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Effectiveness of a Physical Activity-Enhanced Curriculum on Improving Cardiorespiratory Fitness and Body Composition in Preschoolers: Preliminary Results of a Cluster Randomized Controlled Trial

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- Introduction

- Adequate physical activity (PA) is non-negligible for good human well-being
- PA during preschool years contributes to better cardiorespiratory fitness,[1] body composition,[2] motor skills,[3] and cognitive development [4], and largely reduces the risk of developing various non-communicable diseases (eg. cardiovascular diseases, type II diabetes, cancer) in adulthood.[5]
- A daily of 60-min moderate-to-vigorous PA is recommended by the World Health Organization (WHO) for children and adolescents aged 5-17.[6]
- However, local data suggested that >80% of preschoolers had inadequate PA,[7] 70% had poor fitness,[8] and 15% were overweight/obese with heightened cardiometabolic risks.[9] Therefore, effective interventions to promote PA in young children are urgently needed.
- Presently, limited evidence was established on the effectiveness of kindergarten-based PA interventions on improving cardiorespiratory fitness and body composition of preschoolers.

- Objective -

To evaluate the effect of a one school year multi-component **kindergarten-based PA intervention** on **preschooler's cardiorespiratory fitness and body composition**.

- Methods -

207 K3 children (from 10 schools)

This is an ongoing 4-year trial that will include 3300 children from 110 schools.

1:1 Randomization

Control (CON) → **Usual curriculum** with 30-min PA/day — **2.5 hrs** school time PA/week

Intervention (INT) → **Usual curriculum +** **75 min x 2 sessions/wk game-based PA class**; **Weekends:** Parent-led PA assignments & games — **5 hrs** school time PA/week






Generalized estimating equations
assess treatment effects after 1 school year

Outcome assessment timeline

Start of school year (PRE) 0 month

End of school year (POST) 10 months

Outcome 1: **Cardiorespiratory Fitness** (20-m shuttle run)

Outcome 2: **Body composition** (weight, waist, body-mass-index)

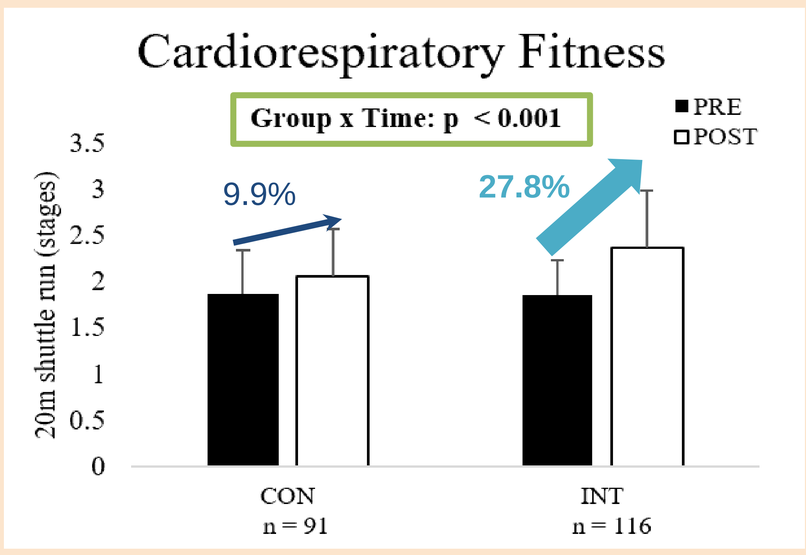
Study timeline:

2022	2023	2024	2025	2026
Batch 1 (10 schools)	Batch 2 (34 schools)	Batch 3 (34 schools)	Batch 4 (34 schools)	
Completed	Ongoing			

- Results (Batch 1) -

A total of 207 children (INT: 116 & CON: 91) from 10 schools were included.

Significant group x time interaction effects were observed for cardiorespiratory fitness (CON: +9.89%, INT: + 27.8% ; p < 0.001).



No significant effects were found for body composition.

Body composition	CON		INT		Group x Time effect (p-value)
	PRE	POST	PRE	POST	
Weight	18.89 (3.89)	19.97 (3.91)	18.62 (3.20)	19.62 (3.35)	0.935
Waist	51.22 (5.94)	54.29 (6.43)	48.03 (9.80)	52.38 (4.84)	0.742
BMI	15.16 (2.13)	14.8 (2.12)	15.10 (1.80)	14.74 (1.75)	0.624

All analysis were adjusted for baseline values, age, gender, socioeconomic status of district, school funding, INT attendance, and cluster factor of kindergarten.

Conclusion

- School-based PA interventions might be effective in improving preschoolers' cardiorespiratory fitness.
- Given poor physical fitness increases all-cause mortality risks,[10] while affects children's ability to participate in future PA,[11] kindergarten-based PA intervention might be effective in reducing young-age physical inactivity and thus improving health, with effects extending into adulthood.
- Results in the coming three years are warranted to confirm such findings and explore possible effects on body composition.

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