

APPLYING DANCE-BASED ACTIVITIES TO ENHANCE PHYSICAL ACTIVITY AND CREATIVITY IN PRESCHOOLERS – PILOT STUDY

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ABSTRACT

Creative movement and dance-based activities are increasingly recognized as valuable tools for supporting motor development and creativity in early childhood. However, empirical evidence documenting their impact in preschool settings remains limited. This study examined the effects of a structured dance-movement program on physical activity levels and movement creativity in preschool children, and compared outcomes between children with and without previous dance experience. A total of 100 children aged 3–4 years participated in a single-session dance-movement intervention lasting 50 minutes, delivered in six preschool institutions in the city of Ružomberok (Slovakia). Children were categorized into two equivalent groups: those with prior dance experience ($n = 50$) and those without such experience ($n = 50$). Physical activity (PA) and creativity (CR) were assessed using systematic direct observation during 10-minute pretest and posttest movement sequences. Two independent raters evaluated each child using a 10-point scale. Data were analyzed using Descriptive statistics, Intraclass Correlation Coefficient and repeated-measures ANOVA. Inter-rater reliability was high across all measures ($ICC = .60-.91$). Significant improvements were observed from pretest to posttest in both PA and CR for all children ($p < .01$). Additionally, children with prior dance experience consistently scored higher in both domains compared with their non-experienced peers. The dance group demonstrated greater overall movement variety, rhythm responsiveness, and creative expression. A brief, structured dance-movement program effectively enhanced physical activity and creative motor expression in preschool children. Prior dance experience further amplified these outcomes. These findings support the integration of dance-based activities into early childhood education.

Key words: preschoolers, dance activities, physical activity, movement creativity, systematic direct observation

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INTRODUCTION

Early childhood represents a critical period for the development of fundamental motor skills, physical activity habits, and creative expression. Children in the preschool years naturally explore movement through play, helping to build motor competence, spatial awareness, emotional regulation, and cognitive flexibility (Torrance, 2000; Trevlas et al., 2003;). Movement-rich environments—particularly those integrating rhythm, imagination, and free exploration—are considered essential for supporting holistic development in this age group (Keily, 1974; Piya-Amornphan et al., 2020).

Within this developmental context, dance and creative movement have gained increasing attention as valuable pedagogical tools in early childhood education. Dance-based activities combine rhythmic structure with opportunities for free expression, allowing children to explore body awareness, coordination, and emotional communication (Cone & Cone, 2012; Çetin & Erdem Çevikbaş, 2020). Contemporary studies emphasize that integrating dance elements into preschool curricula promotes not only motor development but also broader outcomes such as creativity, social engagement, and wellbeing (van der Graaf et al., 2024; Wu et al., 2025). Approaches grounded in creative dance frameworks—such as free expression or brain-compatible dance education—further support autonomy, imagination, and divergent thinking (Handayani et al., 2024; Tan, 2025; Bajar, 2025).

A growing body of empirical evidence shows that structured and semi-structured dance programs can significantly enhance motor creativity and physical competence among preschool and primary school children (Zachopoulou et al., 2006; Thomaidou et al., 2021; Neville & Makopoulou, 2021). Creative dance interventions ranging from six to eight weeks have been found to strengthen motor fluency, originality, and movement variety, suggesting that dance provides a unique stimulus for integrating cognitive and motor challenges (Thomaidou et al., 2021; Ourda et al., 2025). Similarly, dance-based physical education programs have been linked to higher levels of physical activity during school time by increasing children's engagement, motivation, and enjoyment (Sharma et al., 2020). The combination of physical exertion and creative expression appears particularly beneficial, as motor creativity has been associated with both physical fitness and broader measures of child development (Latorre Roman et al., 2017; Frith et al., 2019).

Assessing physical activity and creativity in young children, however, poses methodological challenges. While objective tools such as accelerometers or structured motor tests are widely used, many studies emphasize the importance of subjective evaluation methods that capture qualitative aspects of movement, spontaneity, and imagination (Endo et al., 2021; Marasso et al., 2021). Systematic observation provides a valid approach for assessing the expressive and creative dimensions of physical activity that cannot be fully captured by quantitative devices alone (Neville & Makopoulou, 2021). Such observational methods allow researchers to evaluate attributes such as originality, variation, movement fluency, and responsiveness to rhythm—dimensions highly relevant to dance-based interventions (Handayani et al., 2024; Ourda et al., 2025).

Given this background, the purpose of the present study was to implement a short dance-movement program in preschool settings and examine changes in children's physical activity and movement creativity using subjective assessment by two independent raters. By applying a structured yet playful intervention within the natural kindergarten environment, this study aims to contribute to the growing evidence supporting dance as a meaningful pedagogical tool in early childhood development.

METHOD

Study Design:

The study was conducted in six preschool institutions located in the city of Ružomberok (Slovakia) and took place during regular educational activities. The primary aim was to examine the effect of integrating dance-based elements into preschool education on children's levels of physical activity and movement creativity. Each child participated in a 50-minute dance-movement program, which consisted of three structured phases:

1. Initial Music-Movement Phase (10 minutes)

Children were encouraged by their teachers to engage in spontaneous and free movement activities, including simple children's dance motifs, imitation-based games, and exploratory locomotor movement within the room that reflected their ability to navigate and utilize space.

This phase served as the baseline subjective assessment. Physical activity and creativity were evaluated by two independent observers.

2. Main Program Phase (30 minutes)

This phase involved structured learning of dance elements with an emphasis on basic folk dance technique, drawing on: simple step variations, rhythmic-movement motifs, imitation and expressive movement games, progressive sequencing of steps into movement figures, basics of selected traditional dances and dance elements appropriate for preschool age. The instructional approach followed principles of developmental psychology and methodological guidelines for early childhood dance education.

3. Final Music-Moment Phase (10 minutes)

This section replicated the content of the initial phase and served as the post-intervention assessment. Physical activity and creativity were again rated by the same two independent observers, who were not involved as teachers in any of the participating groups

Participants:

The research sample consisted of 100 preschool children ($n = 100$) aged 3 to 4 years. The sample was divided into two equivalent groups: Dance group (DG) children with prior dance experience acquired through non-formal education programs ($n =$

50), Non-Dance group (nDG) children with no previous dance experience (n = 50). Group allocation was based on information provided by preschool teachers and legal guardians. A purposive sampling strategy was applied, with the intention of balancing both groups in terms of age and sex.

Table 1. Basic parameters of testing groups

group	gender (n)		age (months)	BH (cm)		BW (kg)	
	male	female		M	SD	M	SD
DG	23	27	42.02	100.10	9.25	16.28	2.16
nDG	29	21	41.62	100.08	7.25	16.66	2.58

Legend: R1 = Rater 1; R2 = Rater 2; PA = Physical Activity; CR = Creativity; ICC1,1 = single-measure intraclass correlation coefficient.

None of the children had any diagnosed orthopedic, neurological, or developmental conditions that could influence their participation or pose safety concerns during movement activities. Parents or legal guardians were fully informed about the study procedures, potential risks, and expected benefits. Participation was voluntary, and written informed consent was obtained from all guardians prior to data collection, in accordance with the ethical principles of the Declaration of Helsinki.

Procedures:

Data collection was conducted using unstandardized method of systematic direct observation performed independently by two trained observers, which enables the quantification of spontaneous physical activity and movement creativity in natural settings. All observations took place in the familiar preschool environment and were performed without any interference from the observers to preserve ecological validity.

Both indicators were assessed using an ad hoc 10-point rating scale, specifically designed for the purposes of this study, ranged from 1 (very low level) to 10 (very high level) of physical activity or creativity. The scale was theoretically grounded in Guilford’s (1967) concept of divergent thinking, as operationalized through the Alternative Uses Task, and in Torrance’s (2000) Thinking Creatively in Action and Movement (TCAM) framework, which emphasizes fluency, variability, originality, and expressiveness in motor behavior.

Physical Activity (PA) was defined as the overall quantity, intensity, and continuity of movement displayed during a 10-minute music-based movement segment. Evaluation focused on observable motor engagement rather than technical precision alone. The following criteria were considered: number of body position changes, frequency of locomotor and non-locomotor actions, range and amplitude of movement, and the involvement of both upper and lower limbs.

1–2: Minimal movement; long periods of inactivity; limited limb involvement; very low intensity.

3–4: Occasional movement with frequent pauses; small movement range; limited variability.

5–6: Moderate and continuous activity; balanced involvement of limbs; average movement intensity.

7–8: High level of activity; frequent changes in movement patterns; large movement range and good rhythmic continuity.

9–10: Very high and sustained activity; dynamic full-body engagement; high intensity with fluent transitions and no visible disengagement.

Movement Creativity (CR) was defined as the degree of spontaneous, flexible, and original motor responses to musical stimuli, reflecting the child's ability to generate varied movement solutions rather than reproduce learned patterns. Observed aspects included originality of movement ideas, variability of motor sequences, responsiveness to rhythm and musical changes, quality of improvisation, and the use of imitative or symbolic play.

1–2: Repetitive, stereotypical movements; reliance on imitation; minimal response to music.

3–4: Limited variation; simple movement patterns; occasional spontaneous responses.

5–6: Moderate creativity; some variation in movement sequences; basic improvisation present.

7–8: High variability and originality; clear responsiveness to musical cues; confident improvisation.

9–10: Exceptional creative expression; highly original and diverse movement solutions; fluent integration of rhythm, space, and imaginative play.

Statistical analysis

Shapiro–Wilk test was used to examine distributional normality. Descriptive statistics (mean, standard deviation) were calculated for all variables, and the Inter-rater reliability was evaluated using the Intraclass Correlation Coefficient (ICC 1,1). Effect of dance activities and group differences between children with and without prior dance experience were assessed using the two factor ANOVA with repetition. Partial eta squared η^2 was calculated as a measure of effect size. The significance level was set at $p < .05$; $p < .01$. All statistical analyses were performed using JASP, with data preprocessing and organization carried out in Microsoft Excel.

RESULTS

All data met the assumptions of normality, as confirmed by the Shapiro–Wilk test conducted for each variable. This indicated that the distribution of values was appropriate for the application of parametric statistical methods.

Table 2 summarizes the descriptive statistics and inter-rater reliability for movement activity (PA) and movement creativity (CR) assessed before and after

the intervention. Both raters provided highly consistent evaluations, with similar mean scores and standard deviations across all measurement points. Inter-rater agreement, expressed using ICC (1,1), indicated good to excellent reliability for the pretest and posttest assessments of both constructs, with all confidence intervals remaining within acceptable bounds. These results confirm that the observational scoring system yielded stable and dependable ratings across independent evaluators, supporting the robustness of the measurement procedure.

Table 2. Descriptive Statistics and Inter-Rater Reliability for Movement Activity and Movement Creativity

	R1		R2		ICC1,1	95% CI	
	M	SD	M	SD		lower	upper
PA-pretest	4.330	0.985	4.180	0.947	0.867	0.809	0.908
PA-posttest	6.580	1.056	6.600	1.082	0.912	0.873	0.940
CR-pretest	3.500	1.142	4.180	1.048	0.601	0.538	0.698
CR-posttest	6.310	1.339	6.890	1.163	0.680	0.559	0.772

Legend: R1 = Rater 1; R2 = Rater 2; PA = Physical Activity; CR = Creativity; ICC1,1 = single-measure intraclass correlation coefficient.

The two-factor repeated-measures ANOVA was used to evaluate changes in physical activity (PA) and creativity (CR) from pretest to posttest, as well as overall differences between children with previous dance experience and those without such experience. Both independent raters reported a clear and statistically significant main effect of time, indicating that scores in both PA and CR increased following the dance-movement program. These improvements were consistent across raters and across both assessed domains.

When comparing the two groups, the analyses also showed a significant main effect of group for most measures, demonstrating that children with prior dance experience generally achieved higher levels of physical activity and creativity than children without such experience. This pattern was observed in assessments from both raters, although the strength of the group differences varied slightly between evaluators.

Taken together, the ANOVA results show that the applied dance-movement program led to a meaningful increase in children’s physical activity and creative movement performance, and that children with previous dance experience consistently performed at a higher level across both testing occasions.

Table 3. Results of physical activity and movement creativity for dance group (DG) and non-dance group (nDG) preschoolers, with ANOVA for effect and group.

test	group	pretest		posttest		Anova-effect / η^2	
		M	SD	M	SD	F(1, 98)	F(1,48)
PA	DG	4.600	1.178	6.900	1.216	**/.81	**/.88
rater-1	nDG	4.060	0.652	6.260	0.751		**/.89
Anova-	F(1, 98)	**/.74					
group / η^2	F(1, 48)	**/.82		**/.85			
PA	DG	4.340	1.171	6.980	1.237	**/.84	**/.88
rater-2	nDG	4.020	0.622	6.220	0.737		**/.87
Anova-	F(1, 98)	**/.63					
group / η^2	F(1, 48)	N.S.		**/.83			
CR	DG	3.940	1.346	6.720	1.471	**/.89	**/.87
rater-1	nDG	3.060	0.652	5.900	1.055		**/.86
Anova-	F(1, 98)	**/.86					
group / η^2	F(1, 48)	**/.87		**/.91			
CR	DG	4.700	1.182	7.380	1.354	**/.90	**/.91
rater-2	nDG	3.660	0.519	6.400	0.639		**/.89
Anova-	F(1, 98)	**/.89					
group / η^2	F(1, 48)	**/.93		**/.91			

Legend. DG = dance group; nDG = non-dance group; * p < .05; ** p < .01; N.S. – non significant; PA – physical activity; CR – movement creativity

Legend: R1 = Rater 1; R2 = Rater 2; PA = Physical Activity; CR = Creativity; ICC1,1 = single-measure intraclass correlation coefficient.

DISCUSSION

The primary aim of this study was to evaluate the effects of a short dance-movement program on preschool children’s physical activity and movement creativity, while also examining the reliability of subjective observational assessments. Overall, the findings demonstrate that the intervention significantly enhanced both physical activity and creative movement performance, and that the applied observational tools showed acceptable stability across independent raters.

A key outcome of the study concerns the inter-rater reliability estimates. ICC values for physical activity were consistently higher than those for movement creativity, indicating that raters demonstrated greater agreement when evaluating

activity intensity and quantity than when judging creative movement patterns. This pattern is consistent with previous work showing that creativity-related behaviors—characterized by originality, variability, and improvisation—are inherently more complex and therefore more difficult to evaluate reliably (Trevlas et al., 2003; Frith et al., 2019). The lower ICCs for creativity suggest that future assessments should involve more detailed scoring rubrics, clearer operational definitions of creativity components, and possibly enhanced rater training to reduce interpretive variability (Zachopoulou et al., 2006). Nevertheless, the overall consistency between raters remained acceptable, and the mean scores across observers were comparable, indicating that subjective assessment can still serve as a useful tool for evaluating preschoolers' movement behaviors when objective instrumentation is not feasible (Endo et al., 2021; Marasso et al., 2021).

The observational protocol was designed to be feasible in a natural school setting and was based on global behavioral ratings rather than continuous micro-coding. To support accurate observation, the assessment was conducted in collaboration with classroom staff, which helped ensure correct identification of children and continuity of scoring. While direct systematic observation inevitably involves a degree of subjectivity, the use of two independent raters, standardized criteria, and reliability analysis helped reduce observer bias. Nevertheless, methodological literature indicates that the inclusion of additional independent raters could further strengthen reliability in future studies (Hallgren, 2012; Portney & Watkins, 2015).

The repeated-measures ANOVA results further support the effectiveness of the dance-movement program. Across both raters, children demonstrated a significant increase in physical activity and creativity between the pretest and posttest assessments. These findings align with previous research showing that even relatively short creative movement interventions can stimulate meaningful gains in motor creativity, movement variety, and engagement (Thomaidou et al., 2021; Neville & Makopoulou, 2021). The structured progression from spontaneous movement to guided dance elements likely supported both energetic involvement and opportunities for expressive exploration, consistent with pedagogical recommendations in dance education (Cone & Cone, 2012; Bajar, 2025).

The results also revealed significant group differences: children with prior dance experience consistently achieved higher scores in both physical activity and movement creativity than their peers without such background. This is in accordance with earlier studies showing that repeated exposure to dance activities enhances motor coordination, rhythmic sensitivity, and creative fluency (Çetin & Erdem Çevikbaş, 2020; Handayani et al., 2024). These findings suggest that dance experience may provide a developmental advantage, supporting the notion that regular incorporation of dance elements into preschool curricula can help cultivate higher levels of physical engagement and creative behavior over time (Piya-Amornphan et al., 2020; van der Graaf et al., 2024).

While the immediate post-intervention effects were clearly positive, the study opens several avenues for future research. First, it remains unknown how long these improvements persist. Investigating potential “fade-out effects” through delayed

posttests—e.g., one week or one month after the intervention—would help determine the stability of gains (Zachopoulou et al., 2006). Second, comparing different types, lengths, or frequencies of dance-based programs could identify which pedagogical approaches yield the strongest and most sustainable developmental outcomes. Third, a deeper analysis of creativity components (e.g., fluency, originality, adaptability) would allow for more precise assessment and support improved inter-rater reliability.

As a pilot study, these findings highlight the feasibility and value of integrating creative dance into everyday preschool practice. The results reinforce the importance of providing children with opportunities to engage in expressive movement, explore physical play, and respond creatively to music—activities that multiple authors identify as essential for holistic development (Torrance, 2000; Ourda et al., 2025; Wu et al., 2025). Overall, this study provides evidence that even brief, well-structured dance-movement activities can meaningfully enhance preschoolers' physical activity and movement creativity, underscoring the pedagogical potential of creative dance within early childhood education.

Limitations of the Study

Several limitations should be considered when interpreting the findings of this study. As a pilot investigation conducted within a specific preschool context and with a relatively small sample, the results cannot be readily generalized to broader populations without further confirmation in larger and more diverse samples. Although acceptable inter-rater agreement was achieved using two independent observers, methodological literature suggests that reliability may be further strengthened by including additional raters, which should be considered in future research. Another limitation concerns the use of ad hoc observational scales designed for practical educational application. While these instruments were theoretically grounded and showed satisfactory reliability, they have not yet undergone full psychometric validation, which limits direct comparison with studies employing standardized tools. Additionally, gender differences were not examined, despite evidence that boys and girls may differ in movement behavior, engagement, and creative expression, indicating an important direction for future studies. Finally, although observational procedures were designed to preserve ecological validity, contextual factors inherent to classroom-based assessment may have influenced children's behavior, highlighting the need for complementary approaches, such as video-assisted analysis, in subsequent research.

CONCLUSION

This study demonstrated that a short, structured dance-movement program can significantly enhance preschool children's physical activity and movement creativity. Both independent raters recorded clear improvements from pretest to posttest, confirming the effectiveness of integrating simple dance elements into the educational routine. Although inter-rater reliability was generally higher for physical activity than for creativity, the overall agreement between raters supports the use of structured

subjective observation as a feasible and informative assessment method in preschool settings.

Children with previous dance experience consistently achieved higher scores, suggesting that regular exposure to movement and rhythm-based activities may provide a developmental advantage in both motor engagement and creative expression. These findings highlight the value of creative dance as an accessible pedagogical tool that can enrich early childhood education.

Future research should examine the long-term stability of these gains, explore the effects of different program formats, and refine creativity assessment procedures to enhance reliability. As a pilot study, the results underline the importance of offering children varied opportunities for expressive movement and suggest that even brief interventions can have meaningful developmental benefits.

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