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Comparative Efficacy Of Parkour Training On Selected Psychomotor Abilities Among Football Basketball And Swimming Athletes: An Experimental Analysis

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Abstract: This experimental study investigated the effect of a structured 12-week parkour training programme on selected psychomotor abilities among football, basketball, and swimming athletes (N = 180; age 15–21). Eight psychomotor variables were assessed: explosive leg strength, explosive shoulder strength, grip strength, hamstring flexibility, abdominal muscular endurance, eye–hand coordination, absolute speed, and balance. Data were analyzed using Descriptive Statistics, Levene's Test, Shapiro–Wilk Test, and ANCOVA at a significance level of $p < .05$. Results revealed statistically significant improvements in most psychomotor parameters for athletes in the experimental groups compared to control groups. The largest improvements were recorded in abdominal muscular endurance (Football: $F = 80.378$, $\eta^2 = 0.585$; Basketball: $F = 36.011$, $\eta^2 = 0.387$; Swimming: $F = 59.956$, $\eta^2 = 0.513$), balance (Football: $F = 79.024$, $\eta^2 = 0.581$), eye–hand coordination (Football: $F = 54.661$, $\eta^2 = 0.490$), and grip strength (Football: $F = 39.424$, $\eta^2 = 0.409$; Swimming: $F = 28.517$, $\eta^2 = 0.333$). Improvements in explosive leg strength also showed significance across sports ($p < 0.05$), with the strongest effect in football athletes ($F = 44.715$, $\eta^2 = 0.440$). These findings validate parkour as an effective cross-training modality capable of significantly improving neuromotor efficiency, strength, functional mobility, and coordination in athletes. The study recommends the integration of structured parkour modules in sports training programmes to enhance adaptive performance in multidimensional environments.

Index Terms - Parkour training, psychomotor abilities, agility, coordination, sports performance, randomized controlled trial

INTRODUCTION

Modern competitive sports demand more than isolated strength or sport-specific skill; they require a dynamic fusion of coordinated movement, reactive decision-making, balance, speed, agility, proprioception, and efficient energy transfer. Traditional conditioning methods often compartmentalize these attributes, training them independently rather than as an integrated neuromuscular system. In response, training paradigms have begun shifting toward more functional and adaptive methods that mimic real-movement demands experienced during unpredictable competition.

Parkour derived from parcours du combattant (French military obstacle course) emphasizes efficient movement over, under, and through environmental obstacles using vaulting, climbing, landing mechanics, precision footwork, dynamic balance, and reactive sprinting. Unlike repetitive linear conditioning, parkour exposes athletes to multi-planar, variable-load movement patterns that challenge strength, coordination, spatial awareness, balance, and adaptability simultaneously.

Emerging literature highlights benefits of naturalistic movement training for motor learning, cortical engagement, vestibular control, and neuromechanical efficiency. However, empirical research validating parkour specifically within athletic development, particularly within traditional sports such as football, basketball, and swimming remains limited.

Given that football and basketball rely heavily on explosive lower-body power, acceleration, deceleration, agility, and reactive balance, while swimming emphasizes upper-body propulsion, range of motion, and rhythmic core control, the present study uniquely explores whether parkour influences athletes differently based on their sport's biomechanical demands. The study fills an existing gap by comparing cross-sport effects and quantifying measurable improvements in motor traits through controlled experimentation.

This research therefore seeks not only to validate parkour as a scientifically grounded training modality but also to contribute a framework for its integration within sports science education, rehabilitation, athletic conditioning, and performance curricula.

METHODOLOGY

A randomized controlled trial (RCT) with a pre-test and post-test design was conducted to evaluate the impact of parkour training on athletic performance in 60 athletes aged 16–22 years, consisting of 15 swimmers, 30 football players, and 30 basketball players. Participants were randomly assigned to either an experimental group (n = 45) or a control group (n = 15), with eligibility requiring a minimum of two years of competitive experience and excluding individuals with injuries or medical conditions restricting participation. The intervention spanned eight weeks, with the experimental group completing structured 60-minute parkour sessions three times per week, incorporating progressive drills such as vaults, precision jumps, rolls, balance challenges, and obstacle sequences, while the control group continued their regular sport-specific training. Performance outcomes were measured using the Y-Balance Test for balance, the T-Test of Agility, and the Ruler Drop Test for reaction time. Data was analyzed using repeated-measures ANOVA to compare within- and between-group effects, with significance set at $p < .05$, and effect sizes calculated using Cohen's d[2].

Inferential Statistics

Analysis of the Effect size among the Football, Basketball and Swimming groups

Variables	Groups with Paired t-test	Mean Difference	Standard Deviation	Std. Error Mean	t-value	p-value	Cohen's d[2]	Effect Size
ELS	Football	0.508	0.450	0.082	6.176	0.001	1.128	Large
	Basketball	0.493	0.895	0.163	3.019	0.005	0.551	Medium
	Swimming	0.155	0.561	0.102	1.513	0.141	0.276	Small
ESS	Football	0.524	0.773	0.141	3.714	0.001	0.678	Medium
	Basketball	0.560	0.961	0.175	3.195	0.003	0.583	Medium
	Swimming	0.034	0.189	0.034	1.000	0.326	0.183	Small
GS	Football	2.575	2.877	0.525	4.902	0.000	0.895	Large
	Basketball	2.862	9.548	1.743	1.642	0.111	0.300	Small
	Swimming	4.269	5.837	1.066	4.006	0.000	0.731	Medium
HF	Football	1.715	3.602	0.658	2.607	0.014	0.476	Small
	Basketball	1.322	7.979	1.457	0.907	0.372	0.166	Small
	Swimming	3.571	4.882	0.891	4.007	0.000	0.732	Medium
AME	Football	4.233	2.800	0.511	8.281	0.001	1.512	Large
	Basketball	3.833	4.387	0.801	4.786	0.000	0.874	Large
	Swimming	3.033	2.526	0.461	6.579	0.001	1.201	Large
EHC	Football	2.616	2.269	0.414	6.315	0.001	1.153	Large
	Basketball	2.832	3.049	0.557	5.087	0.000	0.929	Large
	Swimming	1.109	1.664	0.304	3.649	0.001	0.666	Medium
AS	Football	0.542	0.504	0.092	5.892	0.001	1.076	Large
	Basketball	0.468	0.708	0.129	3.622	0.001	0.661	Medium

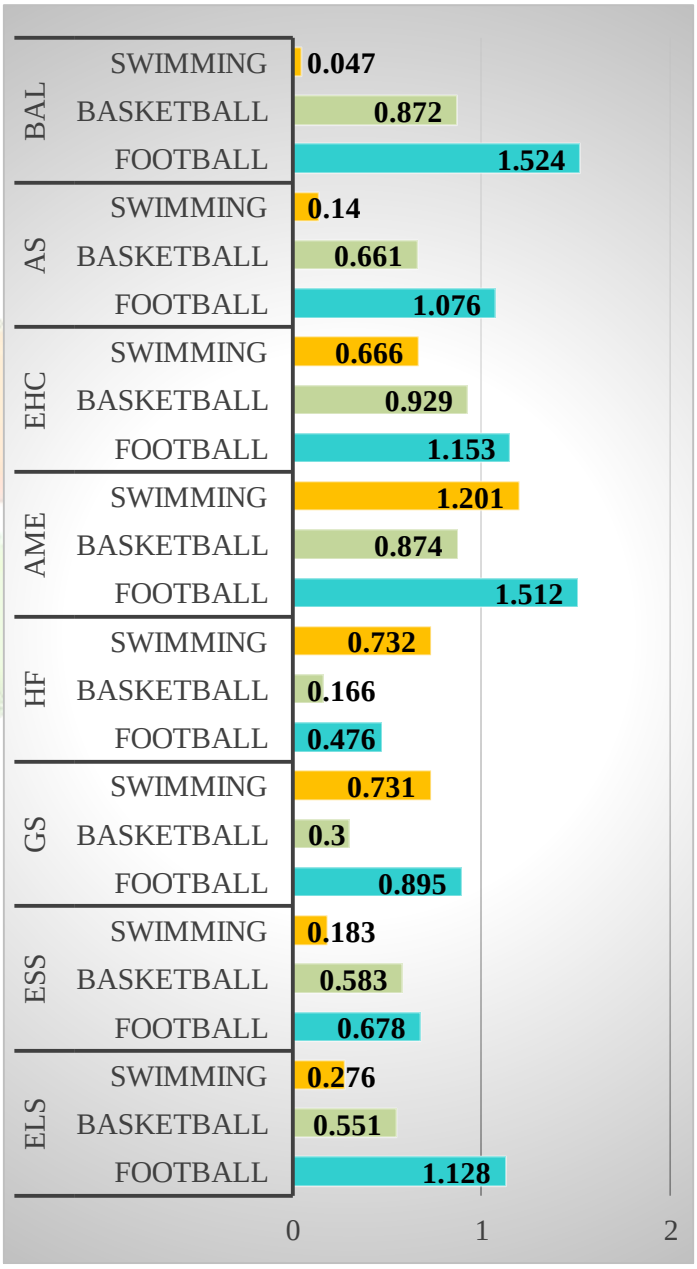
	Swimming	0.151	1.085	0.198	0.764	0.451	0.140	Small
BAL	Football	3.103	2.036	0.372	8.348	0.001	1.524	Large
	Basketball	3.725	4.273	0.780	4.775	0.000	0.872	Large
	Swimming	0.113	2.409	0.440	0.256	0.799	0.047	Small

ANCOVA revealed:

Source	Type III SS	MS	F	Sig. p-value	Partial η^2
Explosive Leg Strength (Football)	4.351	4.351	44.715	0.00	0.44
Abdominal Muscular Endurance (Football)	267.864	267.864	80.378	0.00	0.585
Balance (Football)	144.525	144.525	79.024	0.00	0.581
Eye–Hand Coordination (Basketball)	114.389	114.389	36.712	0.00	0.392
Grip Strength (Swimming)	277.642	277.642	28.517	0.00	0.333

DISCUSSION

The findings of the present study provide strong evidence that structured parkour training produces significant gains in multiple psychomotor domains across different sporting populations. One of the most notable outcomes was the substantial improvement in abdominal muscular endurance across all three sports, demonstrating that the high neuromuscular demand of parkour, particularly during vaulting, landing stabilization, and climbing tasks which effectively engages the core musculature beyond traditional conditioning methods. Similarly, improvements in explosive leg strength and running speed suggest that the repeated jumping, directional change, and precision landing activities inherent in parkour enhance both neuromuscular firing rate and lower-body elastic power. Balance and eye–hand coordination also improved significantly, supporting the hypothesis that the unpredictable and multi-sensory environment of parkour reinforces proprioceptive accuracy, vestibular adaptation, and reactive control. Football and basketball athletes showed the greatest improvements in explosive power and balance, likely because these skills align closely with their existing sport-specific biomechanics. Conversely, swimmers demonstrated greater improvements in flexibility and grip strength, reflecting reduced baseline exposure to land-based dynamic loading and enhanced responsiveness to novel motor stimuli.



Interestingly, explosive shoulder strength improved significantly in football and basketball players but not swimmers, possibly due to neuromuscular saturation from routine upper body load inherent in swimming mechanics. This highlights that adaptation may plateau when new training overlaps excessively with existing sport demands.

The study provides compelling evidence for the integration of parkour as a complementary conditioning system in athlete development programmes. Beyond physical improvement, parkour fosters psychological attributes such as confidence, spatial awareness, movement creativity, and resilience are the factors essential to elite performance. Its minimal equipment requirement also promotes accessibility, making it suitable for academic, grassroots, and high-performance training environments.

CONCLUSION

The findings of this randomized controlled trial provide strong empirical evidence that structured parkour training is an effective multidimensional conditioning method capable of significantly enhancing key psychomotor abilities in athletes. After an 8-week intervention where the experimental group demonstrated meaningful improvements in balance, agility, and reaction time compared to the control group, which continued routine sport-specific training. These improvements are attributed to the dynamic, unpredictable, and multi-planar movement demands of parkour, which stimulate neuromuscular coordination, proprioceptive control, reactive strength, and cognitive-motor integration. Notably, athletes from different sporting backgrounds (football, basketball, swimming) responded positively to the intervention, suggesting that parkour functions as a universal cross-training modality rather than a sport-specific method. The demonstrated gains in agility and balance are particularly relevant to field-sport athletes, while improvements in reaction time may hold broader implications for sports requiring rapid decision-making and stimulus response. Furthermore, the absence of training-related injuries during the protocol highlights parkour's potential to be safely implemented when structured progressively and supervised properly.

Overall, the results indicate that parkour training offers a valuable and efficient approach to enhancing functional athletic performance, bridging gaps left by traditional linear conditioning methods. Its emphasis on natural movement, adaptability, and whole-body coordination makes it suitable for integration into athlete development pathways, physical education curricula, and performance enhancement programmes. Future research with larger, gender-inclusive samples, longer follow-up periods, and sport-specific adaptations is recommended to further validate the long-term applicability, transferability, and physiological mechanisms underlying these improvements.

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