithmetic mean of all 15 items.

Thus, the application of an instrument such as the Sport Imagery Ability Questionnaire (SIAQ) among performance-level gymnasts enables the quantification of a psychological dimension that is essential yet difficult to observe directly. Investigating the level of sport imagery through the SIAQ provides valuable insight into how age and competitive experience may influence this cognitive ability, which lies at the intersection of the technical, aesthetic, and psychological components of training.

Procedure

The questionnaire was administered in 2023 during two separate sessions to minimize potential cross-group influence on participants' responses. The younger gymnasts (Group J3–2) were assessed first, followed by the older gymnasts (Group J1–S). The administration took place in a quiet setting, outside the training hall. Prior to completion, the purpose of the study and the instructions for filling out the questionnaire were clearly explained. Participants were encouraged to reflect honestly on each item, using imagery strictly related to their own athletic experience.

Data were collected anonymously, in compliance with ethical principles concerning confidentiality and informed consent.

Statistical Analysis

The data obtained were processed using IBM SPSS Statistics, version 25. The analysis included:

- Descriptive statistics (mean, standard deviation, standard error of the mean);
- Levene's test for assessing the homogeneity of variances;
- Independent samples Student's t-test, used to compare global and subscale scores between the two groups when the assumption of homogeneity of variances was met;
- Mann-Whitney U test, applied for subscales where the assumption of homogeneity of variances was violated.

In the analysis, the independent variable was a combined developmental category reflecting both age and level of competitive experience (J3–2: 9–12 years; J1–S: ≥ 13 years). Because older gymnasts also tended to have more years of training and competition exposure, these two factors were strongly associated in the present sample. Therefore, the independent variable should be interpreted as a general indicator of developmental and experiential level rather than as a pure measure of age or competition experience alone. The dependent variables were the global SIAQ score and the scores obtained on the five subscales: skill imagery, strategy imagery, goal imagery, affect imagery, and mastery imagery.

Statistical significance was set at a threshold of $p < 0.05$. The interpretation of the results aimed to highlight significant differences between the age groups in terms of sport imagery ability, both globally and across the subscales defined by the SIAQ instrument.

Results

Descriptive Analysis of Raw Scores

To describe item-level responses, participants' raw responses to the 15 SIAQ items were examined. The gymnasts rated how easily they were able to imagine various situations related to their training and athletic performance.

Detailed raw item-level scores for each participant are presented in the supplementary material (Tables 1 and 2).

The frequency analysis of item-level responses revealed that, in the J3–2 group, items such as perfecting a movement (item 3), alternative plans (item 6), anticipation and excitement about sport (item 7), correcting a skill (item 12), or imagining success (item 14) were predominantly rated as “neither difficult nor easy to imagine” (score 4), with proportions ranging from 37.5% to 75%.

For the items related to mastering difficult situations (item 10 – staying positive after failure, and item 15 – feeling confident in a difficult situation), a higher proportion of responses indicated greater difficulty in the J3–2 group: 62.5% of the gymnasts considered item 10 to be somewhat difficult to imagine, and responses to item 15 were split between levels 3 and 4.

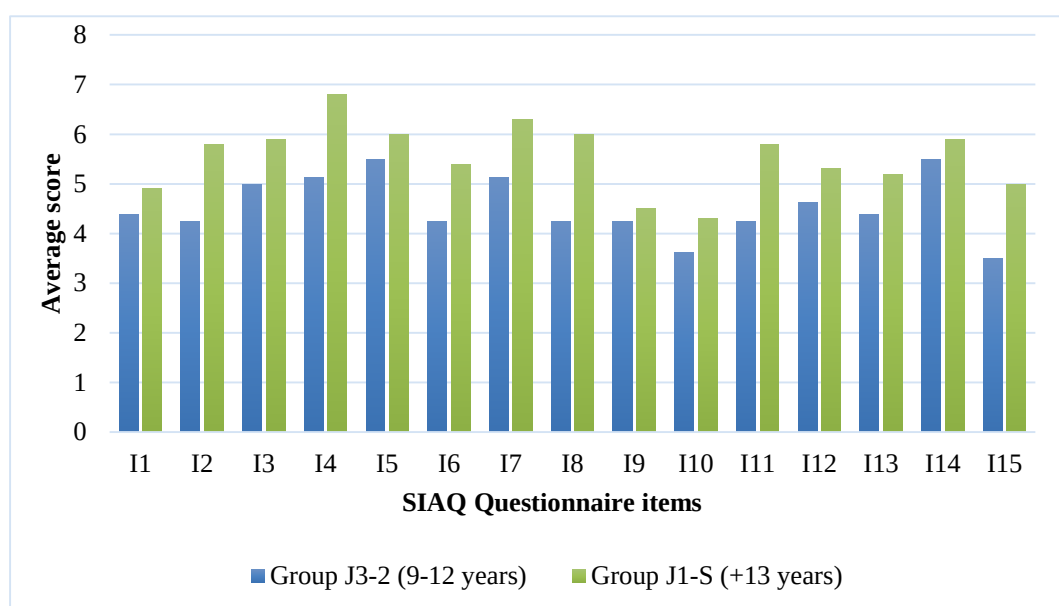


Figure 1. Comparison of mean scores on SIAQ questionnaire items between the two age groups: J3–2 and J1–S

In contrast, in the J1–S group, items related to technical skills (item 3 – perfecting a movement, and item 8 – improving a movement) were rated as easy to imagine by 70–80% of the participants. For the items in the “Difficult Situations” subscale, response distribution was more balanced but showed a general tendency toward higher scores compared to the J3–2 group.

The graph in Figure 1 highlights a clear upward trend in the mean scores of gymnasts from the J1–S group compared to those in the J3–2 group on most SIAQ items. The most noticeable differences appear in items related to perfecting technical movements, managing positive emotions, and mastering difficult situations, suggesting an association between group membership, age, competitive experience, and reported sport imagery ability.

To gain an overview of the level of sport imagery ability, mean scores and standard deviations were calculated for each participant, both at the global level (mean of all 15 items) and across the five subscales defined by the SIAQ: Skill Imagery, Strategy Imagery, Goal Imagery, Affect Imagery, and Mastery Imagery.

Table 1 presents a comparative view of the mean values for the two groups, highlighting the differences between gymnasts in the J3–2 category (ages 9–12) and those in the J1–S category (ages ≥ 13).

Table 1. *Mean values, standard deviations, and group differences for SIAQ subscale scores and global score*

SIAQ Subscale	Group J3-2 (M $\pm$ SD)	Group J1-S (M $\pm$ SD)	Mean difference (J3-2 – J1-S)
Skill imagery	4.59 $\pm$ 0.72	5.70 $\pm$ 0.46	-1.11
Strategy imagery	4.29 $\pm$ 1.19	5.14 $\pm$ 0.55	-0.85
Goal imagery	5.06 $\pm$ 1.33	5.43 $\pm$ 0.67	-0.37
Affect imagery	4.80 $\pm$ 0.60	6.28 $\pm$ 0.77	-1.48
Mastery imagery	3.75 $\pm$ 0.43	5.00 $\pm$ 0.75	-1.25
Global sport imagery score	4.50 $\pm$ 0.59	5.51 $\pm$ 0.37	-1.01

The analysis of mean scores on the SIAQ subscales highlights consistent differences between the two groups of gymnasts (Table 1). Older and more experienced gymnasts (J1–S) obtained higher scores across all dimensions of sport imagery compared to the younger gymnasts (J3–2).

The most substantial differences appear in the “Affect Imagery” subscale (6.28 vs. 4.80), “Skill Imagery” (5.70 vs. 4.59), and “Mastery Imagery” (5.00 vs. 3.75). These results are consistent with the hypothesis that the older and more experienced gymnasts would obtain higher sport imagery scores. Differences in the “Strategy” and “Goal” subscales were smaller but still followed the same trend, suggesting that differences in imagery ability may extend across several dimensions of mental imagery.

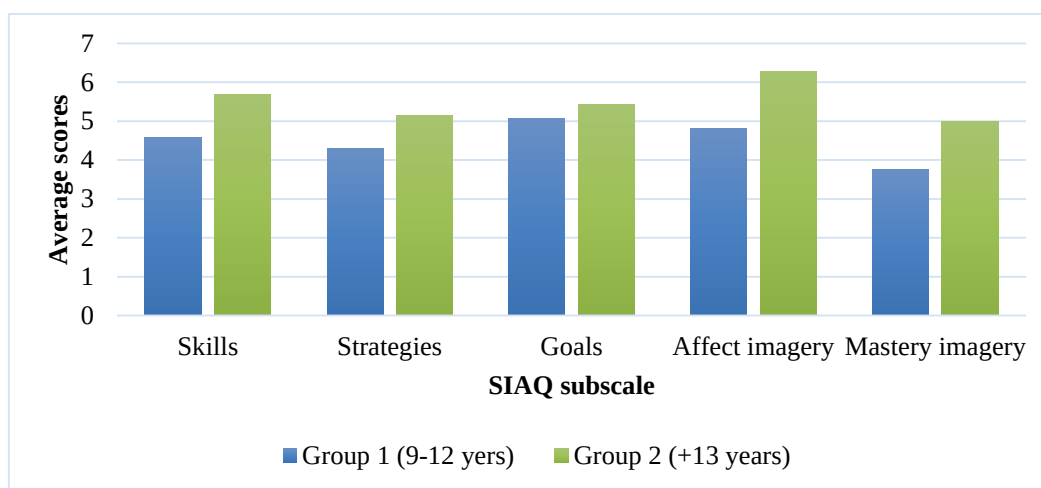


Figure 2. Comparison of mean scores on SIAQ subscales between the two groups: J3–2 and J1–S

Figure 2 highlights a clear difference between the two groups, with higher scores for gymnasts in the J1–S group across all five subscales. The most significant differences appear in the “Skill Imagery,” “Affect Imagery,” and “Mastery Imagery” dimensions, indicating a superior ability for mental representation and psychological management of execution among the more experienced athletes in the J1–S group.

Group Comparison – Inferential Analysis

To test the research hypothesis, an independent samples t-test was applied to identify statistically significant differences between the gymnasts in the J3–2 group (ages 9–12) and those in the J1–S group (ages ≥ 13), both at the global score level and across the five subscales of the SIAQ questionnaire. Levene’s test indicated that the assumption of homogeneity of variances was met ($F = 1.53$, $p = 0.23$).

Table 2. *T-test results for the global SIAQ score*

		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Overall result on sport imagery ability	Equal variances assumed	1.53	.23	-4.46	16	.000	-1.01	.22	-1.49	-.52

Levene’s test indicated that the assumption of homogeneity of variances was met for the global SIAQ score ($F = 1.53$, $p = .23$). The independent samples t-test (Table 2) revealed a statistically significant difference between the two groups. Gymnasts in the J1–S group (≥ 13 years) recorded a mean score of 5.51, significantly higher than the mean score of 4.50 obtained

by participants in the J3–2 group (9–12 years), $t(16) = -4.46$, $p < .001$. These results indicate that the J1–S group had significantly higher global sport imagery scores than the J3–2 group.

Table 3. *Descriptive data on mean scores for the SIAQ questionnaire subscales*

	Evaluated groups	N	Mean	Standard Deviation	Standard Error of the Mean
Skill Imagery Ability (I3+I8+I12/3)	Group_J3-2	8	4.58	.71	.25
	Group_J1-S	10	5.70	.46	.14
Strategy Imagery Ability (I1+I6+I13/3)	Group_J3-2	8	4.28	1.18	.41
	Group_J1-S	10	5.14	.54	.17
Goal Imagery Ability (I5+I9+I14/3)	Group_J3-2	8	5.06	1.33	.47
	Group_J1-S	10	5.43	.67	.21
Affect Imagery Ability (I4+I7+I11/3)	Group_J3-2	8	4.80	.60	.21
	Group_J1-S	10	6.28	.76	.24
Mastery Imagery Ability (I2+I10+I15/3)	Group_J3-2	8	3.75	.43	.15
	Group_J1-S	10	5.00	.74	.23

The descriptive analysis of scores on the five SIAQ subscales presented in Table 3 shows clear differences between the two groups. The largest mean differences appear in the Affect Imagery dimension (J1–S Group: 6.28 vs. J3–2 Group: 4.80), followed by Skill Imagery (5.70 vs. 4.59) and Mastery Imagery (5.00 vs. 3.75). These results indicate a superior ability to mentally represent affective states and confidence in difficult situations among the more experienced gymnasts (J1–S). The differences in the Strategy and Goal subscales are smaller, although mean values in these cases are also higher in the J1–S group.

Table 4. *Group comparison on SIAQ subscales*

Subscale	Levene's F (p)	Test	Statistic (df/U)	p	Effect size	Mean Diff. (95% CI)
Skill imagery	0.26 (.62)	t-test	-3.95 (16)	.001	$d = 1.89$	-1.11 (-1.70, -0.51)
Strategy imagery	2.25 (.15)	t-test	-1.99 (16)	.064	$d = 0.96$	-0.83 (-1.72, 0.06)
Goal imagery	10.56 (.005)*	Mann-Whitney U	33.00	.531	$r = .15$	-
Affect imagery	1.25 (.28)	t-test	-4.47 (16)	< .001	$d = 2.11$	-1.47 (-2.16, -0.77)
Mastery imagery	2.23 (.16)	t-test	-4.17 (16)	.001	$d = 1.99$	-1.24 (-1.87, -0.61)

Note: Levene's $F =$ value, $p =$ significance for equality of variances; if $p < .05$, Mann-Whitney U is reported. Mean difference and confidence interval not computed for Mann-Whitney U . Cohen's d values of 0.20, 0.50, and 0.80 indicate small, medium, and large effects, respectively. For Mann-Whitney U , r values of 0.10, 0.30, and 0.50 indicate small, medium, and large effects, respectively. J3-2 = ages 9–12, J1-S = ages ≥ 13 .

Results for group comparisons on the five SIAQ subscales are presented in Table 4. For the skill, strategy, affect, and mastery imagery subscales, Levene's test indicated that the assumption of homogeneity of variances was met (all $p > .05$), so independent samples t-tests were used. Significant differences favoring the J1-S group were found for skill imagery ($t(16) = -3.95$, $p = .001$), affect imagery ($t(16) = -4.47$, $p < .001$), and mastery imagery ($t(16) = -4.17$, $p = .001$), with mean differences of -1.11, -1.47, and -1.24 respectively. The corresponding effect sizes were large according to conventional benchmarks, indicating substantial standardized between-group differences. No significant difference was found for strategy imagery ($t(16) = -1.99$, $p = .064$), although the effect size remained relatively large. For the goal imagery subscale, Levene's test revealed a violation of homogeneity of variances ($F = 10.56$, $p = .005$), so the Mann-Whitney U test was applied; this analysis indicated no significant group difference ($U = 33.00$, $p = .53$), suggesting only a small effect size.

Discussions and conclusion

The aim of this study was to examine differences in sport imagery ability between two groups of rhythmic gymnasts differing in age and competitive experience, using the SIAQ questionnaire as an evaluation tool. The study hypothesis - that gymnasts with more competitive experience would obtain higher sport imagery scores - was only partially supported.

The results revealed statistically significant differences between the two groups, both in the global score and in three of the five subscales: Skill Imagery, Affect Imagery, and Mastery Imagery. However, no statistically significant differences were identified for the Strategy Imagery and Goal Imagery subscales. Therefore, although the older and more experienced gymnasts generally obtained higher mean values across all dimensions, the hypothesis was confirmed only for the global score and for three of the five imagery domains. These findings suggest that greater age and competitive experience are associated with higher levels of reported imagery ability, particularly in dimensions related to visualization and emotional self-regulation.

However, these conclusions should be interpreted in the context of a relatively small sample size, which may limit the generalizability of the findings to the broader population of performance-level gymnasts.

The findings of this study are consistent with the model proposed by Schack et al. (2014), which suggests that the structure of mental representations associated with motor actions becomes progressively more organized and functional with increasing levels of expertise. Guillot and Collet (2008) proposed the integrative model of motor imagery in sport, emphasizing that mental representations activate brain regions similar to those involved in motor execution, thus supporting technical learning and performance stabilization.

Similarly, Di Rienzo et al. (2019) reported that imagery-based training can support technical learning and performance stabilization, reinforcing the idea that mental representations rely on neural mechanisms similar to those involved in actual movement execution. More recently, Rhodes et al. (2021) showed that athletes with a lower initial level of imagery ability can make significant progress through structured training, reinforcing the idea that this ability can be developed and is not merely innate.

The present findings are consistent with this perspective and suggest that greater competitive experience may be associated with more developed mental representations in rhythmic gymnastics – particularly in the affective and self-regulation dimensions, which are essential in a sport where expressiveness and confidence are explicitly evaluated (Ivanova, 2019; Prawatyotin et al., 2022).

Moreover, the results are consistent with those reported by Janjigian (2024), who emphasizes the importance of a structured imagery protocol in producing real effects on performance. In our case, the significant difference on the Affect Imagery subscale ($t(16) = -4.447$, $p < .001$) suggests that the more experienced group reported greater ability to imagine affective states associated with performance. This difference may be relevant to emotional regulation during competition, although the present study did not directly assess stress or technical execution.

Lastly, the results obtained for the Mastery Imagery subscale support the conclusions drawn by Abraham et al. (2016), who observed that confidence and self-control in high-pressure moments are more developed in athletes who practice mental techniques, including elite gymnasts. In the present study, the significant group difference ($t(16) = -4.17$, $p = .001$) indicates that the more experienced group reported greater ability to imagine managing negative emotions and challenging competitive situations. This ability contributes not only to emotional stability during competitions but also to psychological resilience in the face of errors, pressure, or failure.

As for the Strategy and Goal subscales, although mean values were higher in the J1–S group, the differences were not statistically significant ($p = .06$ for strategy and $p = .53$ for goal imagery). A possible explanation may lie in the young age of participants in the J3–2 group, who – although lacking extensive competitive experience – may still be able to learn and apply strategies or goals conveyed by coaches in a mechanical way, without yet fully integrating them on an ideomotor or emotional level (Berger et al., 2023; Lindsay et al., 2021). Differences in cognitive development may also have contributed to the observed pattern; however, cognitive development was not directly assessed in the present study. These findings suggest that not all dimensions of sport imagery develop at the same pace, and that some imagery abilities may be influenced earlier by coaching practices and basic cognitive development, even in younger gymnasts.

Moreover, the variability of responses within groups, as reflected in the higher standard deviations, may reflect greater individual variability in self-reported imagery ability, particularly among the younger participants, particularly at younger ages (Martini, et al., 2016). These differences could potentially be reduced through the introduction of systematic sport imagery training aimed at supporting the development of this ability at both the strategic and motivational levels (Suica et al., 2022).

These findings have practical implications for the training process in rhythmic gymnastics, particularly regarding the integration of imagery exercises aimed at developing skill imagery, affect regulation, and mastery in difficult situations. The identified differences are not only statistically significant but also practically relevant, suggesting that sport imagery is a skill that develops in parallel with psychological and motor maturation. These findings reinforce the idea that integrating systematic mental imagery interventions into the training process can play a major role in supporting athletic performance and self-confidence. However, the fact that the

research was conducted within a single sports club limits the generalizability of the findings, and the lack of a longitudinal evaluation prevents the observation of how this ability evolves over time. In addition, age category and competitive experience were closely intertwined in the present sample. As a result, it is not possible to determine the extent to which the observed differences in imagery ability are associated with chronological age, developmental maturity, or accumulated competitive experience. Future studies should attempt to examine these factors separately, for example by including gymnasts of similar ages but different levels of competitive experience.

In conclusion, the present study suggests that sport imagery is a cognitive ability closely linked to gymnasts' age and level of competitive experience. The higher scores observed in the older and more experienced group, particularly for Affect Imagery and Mastery Imagery, suggest that these dimensions of imagery ability may be associated with accumulated experience and developmental maturity. The findings support consideration of systematic mental imagery strategies as a complementary component of training, particularly for developing imagery-related skills associated with emotional regulation and mastery.

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Data Availability Statement: Data can be made available upon request to the contact author.

Conflicts of Interest: The authors declare no conflict of interest.

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