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The influence of internal and external visual imagery on Self-confidence in learning gymnastics

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ABSTRACT

Students must have high self-confidence in learning physical education because self-confidence affects individual motor skill performance. The purpose of this study was to reveal differences in the influence of internal and external visual imagery on students' self-confidence in learning gymnastics with cartwheel material. This research is multiple linear regression experimental research. The number of samples in this study was 68 students. Actions are carried out by integrating internal and external visual imagery exercises in gymnastic learning. The data collection technique uses a self-confidence scale as an instrument. Data were analyzed using an independent sample t-test with a significance level of 0.05. The results showed that internal and external visual imagery had a significant effect on students' self-confidence ($p=0.000 < 0.05$), but there was a significant difference between internal and external visual imagery training ($p=0.027 < 0.05$) so that the internal visual imagery training method is better than the external imagery method ($M=71.2941 < 67.8824$). The results of this study indicate that students' self-confidence in performing wheel motion skills can be increased through internal and external visual imagery exercises that are integrated into the learning process, but internal visual imagery training methods are preferred.

Keywords: gymnastics, self-confidence, internal and external visual imagery

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INTRODUCTION

Sports psychology shows that sports success requires physical and mental training (Gomes et al., 2014; Frank et al., 2017). Consistent with this concept, imagery practice has been extensively studied as a potentially effective tool to improve motor learning and performance (Slimani et al., 2016; Kim et al., 2017; Dana & Gozalzadeh Fortes et al., 2017). Imagery training is defined as the execution of mental movements (motor skills) without actual motor skills (Jeannerod, 1995; Decety, 1996; Lotze & Halsband, 2006; Guillot et al., 2012); and is a cognitive tool that athletes use strategically to optimize their motor skills (MacIntyre & Moran, 2007; Post et al., 2012; Weinberg et al., 2003; Schack et al., 2014).

Studies on the process of combining physical and psychomotor exercise have shown that changes in physiological parameters such as the vegetative indices are like physical exercise and activity (Adams et al., 1987; Decety et al., 1991; Collet, et al., 2011). Furthermore, neuroimaging data show that imagined and executed movements share the same neural circuits and therefore share functional similarities (Jeannerod, 1995; Grazes & Decety Burianová et al., 2013; Jiang et al., 2015; Thanikkal, 2016; *Krüger* et al., 2020; Meers et al., 2020; Monany et al., 2022). The results of this study hypothesized that such neural circuits may be the basis for enhancing motor efficiency through imagery training and improving performance in athletes (Schack et al., 2014; Dana & Gozalzadeh, 2017; Ruffino et al., 2017).

Imagination training is represented by visuomotor imagery, in which movements and trajectories are visualized from a first-person (internal visual imagery) or third person (external

visual imagery) perspective (Mahoney & Avener, 1977; Callow et al., 2012; Yu et al., 2016). Internal visual imagery relies on subjects imagining from the same perspective experienced during the coding phase (Nigro & Neisser, 1983; Rice & Rubin, 2009). Strongly influenced by kinesthetic features, this view relates to focusing a person's multimodal experiential space on one's own body and thus operates within an egocentric frame of reference (Vogeley & Fink 2003). In contrast, external visual imagery requires people to represent themselves or others from an external perspective by observing audience gestures (Rice & Rubin, 2009). In visual imagery exercises, subjects also imagine the environment or landscape background, so they work in an allocentric frame of reference. External visual imagery training is thought to be a more complex mental process than internal visual imagery training. This is because the allocentric features need to be integrated into the image subject's egocentric coordinates, requiring more mental processing (Yu et al., 2016).

In recent years, there has been much discussion in sports psychology about whether indoor or outdoor training would be more effective for athletes. Although there are many studies in literature, this issue has not been systematically investigated. In other words, most studies have focused on a specific sport, namely open skills (such as karate, where participants fight in a rapidly changing environment) versus closed skills (such as gymnastics, where athletes perform in a relatively static environment) (Glisky et al., 1996; White & Hardy, 1998; *Callow et al., 2013)*. However, some evidence suggests that open-skill sports utilize more external visual imagery than internal visual imagery (Yu et al., 2016), while closed-skill sports use more internal visual imagery (Spittle & Morris, 2007; Morris & Terry, 2011:275–308; Yu et al., 2016).

In addition to the positive benefits of imagery training, self-confidence is another important psychological factor in athlete development. Confidence plays a positive role in an athlete's state of mind and may alter an athlete's reactions during training and competition (Hanton et al., 2004). Confidence is an important factor that positively influences thoughts and feelings. Additionally, confidence keeps players focused on their goals and activates confidence in their success. In this context, the belief in gymnastics can be seen as mental preparation and the key to achieving pleasures, desires, and goals. In addition, several psychological models and theories have been developed to describe optimal psychological training guidelines and assess psychological skill development (Gardner & Moore, 2004).

Several studies have shown that these factors play important roles in athlete performance when examining the relationship between training expectations and confidence (Mattie & Munroe-Chandler, 2012; Munroe et al., 2000; Weinberg et al., 2003; Callow et al., 2001; Mamassis & Doganis, 2004). The use of imagery is believed to positively improve a player's physical and mental performance and boost their self-confidence. Numerous studies have confirmed that imagination and self-confidence contribute to the mental and physical development of athletes in many sports (Short & Short, 2005; Munroe-Chandler et al., 2008; Adegbesan, 2010), but there is little research examining the effects of using internal and external imagery on self-confidence.

This study addresses the issue from different perspectives, focusing on functional differences between internal and external visual imaging maneuvers. We wanted to test whether these two types of imagery would enhance distinct yet integrated mental capacities in the field of human mental health. This approach was chosen to study these two perspectives separately, regardless of sport (closed skills or open skills). Specifically, internal and external visual imagery exercises guide internal movement, whereas internal and external visual imagery exercises should help explore and refine newly acquired movement. To address this issue, we used the mental time paradigm by comparing the time it takes to perform a bicycle exercise to an imaginary time of the same exercise in terms of internal and external visual images. Such experiments were performed on subjects who were novices in the skill.

METHOD

The present study is an experimental study whose purpose is to find out the effect of internal and external visual images on students' self-confidence in learning practice. The research analysis

was done quantitatively. 68 students with an age range of 13-15 years or at the junior high school level participated in this study. The procedure is carried out by combining internal and external visual exercises with physical education. We use a questionnaire to assess information that students (beginners) have never learned by watching videos or books that show cartwheels. It is important to emphasize that to do cartwheels correctly, the students need to know many aspects (motor control, breathing, etc.), and knowing the sequence of movements is not enough. Therefore, students who have never practiced carriage cannot do so simply by imitation. Recorded data were tested for normality (Kolmogorov-Smirnov test) and homoscedasticity (Levene test). Then, the data were analyzed with an independent sample test to determine the effect of visual imagery on internal and external training. The influence is considered significant at the level of t count > t table and sig value. < 0.05.

A self-confidence assessment questionnaire was used as a data collection technique in this study. Before conducting the survey, the researcher first created a trust scale survey. The content is developed based on Bandura's (van der Bijl & Shortridge-Baggett, 2001) three aspects of measuring self-confidence, which are level, generality, and strength.

Table 1. Self-confidence instrument grid

Variable	Indicator	Item Number	Total Items
Self-Confidence	Level	2, 5, 17, 7	4
	Generality	1, 3, 4, 6, 8, 9	6
	Strength	10, 11, 12, 13, 14, 15, 16, 18	8
Amount			18

From these grids, an instrument was developed in the form of a questionnaire with four possible answers, which was then constructed and validated by asking for expert judgment. After the structures have been tested by experts, instrument tests are continued (Sugiyono, 2014). In this study, the Alpha-Cronbach method was used for the test results of the self-confidence assessment tool.

Table 2. Case processing summary instrument of self confidence

		N	%	Cronbach's Alpha	N of Items
Cases	Valid	31	100.0	.933	18
	Excluded[a]	0	.0		
	Total	31	100.0		

In Table 2, the number of respondents studied in the instrument trial was 31 (N = 31). In table 3, Cronbach's Alpha value is 0.933 and the number of items validated is 18. The r table value for the two-tailed test at a significance level of 5% (ρ = 0.05) can be found based on the number of, or N. If the alpha value is greater than r tables, the research instrument can be said to be reliable (Jusmita & Frinaldi, 2021). According to Sugiyono (2014), the r table value for N = 31 at a significance level of 5% is 0.355, so the self-confidence assessment instrument can be said to be reliable. In accordance with the Alpha Cronbach value table, 0.933 is located between 0.80-1.00, so the level of reliability is very reliable.

Table 3 for a two-tailed test at a significance level of 5% (ρ = 0.05) can be found based on the number of respondents, because N=31 and the r table are 0.355. Based on the value in the Corrected Item Total section, valid statement items have r greater than r table. The SPSS calculation results show that all statement items have an r of more than 0.355. Thus, the 18 statement items are declared valid.

The recorded data were tested for normality (Shapiro-Wilk test) and homoscedasticity (Levene test). Then it was analyzed using a paired sample test to determine the effect of internal and external visual imagery training. The effect was considered significant at the level of *t* count > *t* table and sig value < 0.05.

Table 3. Item-total statistics on the analysis of self-confidence instrument trials

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Item 1	47.74	54.531	.391	.934
Item 2	48.68	53.492	.356	.937
Item 3	48.52	50.591	.834	.926
Item 4	48.97	51.366	.655	.929
Item 5	48.55	50.856	.768	.927
Item 6	48.61	53.778	.424	.934
Item 7	48.35	51.437	.605	.931
Item 8	48.68	54.092	.482	.933
Item 9	48.48	49.525	.833	.925
Item 10	48.74	52.465	.538	.932
Item 11	48.55	50.323	.757	.927
Item 12	48.48	49.258	.864	.925
Item 13	48.35	54.370	.419	.934
Item 14	48.55	50.389	.688	.929
Item 15	48.52	49.125	.852	.925
Item 16	48.52	50.191	.799	.926
Item 17	48.81	52.228	.431	.936
Item 18	48.48	50.058	.847	.925

FINDING AND DISCUSSION

Finding

The results of the descriptive analysis that has been carried out, show that there is a difference in the average increase in students' self-confidence before and after being given treatment in the form of internal and external imagery exercises (Table 4). In the group that was given internal visual imagery exercises, there was an increase in the average self-confidence score from 62.29 to 72.29. The same thing was also found in the group of respondents who were given external visual imagery training, where the average self-confidence score increased from 61.38 to 67.88.

Table 4. Descriptive statistics

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Imagery Internal (Pretest)	34	54.00	73.00	622.941	573.944
Imagery Internal (Posttest)	34	60.00	86.00	722.941	786.449
Imagery External (Pretest)	34	54.00	72.00	613.824	571.025
Imagery External (Posttest)	34	55.00	81.00	678.824	818.263

Based on the results of the data normality test, the influence of internal external imagery on self-confidence was obtained by a sig. on all pretest and posttest data ≥ 0.05. So, as the basis for decision-making in the Kolmogorov-Smirnov normality test, it can be concluded that the data is normally distributed. After all the data is normally distributed, the prerequisites or assumptions of normality for using the paired sample t-test have been met (Table 5).

Based on the statistical analysis of the homogeneity test that has been carried out using the Levene Statistical test, it is known that the pretest significance value of the self-confidence data is 0.979 ≥ 0.05 (Table 6). This means that the data group has a homogeneous variant. Likewise,

the results of the calculations on the post-test showed a significance value of 0.865 ≥ 0.05. This means that the data group has a homogeneous variant.

Table 5. Tests of normality

Tests of Normality				
	Group	Kolmogorov-Smirnov[a]		
		Statistic	df	Sig.
Imagery Internal	Pre-Test	.119	34	.200*
	Post Test	.097	34	.200*
Imagery External	Pre-Test	.125	34	.196
	Post Test	.134	34	.131

Table 6. Tests of homogeneity of variance

Test of Homogeneity of Variances				
	Levene Statistic	df1	df2	Sig.
Pre_test	.001	1	66	.979
Post_Test	.029	1	66	.865

The analysis shows at Table 7 an analysis of the influence of internal imagery and external imagery on self-confidence. In the results of internal image analysis, the calculated t value is 26.818 and the Sig. (2-tailed) value is 0.000. Because the t count is 26.818 > t table (df_{33}) 1.69236 and the significance value is 0.000 < 0.05, these results indicate that there is a significant influence of internal imagery training on students' self-confidence.

Then the results of external imagery analysis show a t count of 13.982 and a Sig. (2-tailed) of 0.000. Because t count is 13.982 > t table (df_{33}) 1.69236 and the significance value is 0.000 < 0.05, these results indicate that there is a significant influence of external imagery training on students' self-confidence.

Table 7. Internal and external visual imagery analysis on self confidence

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Dev	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Internal	Pretest-Posttest	-1.000.000	217.423	.37288	-1.075.862	-924.138	-26.818	33	.000
Eksternal	Pretest-Posttest	-650.000	271.081	.46490	-744.585	-555.415	-13.982	33	.000

*) The t count is negative because the average pretest value is lower than the average posttest. In the context of a case like this, a negative t value can have a positive meaning.

Table 8. Internal and external visual imagery analysis of self-confidence

Independent Samples Test					
	N	Mean.	t-test for Equality of Means		
			t	df	Sig. (2-tailed)
Imagery Internal	34	722.941	2.267	66	.027
Imagery External	34	678.824			

The analysis above shows a t count 2.267 and a significance value of 0.027. Because t count is 2.267 > t table (df 66) 1.99656 and the significance value of 0.027 <0.05, these results indicate that there is a significant difference between internal and external visual imagery training methods in increasing students' self-confidence in learning gymnastics. We can see this difference in the average data on the increase in student self-confidence. The average data of the internal visual

imagery group is 71.2941 > 67.8824, compared to the average of the external visual imagery group. From these data, it can be concluded that internal visual imagery has a greater effect on increasing students' self-confidence in learning cartwheel gymnastics.

Discussion

The purpose of this study was to demonstrate the differential influence of internal and external visual imagery on the self-confidence of students learning gymnastics using cartwheels. The results of this study show that practicing internal and external visual imagery has a significant impact on students' self-confidence. These results are consistent with several previous studies, such as Vadoa et al. (1997), which reported an association between imagery use and self-confidence in skaters. Callow and Hardy (2001) also reported a link between athletic confidence and imagery in netball players. In addition, Callow and Waters (2005) concluded that kinesthetic imagery promotes confidence in movement. Murphy (2005) shows that exercising imagery increases the self-confidence of badminton players. Ramzaninezhad et al. (2009) observed that the use of imagery in professional and amateur volleyball increased individual skill and player confidence. Guerrero et al. (2016) also found a positive correlation between self-esteem and imagery. On the other hand, Yalcin and Ramazanoglu (2020) found positive associations between all imagery subscales (internal and external) and the self-confidence of professional soccer players.

The results of the analysis regarding the first hypothesis that internal imagery training can influence students' self-confidence are acceptable. This is because when students do internal imagery exercises, a self-visualization process will occur, namely the skill of seeing oneself in the mind or on the screen of the heart with full awareness. When students carry out the self-visualization process, they can indirectly find out for themselves the wrong movements when performing skills; this is called the self-evaluation process. If students are at the level of being able to carry out self-evaluation, then psychologically they will be able to know what mistakes they made and correct those mistakes. However, we found that students' emotions when doing internal imagery exercises had a direct impact on reducing self-confidence. This may be because students' emotions when doing internal imagery exercises reduce the self-visualization process. When they are unable to visualize themselves, they are automatically unable to self-evaluate, and this causes their abilities to not change significantly. In line with this problem, Cumming & Williams (2013), Munroe-Chandler et al. (2007), and Cumming & Eaves (2018) also state that emotions have a negative impact on self-confidence because they can reduce the use of general images. which can be a tool to build self-confidence. confidence.

Furthermore, the results of the analysis regarding the second hypothesis that external imagery training can influence students' self-confidence can also be accepted. However, we found that external imaging training was less suitable when applied to non-athlete students. External imagery is done by imagining a movement from a third-person perspective. This means that in this case, students act as observers or see other people's movements through demonstrations or trainer videos and then imagine them as their own visual images. Implementing movement demonstrations or videos with higher movement complexity makes it difficult for them to imagine, imitate and make skillful movements. A similar thing was also conveyed by Yu et al. (2016) who stated that external imagery involves visual transformations of other people and the environment related to higher levels of skill. Apart from that, Yu also added that an external perspective requires individuals to visualize movements produced by other people in their environment, where the observer is a spectator; therefore, external imagery will be useful for training response strategies used when competing against an opponent. So, although research shows that external imagery can increase students' self-confidence in sports learning, it is more advisable to use external imagery for competitive sports training such as martial arts.

In this study, the internal imagery training method had a better impact on increasing students' self-confidence in cartwheeling. This is in accordance with the opinion of Glisky et al. quoted in Yu et.al (2016:2). Glisky et al. stated that internal imagery training is more useful than external imagery training when used to develop movement techniques and strategies. Olsson et

al. (2008) also stated that internal imagery training is also good at generating psychological responses, helping gamers appear calmer and more comfortable while carrying out their duties.

Based on some of the theories above, it is known that internal imagery training has many advantages over external imagery training. The internal imagery training method has several advantages, such as increased psychological response, simplification, and optimization of athletes' movements. From this, it can be concluded that mental training with internal imagery makes a significant contribution to improving athlete performance.

CONCLUSION

The overall results show an increase in the self-confidence of each student in learning cartwheels. This proves that the integration of internal and external visual imagery exercises can increase students' self-confidence in learning cartwheel materials, but internal visual imagery exercises have a greater influence than external visual imagery. The results of this study can be used by teachers as a reference for using effective learning methods to increase students' self-confidence in physical education learning. Teachers are advised to use the imagery training integration method combined with a scientific approach. In addition, learning success is also influenced by internal factors such as students' understanding of motion and their courage in carrying out skills. Teachers must provide students with an understanding of the skills to be taught so that students are able to understand and apply this understanding to skill activities.

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