



EDITORIAL

## The social–ecological context of media use and school success<sup>☆,☆☆</sup>



### Contexto socioecológico do uso de mídias e sucesso escolar

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Academic achievement is a crucial determinant of life course health. Academic achievement in adolescence not only predicts job and financial success in adulthood, but recent evidence suggests that it may be associated with lower adult allostatic load<sup>1</sup> and better health status.<sup>2</sup> These associations may be due to the improved employment and financial opportunities that high academic achievement allows, but there are likely other explanatory variables – such as family functioning, child intellectual or self-regulation abilities, stress associated with chronic poverty, or premorbid mental health conditions, which influence both academic achievement and later outcomes. Regardless, identification of potentially modifiable contributors to school achievement is worthwhile, as improving a child's academic trajectory has important life course relevance.

A growing literature has examined physical activity as a predictor of school success, with good reason: laboratory-based studies suggest that bouts of high-intensity physical activity can improve immediate cognitive functioning, such as impulse inhibition and working memory.<sup>3</sup> Although the evidence is less robust for long-term exercise habits improving executive functions,<sup>3</sup> the benefits may be population-specific: recent evidence suggests that

children with attention deficit hyperactivity disorder (ADHD) show better cognitive and behavioral functioning when taking part in interventions aimed at increasing their physical activity.<sup>4</sup> While a growing literature has shown positive associations between physical fitness and aspects of academic achievement, many of these studies have been limited by their cross-sectional design and the potential for reverse causality. In other words, children with low grades may spend longer on their homework every day, which limits their time for engaging in physical activity, or may be taken off of sports teams by coaches or parents because of failing grades. Some children with learning difficulties also have motor incoordination, which is also associated with low academic achievement<sup>5</sup> and may make them more resistant to engaging in regular physical activity.<sup>6</sup> Finally, lack of control for important confounders leaves room for explanation of observed associations by other variables, such as socioeconomic status, psychosocial stress, or screen media use.

Aguilar et al.<sup>7</sup> attempted to address these gaps in knowledge by performing a large, cross-sectional study of 12-year-old schoolchildren in Chile, finding that cardiorespiratory function (CRF) was significantly related to academic achievement, independent of socioeconomic confounders. However, once the variable daily hours of screen media use was added to the multivariable model, associations between CRF and academic attainment were markedly attenuated, and no longer statistically significant. This strongly suggests that screen media use could be the explanatory mechanism between a sedentary lifestyle and academic difficulties, potentially through displacement of exercise or learning-related activities. Statistically, it is also possible that screen media use and physical activity are so negatively collinear

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that entering both in the multivariable model simultaneously renders associations non-significant; it therefore would have been interesting to assess whether daily hours of media use independently predicted poor academic achievement in this cohort. To address the collinearity issue, the authors astutely stratified analyses by media use, finding that, with high media use (>2 h/day), CRF was completely unrelated to academic achievement. In low media users, CRF continued to be a significant predictor of good grades. This finding is interesting, as it implies that the negative effects of high media use on school success are so dominant that other protective factors (i.e., physical activity and CRF) lose their strength.

Alternatively, excessive media use habits may reflect parenting-related variables such as monitoring of child activities, or involvement in learning and school,<sup>8</sup> which themselves are strong drivers of academic success. This is an illustration of how child screen time habits (like most health-related behaviors, including academic success)<sup>9</sup> evolve within a multi-layered social–ecological context.<sup>10</sup> At the level most proximal to the child, his/her temperament, learning style, self-regulation skills, and cognitive abilities influence how they interact with screen media from the earliest ages. Family-level factors, such as media usage by siblings and parents' rules about time limits, content, and access to screens similarly shape child and adolescent media use habits, which are also influenced by aspects of the child's immediate social environment such as peer relationships, level of poverty or stress in the home, parent mental illness, and access to other activities or learning resources (or, for that matter, physical activity opportunities). On an ecological level, media use habits are shaped by the safety of the child's neighborhood, quality of the child's school (and thus the child's engagement with teachers and taught material), parent work demands, and the cultural importance of media use as a means of social capital or connection. These aspects of the child's social–ecological context are difficult to account for in epidemiologic studies for several reasons, including measurement of cultural influences, necessity of data collection from multiple sources, and the interconnected nature of social–ecological variables, which requires complicated statistical modeling.

This theoretical framework has several implications for future research. First, as screen media become more pervasive in the social–ecological layers of child health through the use of smartphones and tablets, it will be increasingly important for studies to specifically assess these sources of screen time. Their portability and instantly accessibility increase the potential that screen time replaces or interrupts physical activity, learning, social interactions, and sleep. It is also important to take media multi-tasking into account,<sup>11</sup> which often co-occurs with homework and therefore may impact academic achievement. Finally, in future studies, it is important to include children with special education needs, who were excluded from Aguilar et al.'s study, to examine whether they are differentially susceptible to the effects of media use or physical activity.<sup>4</sup> In developmental behavioral pediatric clinical experience, many children

with learning disabilities, high functioning autism spectrum disorder, and ADHD develop excessive media use habits, perhaps because these media – particularly video games – offer an area of positive reinforcement or perceived mastery that academics do not. Media use therefore represents a possible window for intervention, either to engage children in learning through evidence-based educational digital resources, or to decrease excessive media habits by providing replacement activities that provide the same sense of competence and mastery.

## Conflicts of interest

The author declares no conflicts of interest.

## References

1. Westerlund H, Gustafsson PE, Theorell T, Janlert U, Hammarström A. Parental academic involvement in adolescence, academic achievement over the life course and allostatic load in middle age: a prospective population-based cohort study. *J Epidemiol Commun Health.* 2013;67:508–13.
2. Lê-Scherban F, Diez Roux AV, Li Y, Morgenstern H. Does academic achievement during childhood and adolescence benefit later health? *Ann Epidemiol.* 2014;24:344–55.
3. Verburgh L, Königs M, Scherder EJ, Oosterlaan J. Physical exercise and executive functions in preadolescent children, adolescents and young adults: a meta-analysis. *Br J Sports Med.* 2014;48:973–9.
4. Verret C, Guay MC, Berthiaume C, Gardiner P, Béliveau L. A physical activity program improves behavior and cognitive functions in children with ADHD: an exploratory study. *J Atten Disord.* 2012;16:71–80.
5. Lopes L, Santos R, Pereira B, Lopes VP. Associations between gross motor coordination and academic achievement in elementary school children. *Hum Mov Sci.* 2013;32:9–20.
6. Lopes VP, Rodrigues LP, Maia JA, Malina RM. Motor coordination as predictor of physical activity in childhood. *Scand J Med Sci Sports.* 2011;21:663–9.
7. Aguilar MM, Vergara FA, Velásquez EJ, Marina R, García-Hermoso A. Screen time impairs the relationship between physical fitness and academic attainment in children. *J Pediatr (Rio J).* 2015;91:339–45.
8. O'Connor TM, Hingle M, Chuang RJ, Gorely T, Hinkley T, Jago R, et al. Conceptual understanding of screen media parenting: report of a working group. *Child Obes.* 2013;9:S110–8.
9. Lucier-Greer M, O'Neal CW, Arnold AL, Mancini JA, Wickrama KK. Adolescent mental health and academic functioning: empirical support for contrasting models of risk and vulnerability. *Mil Med.* 2014;179:1279–87.
10. Takeuchi LM, Levine MH. Learning in a digital age: toward a new ecology of human development. In: Jordan AB, Romer D, editors. *Media and the well-being of children and adolescents.* Oxford: Oxford University Press; 2014.
11. Foehr UG. Media multitasking among American youth: prevalence, predictors, and pairings. Kaiser Family Foundation; 2006. Available from: <http://kff.org/other/media-multitasking-among-american-youth-prevalence-predictors-2/> [cited 22.02.15].