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التصوّر العقلي وصفات الذات البدنية لدى تلاميذ السنة الثالثة ثانوي ذكور: دراسة ارتباطية مقطعية

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# **Mental Imagery and Physical Self-Attributes among Male Third-Year Secondary School Students : A Cross-Sectional Correlational Study**

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**Imagerie mentale et attributs du soi physique chez les élèves de troisième année secondaire (garçons) : étude corrélacionnelle transversale**

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## **Introduction**

Mental processes occur within the mind and underlie virtually all human interactions. They are rooted in the brain's physiological functions, interact continuously with the environment, and contribute substantially to learning and performance. As Driver, Haggard, and Shallice (2007) point out, these processes range from basic functions such as sensation to more complex ones, including perception, language, attention, memory, and imagery. Without such processes, neither motor nor cognitive activity could be effectively executed, underscoring their central role in teaching, learning, and personal development.

Within this broad set of mental functions, mental imagery is widely recognised as a central cognitive process in sport and physical education. It refers to the deliberate use of sensory representations in the absence of corresponding external stimuli, in order to prepare, regulate or evaluate action. In the sport psychology literature, mental imagery has been shown to support technical learning, tactical preparation, motivation, and self-regulation, and to contribute to performance enhancement when systematically integrated into training programmes (Cumming & Williams, 2012). Psychomotor learning theories similarly emphasise the interdependence of cognitive and motor functions in educational and sporting contexts (Todorović, 2008).

In this study, mental imagery is understood as a mental tool through which individuals can form representations of past experiences or construct new representations of events yet to occur, with the aim of mentally preparing for performance. From this perspective, mental images act as a sort of “mental

map”: the clearer and more structured the map in the learner’s mind, the more precisely the brain can send signals to different parts of the body to organise movement (Bouzaid & Hawawra, 2022; Labchiri, 2018).

Beyond its role in performance, mental imagery also appears to influence how individuals think and feel about their own bodies and physical abilities. Studies have reported that imagery-based interventions can strengthen self-confidence, reduce anxiety and foster more adaptive self-perceptions in young athletes and students (Yildiz, 2015; Munroe-Chandler, Hall & Fishburne, 2008). In this sense, mental imagery may be closely linked to the way learners construct their physical self-concept. The physical self can be defined as the set of beliefs, evaluations and feelings that individuals hold about their physical appearance, physical abilities and physical fitness, including awareness of strengths and weaknesses and perceptions of physical efficacy (Lazraq, 2015). Instruments such as the Physical Self-Description Questionnaire (PSDQ), developed by Marsh and colleagues, provide a multidimensional assessment of these physical self-attributes and have been widely used to examine their relationships with physical activity, sport participation and psychological adjustment.

Adolescence represents a particularly sensitive period for the development of the physical self. In the Algerian education system, the secondary stage corresponds roughly to ages 15–18, during which school subjects are taught in a more specialised and in-depth way than at primary level (Ageli, 1997). During secondary school, boys and girls are confronted with rapid bodily changes, social comparison with peers and performance expectations in physical education and sport (PES) classes. For male students in particular, physical self-attributes such as strength, endurance or physical competence may play an important role in their engagement in physical activity, their motivation in physical education and their overall well-being.

In the Algerian and regional context, several empirical studies have examined mental imagery or the physical self, often focusing on specific populations such as university students or high-level athletes. For example, Ben Haiba (2017) analysed mental imagery and the dynamics of the physical self in relation to elite sports performance; Hadhifa and Hashaishi (2019) studied mental imagery and sports confidence in school sports; Ghazali (2015) investigated physical activity and the concept of the physical self; and other works have explored the effects of mental imagery training on performance in football and handball (Tomiya & Laznak, 2021; Mifoubi & Sabah, 2022; Mahy Safian, 2019). These studies provided theoretical and

methodological guidance for the present work, helping to refine the research questions, hypotheses, tools and statistical procedures.

However, much less is known about how different dimensions of mental imagery are related to physical self-attributes among secondary school students, and more specifically among male third-year secondary school students in public schools. Exploring these relationships could provide useful indications for physical education teachers who wish to integrate mental imagery into their pedagogical practices in order to support students' physical self-concept.

Against this background, the present cross-sectional correlational study aims to examine the relationships between mental imagery and selected physical self-attributes among male third-year secondary school students. More precisely, it focuses on four dimensions of mental imagery (visual, auditory, kinesthetic and emotional imagery) and their associations with physical self-attributes measured by the PSDQ. The central research question can be formulated as follows: is there a statistically significant relationship between mental imagery and physical self-attributes among male third-year secondary school students? This general question is further specified by asking whether visual imagery, auditory imagery, kinesthetic imagery and emotional imagery are each significantly related to physical self-attributes in this population.

In line with the correlational nature of the design, the study assumes that higher levels of mental imagery are associated with more positive physical self-attributes. It is therefore hypothesised that mental imagery, in its different dimensions, is positively related to selected physical self-attributes among male third-year secondary school students. More specifically, it is expected that visual, auditory, kinesthetic and emotional imagery will each show a statistically significant positive association with these attributes. Accordingly, the study pursues two main objectives: first, to identify the relationships between each dimension of mental imagery (visual, auditory, kinesthetic and emotional) and physical self-attributes; and second, to estimate the proportion of variance in physical self-attributes that is statistically associated with these dimensions of mental imagery.

## **1. Method**

### **1.1. Pilot Study**

After obtaining permission to conduct the study, the researcher contacted the administrators of secondary schools in the Ain Touta municipality to gain a comprehensive and representative understanding of local conditions

and anticipate potential obstacles. This preliminary stage also included communication with physical and sports education teachers to facilitate the distribution of the questionnaires and identify potential difficulties students might face in understanding the items.

A small pilot study was then conducted with a group of 10 students from outside the main study sample, enrolled at Saeed Obeid High School in Ain Touta. The pilot study served to check the clarity of the instructions and items in the mental imagery scale and the physical self-attributes scale; estimate the approximate time required to complete each instrument (20 minutes for the mental imagery scale and about 5 minutes for the physical self-attributes scale); and familiarise the research team with the logistical procedures for distributing and collecting the questionnaires. Given the very small number of participants ( $n= 10$ ), any reliability indices obtained at this stage should be interpreted with caution, and the main emphasis of the pilot study lies in testing clarity and feasibility rather than providing definitive psychometric evidence.

## 1.2. Data Collection Instruments

### 1.2.1. Mental Imagery Scale in the Sports Field

The mental imagery scale used in this study was initially developed in the sport psychology literature and adapted into Arabic by Osama Kamel Rateb (2004). The scale aims to determine the extent to which an athlete or student uses mental imagery across four general dimensions of sport situations: individual practice, practice with others, observing a peer, and performance in competition (Rateb, 2004). Within these dimensions, the scale taps several modalities of mental imagery: visual, auditory, kinesthetic, and emotional.

The response format uses a five-point Likert scale, with students indicating how frequently they experience the type of imagery described in each item. The scoring key ranges from 1 to 5, corresponding to increasing clarity and control of imagery, as shown in Table 1.

Table 1. Answer key for the mental imagery scale

Score	Type of answer	Type of response
1	No image	No control
2	Image exists, but with medium clarity	Difficulty in control
3	Image exists and each element is clear	Moderate control
4	Image exists and is clear	Above-average control
5	Image exists and is completely clear	Full control

Source : Adapted from Rateb (2004)

Based on the sum of scores for each dimension, the level of mental imagery is classified according to the grading levels shown in Table 2 (Labchiri, 2021, pp. 106–107).

Table 2. Grading levels for the dimensions of mental imagery

Level	Score range
Excellent	18–20
Good	15–18
Average	12–15
Weak	8–11
Very weak	4–7

Source : Labchiri (2021, pp. 106–107)

1.2.2. Physical Self-Attributes Scale

The Physical Self-Description Questionnaire (PSDQ) was developed by Herbert Marsh and colleagues (1994–1996) as a multidimensional measure of physical self-concept for students aged 13–18 years. Mohamed Hassan Alawi adapted and modified the instrument for use in the Egyptian context, limiting it to 10 dimensions and revising or removing items that were unsuitable for Egyptian male and female students (Mohamed Hassan, 1998).

In the present study, we used a five-dimensional version (30 items in total) that measures physical appearance, sport competence, overall physical self-concept, physical activity, and body fat. Students respond to self-descriptive statements on a Likert-type scale indicating their degree of agreement. Higher scores reflect more positive perceptions of physical self-attributes.

1.3. Scientific Criteria for the Instruments

In the original study, indicators of reliability and validity are reported for a small pilot sample (n= 10). Given the very limited size of this sample, these coefficients should be considered preliminary and primarily indicative of internal coherence rather than definitive psychometric proof. In practice, such indices are more robust when calculated on the full sample (n= 220); however, only the pilot results are available here.

For the purposes of this article, we therefore treat these indices as initial indicators of internal consistency, while acknowledging the need for further validation on larger samples.

Table 3. Scientific criteria for the study instruments

Instrument	Sample size (n)	Reliability coefficient (Cronbach's $\alpha$ )	Validity coefficient
Mental imagery scale	10	0.910	0.953
Physical self-attributes scale	10	0.897	0.947

Source : Prepared by the researchers based on SPSS 27 output (pilot sample)

### 1.4. Methodological Approach

The study relied on a descriptive, cross-sectional correlational approach to examine the relationships between mental imagery and physical self-attributes as they exist in reality at a given point in time. This approach is concerned with providing an accurate description by collecting, analysing and interpreting information, thereby clarifying the characteristics of the phenomenon under consideration (Ghazali, 2015).

### 1.5. Study Population and Sample

The study population comprised all male third-year secondary school students at Ain Touta high schools during the 2023–2024 academic year. According to statistics and documents provided by school administrators, this population comprised 395 students.

The researchers attempted to include all members of this population, but students who were exempted from physical education classes and those who were absent at the time of questionnaire administration were excluded. The final study sample, therefore, comprised 220 students, representing approximately 55.7% of the target population.

Table 4. Study population and sample

Group	Population (N)	Sample (n)
Male third-year secondary school students (Ain Touta high schools)	395	220

Source : Prepared by the researchers based on school statistics (2023–2024)

### 1.6. Statistical Methods Used

The Statistical Package for the Social Sciences (SPSS), version 27, was used for data analysis. The following procedures were applied: computation

of arithmetic means and standard deviations; estimation of Cronbach’s alpha coefficients as indicators of internal consistency; and simple linear regression analyses to examine the associations between each dimension of mental imagery (visual, auditory, kinesthetic, emotional) and physical self-attributes. Given the cross-sectional nature of the data, the regression models are interpreted as statistical relationships rather than causal effects.

2. Results and discussion

2.1. Results

2.1.1. First Sub-Hypothesis

Reformulated hypothesis: There is a statistically significant positive relationship between visual imagery and selected physical self-attributes among male third-year secondary school students.

Null hypothesis ( $H_0$ ): There is no statistically significant relationship between visual imagery and selected physical self-attributes among male third-year secondary school students.

Alternative hypothesis ( $H_1$ ): There is a statistically significant relationship between visual imagery and selected physical self-attributes among male third-year secondary school students.

Table 5. Simple linear regression results for the effect of visual imagery on physical self-attributes

R	R <sup>2</sup>	F	Sig. (F)	B	t	Sig. (t)
0.29	0.087	20.89	0.00	0.41	4.57	0.00

Source : Prepared by the researchers based on SPSS 27 output

These results show a weak but statistically significant positive association between visual imagery and physical self-attributes in the sample studied. Visual imagery accounts for approximately 8.7% of the variance in physical self-attributes, and an increase of one unit in visual imagery is associated with an estimated increase of 0.41 units in physical self-attributes. The F-test and t-test values are significant at the 0.05 level, confirming the model’s statistical significance.

2.1.2. Second Sub-Hypothesis

Reformulated hypothesis : There is a statistically significant positive relationship between auditory imagery and selected physical self-attributes among male third-year secondary school students.



- $H_0$ : There is no statistically significant relationship between auditory imagery and selected physical self-attributes among male third-year secondary school students.
- $H_1$ : There is a statistically significant relationship between auditory imagery and selected physical self-attributes among male third-year secondary school students.

Table 6. Simple linear regression results for the effect of auditory imagery on physical self-attributes

R	R <sup>2</sup>	F	Sig. (F)	B	t	Sig. (t)
0.21	0.047	10.71	0.00	0.26	3.27	0.00

Source : Prepared by the researchers based on SPSS 27 output

The regression results for auditory imagery indicate a weak but statistically significant positive association with physical self-attributes. Auditory imagery explains about 4.7% of the variance in physical self-attributes, and a one-unit increase in auditory imagery is associated with an estimated increase of 0.26 units in physical self-attributes. The F and t values are statistically significant at the 0.05 level, leading to the rejection of the null hypothesis in favour of the alternative.

### 2.1.3. Third Sub-Hypothesis

Reformulated hypothesis: There is a statistically significant positive relationship between kinesthetic imagery and selected physical self-attributes among male third-year secondary school students.

- $H_0$ : There is no statistically significant relationship between kinesthetic imagery and selected physical self-attributes among male third-year secondary school students.
- $H_1$ : There is a statistically significant relationship between kinesthetic imagery and selected physical self-attributes among male third-year secondary school students.

Table 7. Simple linear regression results for the effect of kinesthetic imagery on physical self-attributes

R	R <sup>2</sup>	F	Sig. (F)	B	t	Sig. (t)
0.42	0.18	47.82	0.00	0.61	6.91	0.00

Source : Prepared by the researchers based on SPSS 27 output

The analysis reveals a moderate, statistically significant positive association between kinesthetic imagery and physical self-attributes. Kinesthetic imagery

explains 18% of the variance in physical self-attributes, making it the imagery dimension most strongly associated with these attributes in this study. A one-unit increase in kinesthetic imagery is associated with an estimated increase of 0.61 units in physical self-attributes.

2.1.4. Fourth Sub-Hypothesis

Reformulated hypothesis: There is a statistically significant positive relationship between emotional imagery and selected physical self-attributes among male third-year secondary school students.

- H<sub>0</sub>: There is no statistically significant relationship between emotional imagery and selected physical self-attributes among male third-year secondary school students.
- H<sub>1</sub>: There is a statistically significant relationship between emotional imagery and selected physical self-attributes among male third-year secondary school students.

Table 8. Simple linear regression results for the effect of emotional imagery on physical self-attributes

R	R <sup>2</sup>	F	Sig. (F)	B	t	Sig. (t)
0.35	0.12	30.25	0.00	0.47	5.50	0.00

Source : Prepared by the researchers based on SPSS 27 output

The findings indicate a statistically significant positive association between emotional imagery and physical self-attributes, with emotional imagery explaining approximately 12% of the variance in physical self-attributes. A one-unit increase in emotional imagery is associated with an estimated increase of 0.47 units in physical self-attributes. The F and t values confirm the statistical significance of the model at the 0.05 level.

2.2. Discussion

Taken together, the results of the four sub-hypotheses indicate that all examined dimensions of mental imagery—visual, auditory, kinesthetic and emotional—are positively and significantly associated with physical self-attributes among male third-year secondary school students, with varying strengths of association. The weakest associations were observed for auditory imagery, followed by visual imagery, while emotional imagery and especially kinesthetic imagery showed stronger relationships with physical self-attributes.

This pattern suggests that imagery modalities more directly linked to bodily sensations and emotional states may play a particularly important role

in shaping students' perceptions of their physical selves. The finding regarding visual imagery is consistent with research emphasising the facilitative role of visual recall of movement sequences in learning and performing complex motor skills. Fery and Morizot (2000), for example, demonstrated that both visual and kinesthetic imagery can influence the performance of skills such as the tennis serve. In the school context, students who are able to construct clear visual images of movements, exercises or game situations are likely to feel more prepared and capable, which can translate into more positive physical self-attributes.

The modest but significant association between auditory imagery and physical self-attributes aligns with studies that report the positive role of auditory cues—such as mentally hearing a coach's instructions or the sounds of the game—in enhancing athletes' self-confidence and focus. In our sample, students who frequently recall auditory cues in their minds may feel more guided and supported during physical education activities, contributing to a more positive physical self-concept.

The relatively strong association between kinesthetic imagery and physical self-attributes resonates with the notion that internally simulating the sensations of movement (e.g. muscle tension, joint positions, rhythm) helps learners to refine their motor skills, correct errors and anticipate performance demands. As adolescents progress through secondary school, their neuromuscular development and accumulated experience in physical exercise may strengthen the link between kinesthetic imagery and physical self-perceptions, as suggested in previous work on mental training and psychomotor learning (Todorović, 2008).

Similarly, the positive association between emotional imagery and physical self-attributes suggests that the ability to mentally represent and regulate emotions related to sport and physical activity may support a more positive physical self-concept. This is compatible with findings from studies such as Mahi Safian (2019), which highlight the psychological benefits of mental imagery in training programmes, including reductions in anxiety and improvements in confidence and speed-strength development.

These interpretations are also consistent with the developmental characteristics of the secondary stage. At this age, students' nervous and muscular systems are more mature, enabling them to link mental images more effectively with actual movements and emotional experiences. They show an increased capacity to perceive details of their movements, to interpret sounds and verbal cues, and to anticipate the emotions associated with success or

failure. Such characteristics may explain why mental imagery, especially in its kinesthetic and emotional forms, is meaningfully related to their perceptions of physical self-attributes.

Despite these encouraging results, several limitations of the present study must be acknowledged. First, the cross-sectional correlational design does not allow for causal inferences; we cannot conclude that mental imagery causes changes in physical self-attributes. Longitudinal or experimental studies would be needed to establish causal effects.

Second, the psychometric evidence reported for the instruments is based on a small pilot sample ( $n=10$ ), which calls for further validation studies with larger samples and more comprehensive analyses. Third, the study focused exclusively on male third-year secondary school students in a single district, which limits the generalisability of the findings to other regions, age groups or female students.

## Conclusion

The present study examined the relationships between mental imagery and selected physical self-attributes among male third-year secondary school students in the Ain Touta district. Using a descriptive, cross-sectional correlational approach and a sample of 220 students, we explored how four dimensions of mental imagery—visual, auditory, kinesthetic and emotional—are statistically associated with physical self-attributes measured by an adapted version of the PSDQ.

The main findings can be summarised as follows: there are statistically significant positive associations between each dimension of mental imagery and physical self-attributes, with kinesthetic imagery showing the strongest relationship and auditory imagery the weakest. These results suggest that students who make more frequent and more developed use of mental imagery—especially kinesthetic and emotional imagery—tend to have more positive perceptions of their physical self-attributes.

From an educational perspective, this supports the idea that mental imagery can be used as a pedagogical tool in physical education and sport to support students' physical self-concept, alongside physical practice and feedback. In particular, structured mental imagery exercises could help secondary school students to rehearse technical skills, anticipate performance situations, regulate their emotions and consolidate a more adaptive physical self-concept.

At the same time, the limitations of the design and measurement should encourage caution in interpreting the findings and stimulate further research. Future studies could extend this work by including female students and different age groups, examining the combined effects of mental imagery and physical training in longitudinal or experimental designs, and exploring the role of contextual factors—such as teacher support, peer climate and school resources—in moderating the relationships between imagery and the physical self.

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## Abstract

The aim of this field study was to examine the relationships between mental imagery and selected physical self-attributes among male third-year secondary school students. To this end, a survey was conducted in secondary schools in the Ain Touta district (Batna, Algeria). The research population comprised 395 male third-year secondary students, of whom 220 ultimately participated in the study. A descriptive, cross-sectional correlational design was adopted to describe the existing situation and analyse the data using a survey. Two instruments were administered: a sport-specific mental imagery scale adapted to the local context and a physical self-attributes scale derived from Marsh's Physical Self-Description Questionnaire (PSDQ). Data were

analysed using descriptive statistics, Cronbach's alpha coefficients and simple linear regression. The results indicated statistically significant positive associations between the dimensions of mental imagery (visual, auditory, kinesthetic and emotional) and physical self-attributes among male third-year secondary school students, with explained variance ranging from 4.7% to 18%. These findings suggest that more frequent and better-developed use of mental imagery is associated with more positive perceptions of physical self-attributes in this population, while also highlighting the need for caution in interpretation due to the cross-sectional, correlational design.

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## Keywords

Mental imagery, physical self, secondary school students, sport psychology, physical education

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## Résumé

L'objectif de cette étude de terrain est d'examiner les relations entre l'imagerie mentale et certaines caractéristiques du soi physique chez des élèves de troisième année secondaire (garçons). À cette fin, une enquête a été menée dans les lycées de la daïra d'Aïn Touta (wilaya de Batna, Algérie). La population de recherche était constituée de 395 élèves de troisième année du secondaire, dont 220 ont effectivement participé. La recherche adopte un devis descriptif corrélationnel transversal, permettant de décrire la situation existante et d'analyser les données à l'aide d'une méthode de sondage. Deux instruments ont été utilisés: une échelle d'imagerie mentale dans le domaine sportif, adaptée au contexte local, et une échelle des attributs du soi physique dérivée du Physical Self-Description Questionnaire (PSDQ) de Marsh. Les données ont été traitées à l'aide de statistiques descriptives, de coefficients alpha de Cronbach et de régressions linéaires simples. Les résultats indiquent des associations positives statistiquement significatives entre les dimensions de l'imagerie mentale (visuelle, auditive, kinesthésique et émotionnelle) et les attributs du soi physique chez les élèves de troisième année secondaire, avec des pourcentages de variance expliquée compris entre 4,7% et 18%. Ces résultats suggèrent qu'un recours plus fréquent et plus structuré à l'imagerie mentale est associé à des perceptions plus positives du soi physique dans cette population, tout en soulignant l'importance d'une interprétation prudente en raison du caractère transversal et corrélationnel du dispositif.

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## Mots-clés

Imagerie mentale, soi physique, élèves du secondaire, psychologie du sport, éducation physique

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## المخلص

تهدف هذه الدراسة الميدانية إلى فحص العلاقات الارتباطية بين التصوّر العقلي وبعض صفات الذات البدنية لدى تلاميذ السنة الثالثة ثانوي ذكور. ولتحقيق هذا الهدف، أجرينا

دراسة مسحية بثانويات دائرة عين التوتة (ولاية باتنة، الجزائر). تكوّن مجتمع البحث من 395 تلميذاً في السنة الثالثة ثانوي، شارك منهم فعلياً 220 تلميذاً في هذه الدراسة. اعتمدنا المنهج الوصفي ذي الطبيعة الارتباطية المستعرضة، نظراً لقدرته على وصف الواقع كما هو وتحليل المعطيات بالأسلوب المسحي. تم استخدام أداتين أساسيتين: مقياس التصوّر العقلي في المجال الرياضي المكثّف مع السياق المحلي، ومقياس صفات الذات البدنية المشتق من استبيان وصف الذات البدنية (PSDQ) الذي وضعه مارش وزملاؤه. عولجت البيانات باستعمال الإحصاءات الوصفية، ومعاملات ألفا كرونباخ، ومعادلات الانحدار الخطي البسيط. أظهرت النتائج وجود علاقات ارتباطية ذات دلالة إحصائية بين أبعاد التصوّر العقلي (البصري، السمعي، الحسي الحركي، والانفعالي) وبعض صفات الذات البدنية لدى تلاميذ السنة الثالثة ثانوي ذكور، مع نسب تباين مفسّرة تتراوح بين 4.7% و 18%. وتدل هذه النتائج على أنّ كثافة وجود استخدام التصوّر العقلي ترتبطان بتصوّرات أكثر إيجابية للذات البدنية لدى هذه الفئة، مع ضرورة تفسير النتائج بحذر بالنظر إلى الطبيعة المستعرضة والارتباطية للدراسة.

#### الكلمات الرئيسية

التصوّر العقلي، الذات البدنية، تلاميذ السنة الثالثة ثانوي، علم نفس الرياضة، التربية البدنية والرياضية