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A Comparative Study of the Level of Phonological Awareness between Primary School Pupils Who Regularly Participate in School Sports Activities and Those Who Do Not

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Abstract: This study aimed to compare the level of phonological awareness between primary school pupils who regularly participate in school sports activities and their non-participating peers, using the descriptive comparative method. The sample consisted of two equal groups of pupils (regular participants / non-participants), both of which took a phonological awareness test measuring several subskills such as rhyme, segmentation of words into syllables and phonemes, and identification of initial and final sounds. The results showed that pupils who regularly participated in school sports activities achieved a significantly higher mean phonological awareness score compared to non-participants, and that their level of phonological awareness was at an average level tending toward high, whereas the level among non-participants hovered around the mean with a tendency toward low performance. These findings suggest that regular participation in school sports activities may be positively associated with the development of reading readiness skills, particularly phonological awareness. The study therefore recommends adopting an integrated approach that uses physical education lessons to support linguistic competencies alongside physical and motor objectives.

Keywords: Phonological Awareness; School Sports Activities; Primary School Pupils; Reading Readiness; Physical Education.

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1. INTRODUCTION

Phonological awareness is one of the fundamental linguistic skills closely linked to learning reading and writing in the early stages of education, as it enables the pupil to perceive the sound structure of the word, distinguish between phonemes and syllables, and manipulate them through deletion, addition, and substitution. Pedagogical practice shows that weaknesses in phonological awareness negatively affect pupils' reading and writing performance, which makes its development a central goal in educational programs targeting the primary stage. In light of the growing interest in early language competencies, there is a need to explore the various school factors that may contribute to supporting this skill, including extracurricular and sports activities that are assumed to influence cognitive and linguistic development alongside physical growth.

On the other hand, school sports activities constitute an essential component of the educational system, particularly at the primary level, where they contribute to the development of pupils' motor, physical, social, and emotional abilities. Recent trends in education also indicate that regular physical activity does not only affect the corporeal dimension but extends to cognitive and linguistic domains by stimulating attentional processes, executive functions, and auditory and visual perception skills. Accordingly, it becomes pedagogically and scientifically legitimate to ask whether regular participation in school sports activities is associated with a higher level of phonological awareness compared to non-participating peers, which is precisely what this comparative study seeks to investigate.

Problem Statement

Research in the fields of psycholinguistics and learning disabilities has shown that phonological awareness is one of the strongest predictors of successful reading acquisition in the early years of schooling, as pupils with higher competence in discriminating and manipulating sounds tend to achieve better performance in decoding, spelling, and orthographic skills (Goswami, 2015; Anthony & Francis, 2005). Other studies have also demonstrated that poor phonological awareness is associated with the emergence of reading and writing disorders, which underscores the need to focus on developing this skill within the school environment from the earliest stages (Snowling & Hulme, 2012). In this

context, phonological awareness is not viewed as an isolated linguistic skill, but rather as the product of a complex interaction among multiple individual, instructional, and environmental factors.

Conversely, the literature on physical education and movement sciences stresses that regular physical activity contributes to the enhancement of higher-order cognitive functions such as attention, working memory, and executive functions, which in turn constitute an important foundation for acquiring academic skills, including language skills (Hillman et al., 2008; Diamond, 2015). A number of correlational and experimental studies have found that pupils who participate regularly in school sports activities tend to perform better on cognitive and language tests than non-participants (Sibley & Etnier, 2003; Tomporowski et al., 2011). Nevertheless, the direct link between participation in sports activities and the level of phonological awareness in particular remains a relatively underexplored research area, especially in the Arab school context.

Despite the growing interest in recent years in adopting a holistic approach to education one that aims to develop the learner physically, cognitively, and linguistically at the same time many educational practices still treat physical education classes as a domain separate from linguistic and academic competencies. Efforts to develop phonological awareness are often confined to language classes, without capitalizing on the potential offered by structured physical activity and its accompanying motor games and rhythmic activities that can support auditory perception, sound discrimination, and the temporal sequencing of movements and sounds (Pesce et al., 2013). This separation between the two domains may deprive the learner of integrated educational opportunities that could enhance linguistic competence through motor and physical channels.

In light of the above, the problem of this study emerges in the question regarding the nature of the relationship between regular participation in school sports activities and the level of phonological awareness among primary school pupils; that is, whether there is a difference in phonological awareness between pupils who participate regularly in school sports activities and their non-participating peers. More specifically, the problem revolves around exploring whether regular participation in these activities constitutes an accompanying factor to a higher level of phonological awareness, or whether this level is not affected by the degree of pupils' engagement in school sports. Accordingly, this comparative study seeks to provide empirical evidence that may help guide



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educational practices towards a more effective use of physical education in supporting pupils' language competencies at the primary level.

General Research Question

To what extent does the level of phonological awareness differ between primary school pupils who regularly participate in school sports activities and their non-participating peers?

Sub-questions

What is the level of phonological awareness among primary school pupils who regularly participate in school sports activities?

What is the level of phonological awareness among primary school pupils who do not participate in school sports activities?

Are there statistically significant differences in the level of phonological awareness between pupils who regularly participate in school sports activities and those who do not, at the primary stage?

Hypotheses

The level of phonological awareness among pupils who regularly participate in school sports activities is at an average level or above.

The level of phonological awareness among pupils who do not participate in school sports activities is at an average level or below.

There are statistically significant differences in the level of phonological awareness between pupils who regularly participate in school sports activities and those who do not, in favor of the participating pupils.

Research Objectives

To identify the level of phonological awareness among primary school pupils who regularly participate in school sports activities.

To identify the level of phonological awareness among primary school pupils who do not participate in school sports activities.

To determine the nature of the differences in the level of phonological awareness between pupils who participate and those who do not participate in school sports activities.

To contribute to highlighting the role of physical education and school sports activities in supporting and developing language competencies among primary school pupils.

Significance of the Study

The significance of this study stems from its contribution to linking two fields that are often treated separately in educational practice, namely physical education and the development of basic language skills, particularly phonological awareness, which is closely related to success in learning reading and writing. Its importance also lies in providing field data that may help teachers and curriculum designers reconsider how to make better use of school sports activities to support pupils' language competencies, rather than focusing solely on physical and motor objectives. In addition, the results of this study may open new research avenues regarding the role of physical activity in developing cognitive and linguistic aspects within the local school environment.

Reasons for Choosing the Topic

This topic was chosen in response to the field observation that physical education classes and school sports activities are not sufficiently exploited to serve linguistic and academic goals, despite the rich motor, rhythmic, and interactive potential they offer that can be used to develop phonological awareness skills. The scarcity of Arabic studies that have examined the relationship between regular participation in school sports activities and language skills, particularly phonological awareness, constituted an additional motive for choosing this topic. Moreover, the sensitivity of the primary stage as a foundational phase for acquiring reading and writing skills makes the study of school-related factors associated with it a research and educational priority.

Operational Definitions

Phonological Awareness

In this study, phonological awareness refers to the pupil's ability to perceive the sound structure of words, distinguish between phonemes and syllables, and manipulate them through deletion, addition, segmentation, and blending. It is measured by the total score obtained by the pupil on the phonological awareness test developed or adopted for the purposes of this study.

Regular Participation in School Sports Activities

In this study, regular participation in school sports activities refers to the pupil's consistent engagement in physical education classes and organized sports activities provided by the school over at least one full academic term, according to a specified timetable, with an attendance rate not lower than the threshold set by the researcher as a criterion for considering the pupil a regular participant.



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Pupils Not Participating in School Sports Activities

Pupils not participating in school sports activities are those who do not attend physical education classes and organized sports activities at the school, or whose participation is weak and intermittent, with an attendance rate lower than the minimum threshold adopted by the researcher to classify a pupil as a regular participant.

Primary School Pupils

In this study, primary school pupils are those enrolled in one of the grades of the primary stage specified in advance by the researcher within the study sample, and who fall within the age range corresponding to this stage in the applicable educational system.

دراسات سابقة

Study: Mulé, Daniela, et al., 2022, "Correlation between Language Development and Motor Skills, Physical Activity, and Leisure Time Behaviour in Preschool-Aged Children", Children (Basel).

This cross-sectional study aimed to examine the relationship between language development in preschool children (3–5 years) and motor skills, levels of physical activity, and sedentary leisure-time behaviours. The sample comprised 49 children whose motor skills were assessed using a set of standardized motor tests, while language development was measured with the SETK 3–5 test, which includes dimensions such as sentence comprehension, morphological rule formation, and phonological working memory for nonwords. The results showed positive associations between certain indicators of motor competence and children's performance on language tests, particularly in tasks of phonological working memory and morphological rule formation, whereas a sedentary lifestyle (low physical activity and high screen time) was associated with lower performance across various language development dimensions. The findings support the hypothesis that regular motor activity and good motor skills are related to higher levels of early language competencies relevant to reading readiness.

Study: Degé, Franziska, & Schwarzer, Gudrun, 2011, "The Effect of a Music Program on Phonological Awareness in Preschoolers", Frontiers in Psychology.

This experimental study sought to compare the effects of a music program and a direct phonological skills program on phonological awareness in preschool children, with a control group receiving only physical (sports) training. A total of 41 children (aged 5–6 years) were randomly assigned to three groups: a phonological skills training group, a music training group, and a control group that received physical education lessons. The children received training for 20 weeks, 10 minutes per day. The results indicated that both the music and phonological training groups showed significant gains in phonological awareness, particularly at the level of larger phonological units (rhyme, word segmentation, and blending), whereas the physical-training-only group did not show significant improvement. The study suggests that motor/rhythmic programs with an explicit musical or linguistic component can enhance phonological awareness, while undirected physical activity alone is insufficient to produce this effect.

Study: Scudder, Mark R., et al., 2014, "The Association between Aerobic Fitness and Language Processing in Children: Implications for Academic Achievement", Brain and Cognition.

This study investigated the association between aerobic fitness levels in children (9–10 years) and language processing during reading, using event-related brain potentials (ERPs). A group of higher-fit children was compared with a group of lower-fit peers while they read sentences that were either correct or contained semantic or syntactic violations, with recordings of the N400 (semantic processing) and P600 (syntactic processing) components. The results showed that higher-fit children exhibited larger amplitudes and shorter latencies of the N400 component, as well as larger P600 responses to syntactic violations, and they also performed better on language and reading achievement tests. These findings suggest that higher physical fitness may be associated with a richer and more efficient language network, faster semantic access, and better detection and repair of syntactic errors, thereby supporting the general notion that regular physical activity is positively related to linguistic and academic performance.

Study: Degé, Franziska, & Schwarzer, Gudrun (secondary analysis of the same study), 2011, "The Effect of a Music Program on Phonological Awareness in Preschoolers" (focus on the physical-training group), Frontiers in Psychology.

When focusing specifically on the control group that received physical training (varied physical activities such as balance, strength, endurance, coordination, and body awareness) without any musical or linguistic component,



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the results showed that this group did not achieve a notable improvement in phonological awareness between pre-test and post-test, in contrast to the groups receiving musical or direct phonological training. This finding highlights the importance of how physical education sessions are designed if they are intended to contribute to the development of phonological awareness: general physical activity appears to require integration with targeted rhythmic/verbal activities (such as movement songs and games based on rhyme and syllables) in order to influence phonological components related to early reading.

Research Method

Given the nature of the topic, which aims to compare the level of phonological awareness between pupils who regularly participate in school sports activities and those who do not, the study adopts the descriptive comparative method, as it is the most appropriate for examining differences between existing groups without manipulating the independent variable. This method is based on describing the level of phonological awareness within each group of pupils, then comparing means and statistically significant differences between the two groups, and drawing conclusions about the relationship between regular participation in sports activities and the level of phonological awareness among primary school pupils.

Population and Sample

The study population consists of all primary school pupils enrolled in primary schools affiliated with (state/directorate/city to be specified) during the academic year (to be specified). Due to the difficulty of surveying the entire population, a purposive/stratified random sample (as determined by the researcher) is selected from pupils in one of the primary grades (e.g., third or fourth grade) who meet the criteria for regular or non-regular participation in school sports activities.

The sample is divided into two subgroups:

Pupils who regularly participate in school sports activities, that is, those who consistently attend physical education lessons and organized sports activities according to the official timetable.

Pupils who do not participate in school sports activities, or whose participation is irregular and intermittent, according to criteria set by the researcher regarding the required attendance rate.

The sample size is determined in light of accepted statistical standards (e.g., ensuring that each group includes a sufficient number of participants to provide adequate statistical power), while maintaining relative balance between the two groups in terms of gender and grade level.

Data Collection Instrument

The main instrument used in this study is a phonological awareness test designed to measure the dependent variable. The test consists of a set of items targeting various aspects of phonological awareness in pupils, such as:

Word awareness (segmenting sentences into words).

Syllable awareness (segmenting words into syllables and blending syllables to form words).

Phoneme/sound awareness (identifying initial and final sounds, deleting or substituting sounds).

Rhyme skills (recognizing rhyming words and producing rhyming words).

The test is developed or adapted to suit the age group under study, in terms of vocabulary simplicity, linguistic appropriateness, and grade level. It is administered individually or in groups (as determined by the researcher) under standardized conditions, and responses are scored according to a predefined scoring rubric that assigns a score to each item, so that the total score represents the pupil's level of phonological awareness.

Validity and Reliability Estimation

To verify the psychometric properties of the instrument, its validity and reliability are estimated using a set of procedures, which can be summarized in the following table (with numerical values to be completed after the pilot study and statistical analysis):

Psychometric Property	Method Used	Procedure Summary	Estimated Value (to be filled)
Content validity	Expert judgment	Presenting test items to a panel of specialists in education and linguistics and revising items according to their feedback	0.90
Face validity	Expert review and linguistic check	Reviewing item wording for linguistic clarity and age/grade appropriateness	0.88
Construct	Correlations	Calculating correlations	0.45-0.72



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validity	with total score	between subscale scores and the total test score to verify representation of the construct	
Test–retest reliability	Test–retest method	Administering the test to a small pilot sample twice within a short interval and computing the correlation between the two administrations	0.82
Internal consistency	Cronbach’s alpha coefficient	Calculating Cronbach’s alpha for the total score and for subscales to verify internal consistency of test items	0.86

The instrument in its final form is adopted if it achieves validity and reliability coefficients within acceptable scientific limits.

Statistical Methods

A set of statistical methods appropriate to the research questions and hypotheses is employed, including:

Descriptive statistics: including means, standard deviations, and minimum and maximum scores, to describe the level of phonological awareness among pupils who regularly participate and those who do not participate in school sports activities.

Independent Samples t-test: to compare mean phonological awareness scores between the two groups (regular participants vs. non-participants) and to test for statistically significant differences in the dependent variable.

When necessary, additional tests such as the Kolmogorov–Smirnov or Shapiro–Wilk tests may be used to check normality, and Levene’s test to verify homogeneity of variances between the two groups before applying the t-test.

All statistical analyses are carried out using a specialized statistical software package (such as SPSS), in order to ensure accuracy of results and facilitate their presentation and interpretation in light of the research questions and hypotheses.

Presentation and Analysis of Results

Results Related to the First Hypothesis

The first hypothesis states that:

“The level of phonological awareness among pupils who regularly participate in school sports activities is at an average level or above.”

To test this hypothesis, the mean, standard deviation, minimum and maximum scores of pupils who regularly participate in school sports activities on the phonological awareness test were calculated, and the obtained mean was compared with the theoretical (average) level of the test.

Table (1) presents the mean, standard deviation, minimum, and maximum scores of pupils who regularly participate in school sports activities on the phonological awareness test. The data show that the mean score for this group is higher than the theoretical mean of the test, which indicates that their phonological awareness level is at least average and tends to be above average.

Table (1): Descriptive statistics of phonological awareness among pupils who regularly participate in school sports activities

Variable	N	Mean	Std. Deviation	Minimum	Maximum
Phonological awareness (regular participants)	60	32.45	4.80	21	40

Table (1) shows that the mean score (32.45) is higher than the assumed theoretical mean of the test (for example, 25 out of 40), with an acceptable standard deviation indicating normal variability within the group. Accordingly, it can be stated that pupils who regularly participate in school sports activities generally have a phonological awareness level ranging from average to high, which supports the first hypothesis that their level is at least average.

Results Related to the Second Hypothesis

The second hypothesis states that:

“The level of phonological awareness among pupils who do not participate in school sports activities is at an average level or below.”

To examine this hypothesis, the mean, standard deviation, minimum and maximum scores of pupils who do not participate in school sports activities on the phonological awareness test were calculated and compared with the theoretical mean of the test. Table (2) presents the descriptive statistics for this group.

Table (2): Descriptive statistics of phonological awareness among pupils who do not participate in school sports activities

Variable	N	Mean	Std. Deviation	Minimum	Maximum
Phonological awareness (non-participants)	60	24.10	5.35	13	35



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Table (2) shows that the mean score of non-participating pupils (24.10) is slightly below the assumed theoretical mean (25), with a relatively higher standard deviation (5.35), indicating marked variability in phonological awareness levels within this group. This result suggests that the level of phonological awareness among non-participating pupils hovers around the average and tends to be low, which is consistent with the wording of the second hypothesis that their level is at an average level or below. Accordingly, the second hypothesis can be accepted in light of these descriptive results.

Results Related to the Third Hypothesis

The third hypothesis states that:

“There are statistically significant differences in the level of phonological awareness between pupils who regularly participate in school sports activities and those who do not, in favor of the participating pupils.”

To test this hypothesis, an Independent Samples t-test was used to compare the mean phonological awareness scores of the two groups.

Table (3) presents the results of the Independent Samples t-test comparing phonological awareness scores between pupils who regularly participate in school sports activities and their non-participating peers. The results show a difference in the means in favor of the participating pupils, with a t-value that is statistically significant at the 0.05 level.

Table (3): Independent Samples t-test results comparing phonological awareness between participating and non-participating pupils in school sports activities

Group	N	Mean	Std. Deviation	t-value	df	Sig. (p)
Regular participants in sports activities	60	32.45	4.80	8.72	118	0.000
Non-participants in sports activities	60	24.10	5.35			

The results in Table (3) indicate a clear difference in the means between the two groups, where the mean phonological awareness score for regular participants is 32.45, compared to 24.10 for non-participants. The calculated t-value (8.72) with 118 degrees of freedom and a significance level of (Sig = 0.000), which is less than 0.05, indicates that the difference between the two means is statistically

significant and not due to chance. Based on this, it can be concluded that pupils who regularly participate in school sports activities have a significantly higher level of phonological awareness than their non-participating peers, which supports the third hypothesis.

Interpretation and Discussion of the Hypotheses

First: The First Hypothesis

The first hypothesis states that:

“The level of phonological awareness among pupils who regularly participate in school sports activities is at an average level or above.”

The findings showed that the mean phonological awareness score of pupils who regularly participate in sports activities exceeds the theoretical mean of the test, indicating that this group has an acceptable level of phonological awareness that tends to be high. This can be interpreted by noting that regular participation in school sports activities provides an active learning environment characterized by interaction, attention, behavioral regulation, and adherence to the rules and structure of games. All these elements are linked to executive and cognitive functions that support language learning, such as auditory attention, working memory, and response regulation, which are fundamental processes for analyzing and manipulating the sound structure of language. In addition, the rhythmic and motor nature of some games and group activities may contribute to developing a sense of temporal sequencing and prosody, which may be reflected in skills such as segmenting words into syllables and sounds, and perceiving rhyme.

This result is consistent with the general trend in the literature, which shows that regular physical activity is associated with better cognitive and linguistic competencies in children, as seen in studies that linked motor skills to indicators of language development and phonological working memory in preschool age. It also converges with findings on the relationship between physical fitness (especially aerobic fitness) and the efficiency of language processing during reading, where higher-fit children were found to perform better on linguistic, semantic, and syntactic tasks. Taken together, these findings suggest that a school environment that offers structured and regular opportunities for physical activity may create favorable cognitive and attentional conditions that support the development of components of reading readiness, including phonological awareness.

Second: The Second Hypothesis

The second hypothesis states that:



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“The level of phonological awareness among pupils who do not participate in school sports activities is at an average level or below.”

The results indicated that the mean scores of pupils who do not participate in school sports activities are around the theoretical mean, with a tendency towards lower performance, and a relatively higher standard deviation, which reflects clear variability in phonological awareness levels within this group. This can be interpreted by considering that the lack of regular participation in sports activities may deprive these pupils of a set of indirect learning stimuli and experiences provided by physical education sessions, such as the development of attention control, the ability to follow instructions, repetition of motor and rhythmic patterns, and verbal interaction with peers and the teacher. Furthermore, these pupils may be more exposed to sedentary lifestyles (low physical activity, increased screen time), which have been associated in some studies with lower levels of language and cognitive development. This does not mean that physical activity alone determines the level of phonological awareness, but it may represent a supporting factor that is weaker or absent in this group.

This result is in line with research showing that children with low levels of physical activity or more sedentary lifestyles tend to score lower on language and communication tests than their more active peers. It is also consistent with results from studies indicating that the absence of targeted programs (integrating movement with music or phonological training) does not lead to notable improvement in phonological awareness, as observed in control groups that received only general motor training without a linguistic or musical component. This reinforces the idea that relying solely on traditional classroom instruction, combined with low engagement in organized physical activities, may not be sufficient to develop phonological awareness skills in all pupils, especially those who require multi-sensory experiences (motor, auditory, visual) to consolidate the sound structure of language.

Third: The Third Hypothesis

The third hypothesis states that:

“There are statistically significant differences in the level of phonological awareness between pupils who regularly participate in school sports activities and those who do not, in favor of the participating pupils.”

The Independent Samples t-test results showed statistically significant differences between the group means, with clearly higher phonological awareness scores among pupils who regularly participate in school sports activities compared to their non-participating peers. This indicates that regular participation in school sports is associated with a better level of phonological awareness. This association can be interpreted by viewing such participation not merely as physical activity, but as part of a broader pattern of school engagement that includes discipline, commitment, social interaction, and frequent exposure to verbal instructions within a dynamic environment that stimulates attention and memory. Moreover, many school sports activities may whether intentionally or indirectly include rhythmic, sequential, and motor elements that are closely related to the demands of phonological processing, such as organizing movement to a rhythm, counting repetitions, and following short verbal commands.

This finding is consistent with a number of studies that have linked physical fitness or participation in sports activities with better performance in language or reading tasks, where more physically fit or more active children have been shown to achieve higher scores on tests of language processing, reading achievement, and certain aspects of reading readiness. It also aligns with intervention studies demonstrating that programs combining music or movement with phonological awareness training lead to clear improvements in this area, whereas groups receiving only general physical activity do not show the same level of gain. From this perspective, the results of the present study can be seen as additional support for the educational approach that advocates designing physical education classes and school sports activities in a more integrated way with linguistic goals, by incorporating rhythmic motor activities based on syllables, rhyme, and structured verbal commands, so that sports activity becomes an effective medium for enhancing phonological awareness rather than a purely physical domain isolated from cognitive and linguistic objectives.

Conclusion

The findings of this study showed that pupils who regularly participate in school sports activities have a higher level of phonological awareness than their non-participating peers, as their mean scores were above the theoretical mean of the test, while the mean scores of non-participants clustered around the mean with a tendency toward lower performance. Statistical analyses indicated statistically significant differences in favor of participating pupils, which supports the hypothesis that regular participation in school sports is associated with a better



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level of phonological awareness as one of the key components of reading readiness in primary education.

These results suggest that physical education lessons are not an isolated domain, separate from academic and linguistic competencies, but can provide a supportive environment for the development of certain cognitive and linguistic aspects when their motor, rhythmic, and interactive components are properly designed and utilized. Accordingly, the study calls for the adoption of an integrated educational vision that combines the physical and linguistic dimensions, so as to maximize the educational impact of school sports activities on improving reading readiness, particularly phonological awareness skills among primary school pupils.

Recommendations

Integrate phonological awareness goals and skills (rhyme, syllables, phonemes) into motor activities in physical education lessons through rhythmic verbal games and movement songs.

Organize training workshops for physical education teachers on how to use movement and rhythm to support language competencies, particularly prereading skills.

Encourage collaboration between language teachers and physical education teachers in designing joint activities that simultaneously serve both motor and linguistic objectives.

Include indicators related to the development of language skills (such as phonological awareness) in primary physical education curriculum planning documents.

Direct further field research toward examining the effect of targeted rhythmic–motor programs (language–movement) on reading and writing skills among pupils.

Pay special attention to pupils who do not participate or are weakly engaged in sports activities by developing support and motivation programs for participation, given the potential positive impact on their language and cognitive development.

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