

How Physical Activity and Digital Media Use Impact Brain Activity, Cognitive, Physical, Emotional and Psychosocial Wellbeing of Singaporean Children Aged 4 to 5 Years

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KEY IMPLICATIONS

- Physical activity is key for physical and cognitive function in children aged 4 to 5 years.
- Physical activity may promote greater social-emotional abilities in children.
- No associations were observed with digital media use, but this may be influenced by the type of media usage amongst children.

BACKGROUND

In the early years of childhood, the brain undergoes various stages of neurodevelopment and remodeling based on a child's experiences. Children between the ages of 4 to 5 years will significantly advance their skills in observing

and interacting with the world around them. Two factors have been identified, that is physical activity (or lack of) and sedentary behavior associated with digital media use have been implicated in a child's neurodevelopment in the early years. Longitudinal studies in adults and older children have found clear positive associations between physical activity on cognition and emotional functioning (Donnelly et al., 2016), while other studies have reported poorer psychosocial and emotion wellbeing associated with greater use of digital media platforms (O'Keeffe, Clarke-Pearson, Council on, & Media, 2011). However, the role of physical activity and digital media use play in younger children (4 to 5 years), on cognitive, physical, emotional and psychosocial wellbeing are less understood.

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FOCUS OF STUDY

Between January 2020 to March 2022, the team conducted a cross-sectional, observational study on 80 preschool children (4 to 5 years) to observe and monitor levels of physical activity for a period of 4 days. The team administered a series of cognitive, neuroimaging, and physical assessments to assess executive, fine and gross motor function. Following these assessments, each child was fitted with a physical activity monitor for which they were instructed to wear continuously for a duration of 3 consecutive days. Additionally, a parent questionnaire was administered to each parent to determine their child's level of digital media use, and social-emotional wellbeing.

In this study, we aim to 1) provide first-hand evidence for the level of physical activity in younger children in Singapore and 2) make direct comparisons to other cohorts of different geographical backgrounds. Further we aim to use age-appropriate gold standard physical and cognitive tests to ascertain the level of physical, cognitive, emotional, and psychosocial development of younger children in Singapore.

KEY FINDINGS

1. Increased physical activity is associated with better gross motor function and impulse control.
2. Increased in sedentary time and digital media use may be associated with poorer impulse control.
3. Sedentary time and digital media use was less during school days compared to weekends.

SIGNIFICANCE OF FINDINGS

Implications for practice

1. Schools should maintain or incorporate physical activity/play as part of their teaching curriculum
2. Developing curriculum that encompasses cognitive development and physical play may be beneficial for children's learning and physical wellbeing and cognitive development.

Implications for policy and research

1. Physical activity and play in children are essential for learning, social and emotional development, and education policies should consider encouraging physical activities in the form of physical games to teach learning strategies and develop social-emotional abilities particularly in young children.
2. Intervention and long-term follow-up studies will be necessary to determine if tailored physical activity-enabled programmes in preschool will result in greater cognitive, physical, and social-emotional development in children, which is a key competency by MOE.

PARTICIPANTS

This study was conducted at E-Bridge Preschool and Childcare (Punggol). A total of 80 preschool children (aged 4 to 5 years) and their parents were recruited to participate in this study.

RESEARCH DESIGN

This was a cross-sectional observation study to monitor children's habitual physical activity over a period of 3 days. Prior to monitoring their activities, all children were assessed for their executive function (using the Early Years Toolbox) and motor abilities (i.e., 9-hole pegboard test, single leg balance, standing broad jump and Timed-up-and-go test). Parent self-report questionnaires were disseminated to ascertain level of digital media use, social and emotional wellbeing of their child.

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