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Research Article ♪ Araştırma Makalesi

The impact of Orff-Schulwerk supported movement and dance activities on the musical skills of preschool children

Orff-Schulwerk destekli hareket/dans çalışmalarının okul öncesi dönem öğrencilerinin müzikal becerilerine etkisi

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ABSTRACT

This study was conducted to observe the impact of Orff-Schulwerk pedagogy-supported movement and dance activities on students' musical skills. The study group consisted of 15 preschool students aged 5-6 years. Data were collected through the "Observation Form for the Effects of Orff-Schulwerk Pedagogy-Supported Movement/Dance Activities on Musical Skills of Preschool Students", developed by the researcher. An Educational Programme was designed by the researcher for the data collection process. The musical concepts targeted for student acquisition in this program included: the ability to perceive pitch differences (high/low sounds), the ability to understand the concept of duration in music (musical memory), the ability to understand the concept of tempo in music (fast/slow), the ability to understand the concept of form in music (identifying a musical phrase), developing rhythmic skills (ability to move rhythmically), the ability to perceive nuance differences (piano/forte), and the ability to perform rhythmic and melodic improvisation in accordance with a given theme. A single-group pre-test/post-test design was employed. The Wilcoxon Signed-Rank Test was used to determine the difference between pre-test and post-test results. An 8-week experimental design was employed, featuring a 6-week educational intervention during which movement and dance-integrated Orff-Schulwerk activities were conducted with 15 students in the sample. The results of the study indicated that Orff-Schulwerk pedagogy-supported movement and dance activities did not lead to a statistically significant improvement in the ability to perceive nuance differences and performing narrative thematic rhythmic improvisation. However, a statistically significant development was identified in the ability to perceive pitch differences, the ability to understand the concepts of duration, tempo, and form, the development of rhythmic skills, and the ability to perform general rhythmic and melodic improvisation.

Keywords: Orff-Schulwerk, preschool music education, creative dance, musical skills, movement-based learning

ÖZ

Bu araştırma, Orff-Schulwerk pedagojisi destekli hareket/dans çalışmalarının öğrencilerin müzikal becerilerine etkisini gözlemlemek amacıyla gerçekleştirilmiştir. Araştırmanın çalışma grubunu okul öncesi dönem 5-6 yaş arası 15 öğrenci oluşturmaktadır. Araştırmanın verileri araştırmacı tarafından geliştirilen "Orff-Schulwerk Pedagojisi Destekli Hareket/Dans Çalışmalarının Okul Öncesi Dönem Öğrencilerinin Müzikal Becerilerine Etkisi Gözlem Formu" aracılığıyla toplanmıştır. Araştırmanın veri toplama sürecinde uygulanmak üzere, araştırmacı tarafından bir Eğitim Programı hazırlanmıştır. Bu program ile öğrencilerde kazanılması hedeflenen müzikal kavramlar: Ses yüksekliklerini fark etme becerisi (ince/kalın

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Bu makale, Ezgi Tatar'ın Gökay Yıldız ve Banu Özevin danışmanlığında yürüttüğü "Orff-Schulwerk pedagojisi destekli hareket/dans çalışmalarının okul öncesi dönem öğrencilerinin müzikal becerilerine etkisi" başlıklı yüksek lisans tezinden üretilmiştir.

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ses), müzikte süre kavramını anlama becerisi (müzikal bellek), müzikte tempo kavramını anlama becerisi (hızlı/yavaş), müzikte form kavramını anlama becerisi (bir müzikal cümleyi anlayabilme), ritimsel becerileri geliştirme (ritmik hareket edebilme), nüans farklılıklarını fark edebilme (piano/forte), verilen temaya uygun ritmik ve melodik doğaçlama yapabilmedir. Araştırmada öntest-sontest tek gruplu model kullanılmıştır. Öntest ve sontest sonuçları arasındaki farkı tespit etmek üzere Wilcoxon işaretli sıralar testi kullanılmıştır. Araştırma, 6 haftalık eğitimsel müdahale sürecini kapsayan toplam 8 haftalık deneysel bir tasarımda yürütülmüş, bu süreçte örneklemi oluşturan 15 öğrenci ile hareket ve dans temelli Orff-Schulwerk çalışmaları gerçekleştirilmiştir. Araştırmanın sonucunda, Orff-Schulwerk pedagojisi destekli hareket/dans çalışmalarının okul öncesi dönem öğrencilerinin müzikte nüans farklılıklarını fark etme ve öyküsel tematik ritmik doğaçlama yapabilme becerilerinde istatistiki olarak anlamlı bir gelişme görülmemiş; ses yüksekliklerini fark etme becerisi, süre kavramını, tempo kavramını ve form kavramını anlama becerisi, ritimsel becerileri geliştirme, genel ritmik ve melodik doğaçlama yapabilme becerilerinin istatistiki olarak anlamlı düzeyde geliştiği tespit edilmiştir.

Anahtar kelimeler: Orff-Schulwerk, okul öncesi müzik eğitimi, yaratıcı dans, müzikal beceriler, hareket-temelli öğrenme

1. INTRODUCTION

Early childhood represents a critical window for cognitive, emotional, and social development, with the developmental environment significantly shaping the brain's foundational architecture (Center on the Developing Child, 2023). During this period, children rapidly acquire the core competencies that define their future learning trajectories and social interactions (UNESCO, 2021). Engagement with music, in particular, fosters interconnected gains across cognitive, motor, and social domains, highlighting its profound value in early development (Hallam, 2010). Furthermore, musical engagement serves as a vital bridge between cognitive maturation and cultural expression, integrating diverse pedagogical perspectives to promote holistic growth (Andang'o & Mugo, 2007; Hallam, 2010). By offering a unique platform for creative exploration, emotional expression, and social collaboration, music becomes an indispensable component of early childhood education (Goodkin, 2013; Uçan, 2003).

Among the diverse pedagogical frameworks in early childhood music education, Orff-Schulwerk emerges as a particularly effective methodology. Developed in the 1920s by German composer Carl Orff in collaboration with Gunild Keetman, this approach prioritizes active, experiential learning through the integration of music, movement, speech, and play. In contrast to traditional music education—which frequently emphasizes passive listening and technical proficiency—Orff-Schulwerk invites children to engage directly in music-making through physical movement, improvisation, and creative expression. This holistic pedagogy is grounded in the conviction that music education should be a joyful, engaging, and child-centered process that mirrors the innate ways in which children play and interact. Furthermore, contemporary research continues to highlight the efficacy of the Orff approach in fostering children's creativity and collaborative skills, thereby enhancing both their musical literacy and broader personal development (Sangiorgio, 2020).

The efficacy of Orff-Schulwerk pedagogy in early childhood music education is well-established, however, its impact extends beyond songs and percussion, rooted in Carl Orff's concept of 'elemental music'. This natural and bodily approach invites children to engage with music using every sense and limb. Central to this is purposeful movement and dance, which transform daily motions into expressive actions. When analyzed through space, time, and energy, movement becomes a vital developmental resource, comparable to the life-sustaining force of breathing (Fernandes, 2014). Consequently, dance serves as the meaningful shaping of this raw material for self-expression (Exiner & Lloyd, 1987; Joyce, 1994). In Orff-Schulwerk, creative movemet/dance activities allows preschoolers to develop their own movement vocabulary, uniting mind, body, and emotion through kinesthetic mastery. Empirical evidence suggests that integrating these activities enhances pitch perception, rhythmic accuracy, musical memory, and improvisational creativity (Bradley, 2009; Kayili & Kuşcu, 2020).

1.1. Movement and Dance Education

Movement and dance are often used interchangeably, yet they are distinct in their expressive intent. While daily motions often become unconscious habitual patterns, dance requires a heightened awareness of the body as a holistic entity, transforming physical movement into a conscious, embodied experience (Anttila, 2015). As the primary raw material of dance, movement serves as a fundamental developmental resource, comparable in its vital force to the act of breathing (Fernandes, 2014). Beyond its physical dimension, movement encompasses instrumental, exploratory, social, and personal domains, facilitating a child's intellectual and emotional growth (Haselbach, 2016; Joyce, 1994). When this raw movement is shaped into dance, it transcends mere motion to become a live art form that integrates the physical, cognitive, and

affective aspects of human experience (Lin, 2005). Within the scope of early childhood education, creative dance—or modern educational dance—emerges as the most suitable form, as it prioritizes natural movement over standardized techniques (Stinson, 1988). By allowing children to craft their own movement vocabulary, creative dance fosters a unique learning process that unites mind, body, and soul through imaginative exploration (Gilbert, 1992; Joyce, 1994).

1.2. Movement and Dance Education in Orff-Schulwerk Pedagogy

In Orff-Schulwerk pedagogy, movement and dance are regarded as fundamental tools for musical expression and communication. This approach is rooted in the concept of internal rhythm, where the heartbeat serves as an individual's first rhythmic experience, finding its expression through bodily motion. According to Günther (2011), the fundamental movement types required for daily life—such as walking, running, and jumping—develop naturally in childhood, driven by an innate urge to move. Movement serves as the center of all experiences, facilitating self-perception and fostering a connection with the external world (Haselbach, 2011). Within this pedagogy, dance is interpreted not as a standardized style, but as an 'elevated form of everyday movement' that transcends ordinary activity to become a joyful and artistic expression (Haselbach, 2011). Haselbach (2016) further categorizes the role of movement in Orff-Schulwerk into several dimensions, including physical and mental warm-ups, the experiential learning of musical parameters (time, space, energy, and form), movement improvisation, and the creation of choreography. Moreover, the effectiveness of these activities is influenced by critical factors such as the group's readiness, the central role of play as a catalyst for movement in children, and the principle of 'didactic reduction,' which ensures that complex themes remain accessible without losing their structural integrity (Jungmair, 2003; Orff, 2003) Ultimately, Orff-Schulwerk emphasizes a process-oriented approach, prioritizing the child's exploratory journey and social interaction over the pressure of a final performance.

Despite the strong theoretical link between bodily movement and musical cognition, empirical research quantifying the transfer of structured creative dance sequences to discrete musical skills remains limited. While existing literature primarily focuses on rhythmic synchronization, the impact of these holistic interventions on higher-level components such as melodic direction (pitch), nuance sensitivity (dynamics), and improvisation (musical composition) remains an under-explored area. Therefore, it is essential to evaluate how movement-integrated strategies, when embedded within the Orff-Schulwerk framework, translate into measurable gains in early musical literacy and to address this gap with evidence-based data.

1.3. The Purpose of the Study

The primary objective of this study is to investigate the impact of an Orff-Schulwerk-supported movement and dance program on the musical skills of preschool children. In alignment with this objective, the central research question is: "What are the effects of movement and dance activities based on Orff-Schulwerk pedagogy on the development of musical skills in preschool children?" To address this problem, the following sub-questions were examined:

Does the Orff-Schulwerk-supported movement and dance program significantly affect:

- The ability to perceive pitch differences?
- The development of rhythmic skills?
- The understanding of the concept of tempo?
- The ability to differentiate musical nuances?
- The understanding of the concept of duration in music?
- The understanding of the concept of musical form?
- The ability to perform rhythmic improvisation?
- The ability to perform melodic improvisation?
- The overall musical skill scores as measured by the validated observation form?

1.4. Importance of the Study

As every child is born with an innate interest in music and movement, it is a key responsibility of educators to uncover and nurture this potential. The Orff-Schulwerk approach adopts a holistic view of the human experience, aiming to develop individuals who can actively engage in singing, moving, playing instruments, and improvising. Through movement and dance—core elements of this pedagogy—children can holistically experience and learn the shared parameters of music and dance, including time, dynamics, energy, space, and form (Haselbach, 2016).

While these theoretical connections are well-established, there is a lack of empirical research that quantifies the impact of such interventions on specific musical competencies in early childhood. This study addresses this gap by examining targeted musical acquisitions, including: the perception of pitch differences (high/low), the understanding of duration (musical memory), tempo (fast/slow), and form (identifying musical phrases); the development of rhythmic skills; the perception of nuance (piano/forte); and the ability to perform rhythmic and melodic improvisation. By addressing the research questions related to these specific parameters, the study provides evidence-based insights into how movement and dance activities within the Orff-Schulwerk framework support the development of students' musical perceptions.

1.5. Limitations

This study has several primary limitations regarding its methodology and scope. First, the absence of a control group in the single-group pre-test/post-test design limits the ability to isolate the observed gains from other external developmental factors. Second, the limited sample size (N=15) reduces the statistical power of the findings and restricts the generalizability of the results to the broader preschool population. However, maintaining a small cohort was a pedagogical necessity to ensure instructional fidelity and allow for high-quality individual observation during the intensive Orff-Schulwerk sessions. Furthermore, the research is limited to the specific competencies measured by the "Observation Form for the Effects of Orff-Schulwerk Pedagogy-Supported Movement/Dance Activities on Musical Skills of Preschool Students" and the six-week instructional design developed by the researcher. These constraints highlight the pilot nature of the study and underscore the need for future research involving larger samples and control group comparisons.

2. METHOD

2.1. Research Design

This study employed a single-group pretest-posttest quasi-experimental design, a quantitative research methodology used to observe developmental changes within a specific cohort (Karasar, 2022). In this model, measurements of the dependent variable are obtained through the same measurement instruments both before (pretest) and after (posttest) the experimental intervention (Büyüköztürk et al., 2022). This design was specifically chosen to determine the direct impact of the 6-week Orff-Schulwerk-based movement and dance program on the participants' musical skills during an 8-week experimental period (encompassing Week 1 for pre-test, Weeks 2–7 for implementation, and Week 8 for post-test).

2.2. Participants

The study group consisted of 15 children aged 5 to 6 years (N=15) during the 2024-2025 academic year. The participants were selected through convenience sampling, a method frequently utilized for its accessibility and suitability for pilot pedagogical interventions (Büyüköztürk et al., 2022). While 20 students initially began the program, 5 were excluded from the final analysis due to inconsistent attendance to maintain the integrity of the data, resulting in a final sample of 15 students (9 males, 6 females). Prior to the intervention, it was confirmed that none of the participants had previous formal exposure to Orff-Schulwerk pedagogy or professional dance training. The choice of a relatively small sample size was intentional, as the intensive and interactive nature of Orff-Schulwerk sessions requires high levels of individual observation, instructional fidelity, and qualitative depth. As a pilot pedagogical intervention, this cohort size allowed the researcher to monitor individual developmental changes more precisely during the 6-week intervention.

2.3. Data Collection Tools: Development and Validation

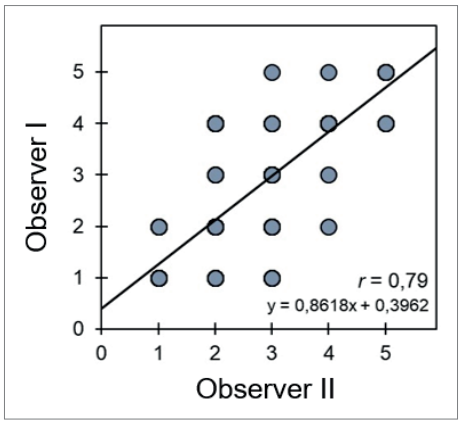
The primary data collection instrument used in this study was the "Observation Form for the Impact of Orff-Schulwerk Pedagogy Supported Movement Activities on Musical Skills," which was developed by the researcher. The development and structural validation of the tool followed a rigorous multi-stage process. Initially, in the item generation and pilot testing stage, trials were conducted with a separate group of 10 children of varying ages to ensure that the observation items were age-appropriate and clear. Following these trials, the form was submitted for content validity review by three expert music educators specializing in Orff-Schulwerk pedagogy to ensure professional and academic rigor. Based on the expert feedback received, two items were revised to enhance their structural clarity. The final version of the form was structured to assess eight key musical competencies, namely: (1) pitch perception, (2) musical duration/memory, (3) tempo recognition, (4) form comprehension, (5) rhythmic ability, (6) nuance perception, (7) rhythmic improvisation, and (8) melodic improvisation.

2.3.1. Reliability and Validity of the Observation Form

To ensure the scientific rigor of the instrument, both reliability and construct validity were assessed. The internal consistency of the eight-item observation form yielded a Cronbach's alpha coefficient of $\alpha=0.52$ for the post-test scores. While this value reflects the multidimensional nature of musical skills in early childhood, the instrument's primary reliability was established through inter-rater consistency. All sessions were independently evaluated by two researchers, and the Pearson correlation coefficient was found to be $r=0.79$, indicating a high level of objectivity and scoring consistency (Fig. 1).

Figure 1

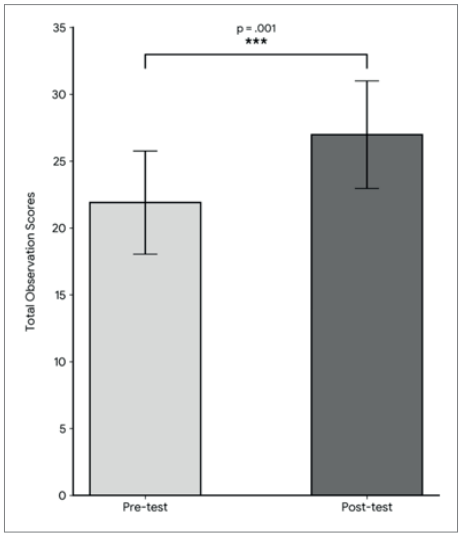
Scatter plot illustrating agreement between the two independent raters. Each point represents an individual child's total score on the Observation Form for Assessing the Impact of Orff-Schulwerk Pedagogy on Musical Skills. Scores assigned by Observer-I are plotted on the y-axis and those by Observer-II on the x-axis. The fitted regression line and Pearson correlation coefficient (r = 0.79) indicate strong inter-rater reliability, supporting the consistency of the scoring after content validation and pilot refinement



Furthermore, the construct validity of the form was confirmed by its ability to differentiate between pre-test and post-test performance levels. The instrument successfully captured the significant developmental progress of the participants (N=15) following the intervention ($p<.001$), as illustrated in the comparison of total observation scores (Fig. 2). These psychometric findings suggest that the observation form is a reliable and valid tool for assessing the impact of Orff-Schulwerk-based movement activities on musical skills.

Figure 2

Comparison of total observation scores between pre-test and post-test (N=15). Error bars represent standard deviations. The difference between assessments is statistically significant at the p<.001 level



2.4. The Intervention Process

The researcher, acting as a participant-observer, implemented a program based on the principles of Orff-Schulwerk Elemental Music and Movement Education. The program used a movement and dance-integrated approach, incorporating rhythmic speech and body percussion to foster holistic musical growth. The 8-week experimental period was structured as follows:

- Phase I (Week 1): Pre-test administration through individual 10-minute video-recorded interviews.
- Phase II (Weeks 2–7): A six-week instructional intervention consisting of 45-minute weekly sessions. The intervention followed structured lesson plans developed by the researcher (e.g., 'The Yellow Ball,' 'The Magic Rope,' 'The Little Rabbit'), each specifically designed to scaffold core musical concepts through kinesthetic exploration and creative movement.
- Phase III (Week 8): Post-test administration using the same observation form.

2.5. Data Analysis

Quantitative data were analyzed using IBM SPSS Statistics 20. Given the small sample size (N=15), the Wilcoxon Signed-Rank Test, a non-parametric procedure for comparing paired scores, was utilized (Büyüköztürk et al., 2022). Qualitative data from teacher diaries and field notes were used to support and triangulate the quantitative findings in the Discussion section. The significance level for all statistical operations was set at p<.05.

2.6. Ethical Approval of the Study

In this study, all the rules specified within the scope of the "Higher Education Institutions Scientific Research and Publication Ethics Directive" have been followed. None of the actions listed under the second section of the directive, titled "Violations of Scientific Research and Publication Ethics," have been committed. Additionally, this study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. Written informed consent was obtained from the parents of the participants, specifically covering the use of video recordings for academic analysis. Ethics committee permission information:

- Name of the committee that conducted the ethical assessment: Mehmet Akif Ersoy University, Ethics Committee of the Institute of Educational Sciences
- Date of the ethical assessment decision: 08.07.2024
- Ethics assessment document number: Meeting No: 2024/07, Decision No: GO 2024/386 (Document Date: 25.07.2024)

3. FINDINGS

3.1. Findings Regarding the Effect on Pitch Perception and Expression Skills

Table 1

Wilcoxon signed-rank test results for pitch perception and expression skills

Post-test-Pre-test	N	Mean Rank	Sum of Rank	z	p
Negative Ranks	0	.00	.00	-2.04	.041*
Positive Ranks	5	3.00	15.00		
Ties	10				

*p < .05

Table 1 indicates that the post-test scores (Mean Rank = 3.00) were significantly higher than the pre-test scores (Mean Rank = .00), with $z=-2.04$ and $p=.041$. This result shows a statistically significant improvement in students' ability to perceive and express pitch differences.

Qualitative observations from field notes and teacher journals further elucidate these quantitative gains. During the 'Magic Rope' (Sihirli İp) activity (Week 4), students initially struggled to internalize melodic contours. However, as they raised or lowered the rope to represent vertical pitch changes, their vocal accuracy and phrasing improved significantly. This tactile-kinesthetic interaction transformed the abstract concept of pitch into a concrete spatial experience.

3.2. Findings Regarding the Effect on Rhythmic Skills

Table 2

Wilcoxon signed-rank test results for rhythmic skills

Post-test-Pre-test	N	Mean Rank	Sum of Rank	z	p
Negative Ranks	0	.00	.00	-2.41	.016*
Positive Ranks	7	4.00	28.00		
Ties	8				

*p < .05

According to Table 2, the post-test scores significantly increased compared to pre-test scores ($z=-2.41$, $p=.016$). This suggests that the movement-integrated intervention significantly enhances the rhythmic repetition abilities of the participants.

Observational data from teacher diaries highlight that rhythmic synchronization improved notably when children used the 'Yellow Ball' (Sarı Top) metaphor. Initially, many students' steps were erratic and disconnected from the pulse; however, by Week 5, they were able to collectively adjust their walking pace to match the steady beat of the percussion, demonstrating a transition from mechanical movement to internalized rhythm.

3.3. Findings Regarding the Understanding of Tempo

Table 3

Wilcoxon signed-rank test results for tempo recognition

Post-test-Pre-test	N	Mean Rank	Sum of Rank	z	p
Negative Ranks	0	.00	.00	-2.23	.026*
Positive Ranks	6	3.50	21.00		
Ties	9				

*p < .05

The analysis in Table 3 indicates a statistically significant difference (p=.026), confirming that the intervention positively impacted the students' ability to maintain rhythm in accordance with a given tempo.

During tempo variation exercises, students synchronized their movements more accurately when speed was associated with the 'Little Rabbit' (Minicik Bir Tavşan) activity. By experiencing the rabbit's fast-small and slow-large leaps, children embodied the pulse.

3.4. Findings Regarding the Differentiation of Musical Nuance

Table 4

Wilcoxon signed-rank test results for nuance differentiation

Post-test-Pre-test	N	Mean Rank	Sum of Rank	z	p
Negative Ranks	0	.00	.00	-1.84	.066*
Positive Ranks	4	2.50	10.00		
Ties	11				

*p < .05

As shown in Table 4, no statistically significant difference was observed (z=−1.84,p=.066). The results suggest that the students' ability to differentiate piano/forte dynamics did not show significant improvement within the study period.

Teacher journals noted that while children could identify loud and soft sounds verbally, they struggled to translate these into controlled physical energy. Observation notes indicate that most participants continued to move with a consistent moderate intensity regardless of the musical volume, which explains the lack of statistical significance in this specific parameter.

3.5. Findings Regarding the Perception of Duration in Music

Table 5

Wilcoxon signed-rank test results for the perception of duration in music

Post-test-Pre-test	N	Mean Rank	Sum of Rank	z	p
Negative Ranks	0	.00	.00	-2.04	.041*
Positive Ranks	5	3.00	15.00		
Ties	10				

*p < .05

As indicated in Table 5, the post-test scores (Mean Rank = 3.00) were significantly higher than the pre-test scores (Mean Rank = .00), with z=−2.04 and p=.041. This result shows a statistically significant improvement, suggesting that the Orff-Schulwerk-supported program effectively enhances preschool students' ability to perceive and identify the conclusion of musical phrases.

Field notes emphasize that students followed musical cues more attentively as temporal markers. During the "Magnet Game" in the "Cotton and Butterfly" lesson, the synchronization of body percussion from feet to head with the ascending C-major scale played on the kalimba demonstrates that the children were able to physically anticipate the conclusion of a musical phrase.

3.6. Findings Regarding Form Recognition

Table 6

Wilcoxon signed-rank test results for musical form comprehension

Post-test-Pre-test	N	Mean Rank	Sum of Rank	z	p
Negative Ranks	0	.00	.00	-2.39	.017*
Positive Ranks	7	4.00	28.00		
Ties	8				

*p < .05

Table 6 indicates a statistically significant gain in form recognition (p=.017), demonstrating that students improved in identifying musical phrases through movement.

Qualitative evidence from process-based observations confirms these quantitative gains in spatial and structural awareness. During the intervention, students demonstrated an increasing ability to identify musical changes through movement; when the music transitioned from Section A to Section B, they successfully adjusted their direction or formation without verbal prompts.

3.7. Findings Regarding Rhythmic Improvisation Skills

Table 7

Wilcoxon signed-rank test results for rhythmic improvisation skills

Post-test-Pre-test	N	Mean Rank	Sum of Rank	z	p
Negative Ranks	0	.00	.00	-2.54	.011*
Positive Ranks	8	4.50	36.00		
Ties	7				

*p < .05

As indicated in Table 7, the post-test scores (Mean Rank = 4.50) were significantly higher than the pre-test scores (Mean Rank = .00), with z=−2.54 and p=.011. This statistically significant improvement suggests that the intervention successfully enhanced students' ability to produce original rhythmic structures using various timbres within a specific duration.

Qualitative data from teacher journals support these findings, highlighting the transition from physical exploration to creative expression. During the Week 6 rhythmic improvisation session, students who were initially hesitant to lead began using their entire bodies to propose patterns. One student remarked, "My feet find the rhythm first, then my hands do the clapping," illustrating how the movement-integrated approach facilitates the transition from physical sensation to rhythmic awareness.

3.8. Findings Regarding General Rhythmic Improvisation

Table 8

Wilcoxon signed-rank test results for general rhythmic improvisation

Post-test-Pre-test	N	Mean Rank	Sum of Rank	z	p
Negative Ranks	0	.00	.00	-2.20	.028*
Positive Ranks	9	5.39	48.50		
Ties	6				

*p < .05

Beyond general rhythmic production, students were also assessed on their ability to improvise in alignment with a specific theme. Table 8 shows that post-test scores (Mean Rank = 5.39) were significantly more positive than pre-test scores (z=−2.20,p=.028). This indicates that the Orff-Schulwerk-supported activities significantly improved children's capacity to integrate nuances and rhythmic variety into a contextually appropriate improvisation.

Qualitative observations from the "Collective Mirror" (Toplu Ayna) session highlight this progress. Acting as "clothes" within a "machine" metaphor, students demonstrated high rhythmic synchronization by mirroring a leader's movements in precise unison. The fluid transition of leadership and the production of creative movements—such as folding or bending—within the thematic pulse confirm an emerging capacity for structured rhythmic improvisation, supporting the significant quantitative gains (p=.028).

3.9. Findings Regarding the Narrative Thematic Melodic Improvisation

Table 9

Wilcoxon signed-rank test results for narrative thematic melodic improvisation

Post-test-Pre-test	N	Mean Rank	Sum of Rank	z	p
Negative Ranks	0	.00	.00	-2.70	.007*
Positive Ranks	9	5.00	45.00		
Ties	6				

*p < .05

Table 9 reveals a highly significant improvement (p=.007) in melodic improvisation tasks, suggesting that Orff-based movement activities strongly support creative melodic expression.

Qualitative documentation from the Week 7 "Storytelling" session illustrates how students integrated melodic and rhythmic patterns into a narrative context. Specifically, participants demonstrated an ability to represent story events (e.g., climbing and descending stairs) through corresponding melodic directions on the Glockenspiel. Furthermore, the students' successful performance following a graphic notation confirms their ability to translate visual cues into thematic melodic improvisation with dynamic nuances, supporting the significant quantitative gains observed (p=.007).

3.10. Findings Regarding Total Observation Scores

Table 10

Wilcoxon signed-rank test results for total observation form scores

Post-test-Pre-test	N	Mean Rank	Sum of Rank	z	p
Negative Ranks	0	.00	.00	-3.41	.001*
Positive Ranks	15	8.00	120.00		
Ties	0				

*p < .05

Finally, Table 10 shows a highly significant difference in total scores (z=−3.41,p=.001), confirming the overall effectiveness of the 8-week program on students' musical skills. As illustrated in Figure 2, the total observation scores significantly increased from the pre-test ($\bar{X}$=21.90) to the post-test ($\bar{X}$=26.97). This visual representation underscores the collective improvement in students' musical competence following the intervention.

5. DISCUSSION AND CONCLUSION

The findings of this study suggest that Orff-Schulwerk-supported movement and dance activities effectively enhance core musical skills in early childhood. Among these, a statistically significant improvement was observed in pitch perception (p=.041). This finding supports previous research indicating that kinesthetic engagement functions as an effective bridge between concrete bodily experience and abstract musical understanding (Haselbach, 2011). Consistent with earlier studies (Burak & Erdoğan, 2018; Uçal, 2003), the integration of movement and creative processes appears to enhance children's auditory discrimination and musical responsiveness. This improvement may be explained by the embodied nature of the intervention, in which abstract melodic contours are externalized through spatial movement (e.g., raising or lowering the body), transforming auditory input into a multisensory experience.

A significant improvement was also identified in rhythmic skills (p=.016), indicating that the movement-integrated structure of the intervention effectively supported the development of rhythmic accuracy. This finding is consistent with recent research demonstrating that structured musical activities enhance musical-rhythmic intelligence in preschool children (Gökçen & Çalışandemir, 2024). From a theoretical perspective, this result aligns with Jungmair's (2003) concept of 'internal rhythm', which emphasizes the intrinsic connection between movement, language and musical expression. The use of body percussion and rhythmic speech within the intervention enabled children to experience rhythm as a physically grounded phenomenon, rather than an abstract concept, reflecting Goodkin's (2013) notion of the body as an innate orchestra.

The improvement in musical form comprehension (p=.017) supports Haselbach's (2016) framework, suggesting that movement enables children to experience shared parameters such as space and form holistically. This finding is consistent with Atak (2023), who demonstrated that structured movement sequences in partner dance activities enhance cognitive coordination and structural awareness in preschool children. By physically experiencing musical structure, children were likely able to internalize musical sections and transitions more effectively, confirming that movement-based learning is an efficient tool for developing musical form perception.

The absence of a statistically significant improvement in the ability to differentiate musical nuances (p=.066) suggests that dynamic sensitivity (piano/forte) may be a more complex and developmentally demanding skill compared to other musical competencies. This may be due to the fact that children are required not only to perceive auditory differences but also to consciously regulate the energy level of their movements. From this perspective, the development of nuance perception may require longer and more targeted pedagogical interventions. Although this finding differs from Sarıkavak's (2022) results in choral settings, it suggests that a six-week intervention period may not be sufficient for the acquisition of such abstract aesthetic parameters at this developmental stage.

Significant improvements observed in rhythmic (p=.011) and melodic (p=.007) improvisation skills indicate that Orff-Schulwerk activities strongly support creative expression. The transition from simple instrument striking to more diverse sound-production techniques observed in the sessions reflects Yücesan's (2021) assertion that teachers view the Orff approach as a key catalyst for spontaneous musical production. These findings align with Kuşcu (2017), emphasizing the role of the Orff approach in fostering creative exploration through embodied engagement.

Although the findings indicate significant improvements in children's musical skills following the Orff-Schulwerk-based intervention, the small sample size (N=15) constitutes a primary limitation of the study. In quantitative research, such a limited cohort may reduce statistical power and restrict the generalizability of the findings to broader populations. However, considering the intensive, interactive, and observation-based nature of Orff-Schulwerk pedagogy, maintaining a small group was a pedagogical necessity to ensure instructional fidelity and provide high-quality individual guidance. As a pilot intervention focusing on preschool children, this study provides a foundation for future research involving larger and more diverse samples to further examine and validate these findings.

In conclusion, the overall significant increase in total observation scores ($p<.001$) suggests that a 6-week Orff-Schulwerk-supported program contributes meaningfully to the musical development of preschool children. The results indicate that movement and dance-integrated activities facilitate the internalization of melodic and rhythmic structures. While basic perceptual skills respond effectively to movement-based interventions, more complex musical parameters, such as dynamic sensitivity, may require longer pedagogical processes. Ultimately, the study confirms that music and movement should be approached as an interconnected, 'elemental' language that supports holistic growth in early childhood education.

5.1. Recommendations

Based on these findings, several recommendations are made to enhance early childhood music education. Music and preschool teachers should prioritize movement-integrated activities, as the "internal rhythm" discovered through dance directly translates into better rhythmic and melodic accuracy. For curriculum design, it is advised that nuance and dynamic perception activities be introduced through more exaggerated physical-energy tasks to help children bridge the gap between bodily energy and musical volume. Finally, future researchers should consider employing longer intervention periods and larger sample sizes to determine the long-term effects of movement-based pedagogy on complex musical competencies such as nuance perception and thematic improvisation.

Ethical approval

The study was approved by Mehmet Akif Ersoy University, Ethics Committee of the Institute of Educational Sciences (date: 08.07.2024, number: GO 2024/386).

Author contribution

Study conception and design: ET, GY; data collection: ET, BÖ; analysis and interpretation of results: ET, GY; draft manuscript preparation: ET, GY. All authors reviewed the results and approved the final version of the article.

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Conflict of interest

The authors declare that there is no conflict of interest.

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