



*British Association for Community Child Health News, Annual Scientific Meeting Special Issue. December, 2015.*

## **Child's Play: The new paediatric prescription**

Dr Aric Sigman

**Citation:** Sigman A. (2015) Child's Play: The new paediatric prescription. *BACCH News*, Annual Scientific Meeting Special Issue. December:20-22.

BACCH is a membership organisation for doctors and other professionals working in paediatrics and child health in the community. It is the largest specialty group of the Royal College of Paediatrics and Child Health.

Principal and registered office: 5-11 Theobalds Road, London WC1X 8SH

**While the concept of child's play has connotations of being merely a pleasant digression from the serious business of proper child development, it is now emerging as a health requirement in achieving disease prevention objectives, optimising child development outcomes and redressing educational and social inequalities.**<sup>1,2,3,4</sup>

The American Academy of Pediatrics issued a *Clinical Report on The Importance of Play in Promoting Healthy Child Development*, in which they state: 'Play is important to healthy brain development ... In fact, play may be an exceptional way to increase physical activity levels in children and, therefore, may be included as an important strategy in addressing the obesity epidemic.'<sup>2,3</sup>

Although play and physical activity (PA) share some common features, the two are distinct concepts. Moreover, play may offer a wider range of benefits, achieve superior levels of compliance, and ultimately succeed where PA initiatives have failed.<sup>5</sup>

As an intervention, children are more likely to engage in a given activity and enjoy it more if it is labelled as 'play'.<sup>6</sup> British research observed 'children in the study spent a higher proportion of time in activity of a moderate-vigorous intensity in all the play sessions with toys and boxes (61%) than they did in PE (38%)'.<sup>7,8</sup>

A shift of emphasis to play may also help address concerns raised by the Chief Medical Officer that 'across all ages girls are much less active than their male peers' and by Public Health England that 84% of girls fail to meet minimum PA recommendations.<sup>9,10</sup>

### **PA v Play: cardiometabolic implications**

Although PA is associated with a reduction in cardiometabolic risk, recent meta-analyses have found growing evidence that structured PA programs have little impact on children's overall PA or BMI. In 'Active Play as a Strategy for Preventing Childhood Obesity', Janssen (2015) concluded '...physical activity interventions with child populations have had a small effect on their total physical activity ... and have not been associated with changes in body mass index'.<sup>5</sup> An article in the Canadian Medical Association Journal pointed out that 'Unstructured play can burn more calories than school and sports programs combined'.<sup>11</sup> Although unstructured playtime isn't particularly intense, it's the sheer *volume* of physical movement that appears to be advantageous.

With this in mind, many researchers point to consistent evidence that 'when children are outside they move more, sit less and play longer'.<sup>1</sup> Aronsson et al (2015) recently reported that 'children spent a significantly larger proportion

of their time doing MVPA [moderate to vigorous PA] during outdoor learning sessions.<sup>12</sup>

British and American research has identified social interaction as a significant co-factor potentiating this effect, especially in informal play environments, in that friends may make a significant difference to PA levels. For example, Jago et al (2011) found that British children 'who take part in physical activity with their best friend at home or in the neighborhood where they live engage in higher levels of physical activity.'<sup>13</sup>

There is a disparate range of potential benefits and outcomes associated with play.

### **Outcomes**

Evidence from evolutionary developmental psychology suggests child's play results in long-term favourable outcome measures. For example, in assessing 'developmental' and 'social success' in subjects between ages 20 – 66yrs, the study 'Does Playing Pay? The fitness-effect of free play during childhood' concluded 'that the opportunity for and the promotion of free play in childhood significantly predict some indicators of social success... promotes developmental resources, in particular individual adaptivity in adulthood ...'.<sup>14</sup>

### **Psychopathology**

The American Academy of Pediatrics states 'The implications of play deprivation may be substantial'.<sup>3</sup> Many paediatric health professionals now consider play vital to mental health, while 'play deprivation' contributes significantly to psychopathology.<sup>15</sup> Yet, play may be causative in promoting emotional well being in children. The study *The impact of children's perception of an activity as play rather than not play on emotional well-being*, concluded 'Children demonstrate increased emotional well-being when they perceive an [identical] activity as play rather than not play ... play can be seen as an observable behaviour but also as a mental state.'<sup>6</sup>

Active play may contribute to the prevention of depression. A systematic review of prospective studies published in the American Journal of Preventive Medicine reported 'consistent evidence that PA may prevent future depression ... including low levels [of PA]. From a health promotion perspective ... promoting any level of PA could be an important strategy for the prevention of future depression'.<sup>16</sup> Neuropsychiatric research on light intensity 'leisure time PA' involving 9,676 older adults supports this conclusion: 'PA was found to be the only independent factor protecting against depressive symptoms, after controlling for a range of confounders'.<sup>17</sup>

### **Psychosocial development**

Social skills, sharing, cooperation, trust, bonding and empathy between children and children and parents are developed through play.<sup>3</sup>

This process may be partly attributed to the role of the neuropeptide oxytocin in social interaction.<sup>18</sup> Oxytocin has been reported to improve 'mind-reading in humans' and increase 'willingness to socially share one's emotions'.<sup>19,20</sup>

Other studies report that childhood social experiences may program current

as well as future release of oxytocin, with the early and frequent release of oxytocin facilitating further release.<sup>21,22</sup> Child play from an early stage may help to establish and augment this social process.

### **Risky Outdoor Play**

A large multidisciplinary research team recently published its review and position statement on play noting 'overall positive effects of risky outdoor play on a variety of health indicators and behaviours in children'<sup>1,23</sup>

### **Executive functions**

Executive functions (EF) are critical early predictors of success across a range of important child outcomes. Furthermore, children with poorly developed EF go on to experience poorer health, financial circumstances, and social outcomes in adulthood.<sup>24</sup> Harvard University's Center on the Developing Child recently published formal guidance on *Enhancing and Practicing Executive Function Skills with Children from Infancy to Adolescence* in which they place a great deal of emphasis on the crucial role of 'creative play, games'.<sup>4</sup> It is thought that changes in gene expression underlie such enhancement.<sup>25</sup> A recent study found 'Less-structured time in children's daily lives predicts self-directed executive functioning'.<sup>24</sup>

### **Physical play**

There is mounting evidence that physical activity, including active play, provides benefits to brain development and academic performance.

Research published in *Pediatrics* on the effects of out of school physical activity on 7 – 9 year olds found that it 'enhanced cognitive performance and brain function during tasks requiring greater executive control ... These findings demonstrate a causal effect'.<sup>26</sup>

Researchers publishing in the journal *Frontiers in Human Neuroscience* reported that 'aerobic fitness plays an important role in the brain health of children, especially in terms of brain structure and brain function ... often coupled with performance differences ... on tasks of cognitive control and memory as well as scholastic achievement tests'.<sup>27</sup>

A systematic review *Physical Activity and Performance at School* published in the *Journal American Medical Association: Pediatrics*, came to the conclusion that 'Participation in physical activity is positively related to academic performance in children'.<sup>28</sup>

### **The epigenetics of play**

There is growing reason to believe that play may alter gene expression and affect long-term neural development. Animal research has observed that the equivalent of active play and social interaction 'enhanced motor and cognitive function through the alteration of synaptic activity–regulating genes'.<sup>29</sup> In mice, 'the expression levels of 104 genes were altered in the cortex' after only short term exposure to such an enriched environment.<sup>30</sup>

The study 'Early childhood home environment predicts frontal and temporal cortical thickness in the young adult brain' followed children from birth to age 19. The outcome was associated with whether the children had enriched play opportunities: "powerful evidence that even relatively minor variations within the normal range of home experience can affect brain development over a lifetime."<sup>31,32</sup>

There are significant implications for socially deprived children, with new evidence that childhood socioeconomic status predicts executive function performance and measures of prefrontal cortical (PFC) thickness and function.<sup>3,33</sup> This may be important in adulthood as greater PFC volume and thickness are associated with better executive performance in healthy adults.<sup>34</sup>

## **RECOMMENDATIONS**

Promoting play as a health initiative encompasses many factors beyond the sphere of paediatrics and child health. Most importantly, parents must be made fully aware of the vital role of play and how they can ensure their child benefits from it. BACCH members can also raise awareness of the following:

### **Play economics**

Overturn promoted misconceptions that for play to be effective, it must involve expensive toys. Simple, inexpensive toys are often more effective and it is also parents' presence and attention that benefit children.<sup>3</sup>

### **Play improves parent-child relationship**

Play enables parents to listen to their child in a very different way affording the opportunity to better understand the child's needs. The intensive engagement and relaxed interactions occurring through play convey to the child that they have their parents' undivided attention.<sup>3</sup>

### **Play is a disease prevention strategy**

Play may lead to a reduction in a wide variety of risk factors for morbidity including obesity and improvement in health outcomes.

### **Reduce discretionary screen time**

Health authorities believe excessive discretionary screen time (DST) has become a major obstacle to time spent in free or active play and are becoming increasingly vocal in recommending significant reductions (not e-books).<sup>35,36</sup> The NHS now encourages all parents to 'Decrease screen time ... Drag the kids away from the TV, computer and games console', which may require a degree of PA on the part of the parents.<sup>37</sup>

In confronting factors 'contributing to a decline in free play', The Annual Report of the Chief Medical Officer (2013) includes a specific section addressing the rise in children's DST: '**Screen time: ... Mechanisms to reduce this effect include age-specific maximum times set by parents.**'<sup>9</sup>

There is good evidence that parents can achieve significant reductions in child DST through establishing simple DST rules and limits and if necessary

through more robust means as described in a BMJ Open study which found: '... removal of all electronic games resulted in a significant increase in MVPA [moderate/vigorous] and a decrease in sedentary time'.<sup>38</sup>

### **Play outdoors**

It is important for children to play outdoors in nature, especially unstructured time the outdoors provides a different source of inspiration for play, and sunlight enables the dermal synthesis of vitamin D.

### **Play improves parental health**

Parents too have their own excess adiposity to contend with along with a range of other health risks. Instead of family members exercising individually (or in most cases not at all), playing together with children may be a highly effective long-term way to increase parental PA whilst reinforcing parent-child relationships. Parental role modelling for active play may also have a long term influence on children's activity habits.<sup>39</sup>

### **Schools**

Schools should reintroduce more frequent periods of 'play time' and outdoor learning. Active play time in school may immediately increase children's capacity to encode new information.<sup>3</sup> Public Health England recently reported 'we found a large body of good quality evidence ... for single bouts of exercise on academic performance as well as acute physical exercise on executive function to a positive long term association with moderate to vigorous physical activity on academic attainment'.<sup>10</sup> Schools must implement the Health and Safety Executive directive on play that 'mistaken health and safety concerns do not create sterile play environments that lack challenge and so prevent children from expanding their learning and stretching their abilities'.<sup>40</sup>

## **CONCLUSIONS**

Those working in paediatrics and child health are now in a strong position to elevate the role of play in the eyes of wider society to that of a paediatric and child health requirement. The BACCH and RCPCH should adopt a more formal and prescriptive position on play and communicate the reasons, ways and means to allied health professionals, parents, education authorities and policy makers. Moreover, it would be advantageous to shift official focus and accompanying vernacular from 'exercise' and 'physical activity' to play.

This will entail greater liaison between relevant government departments accompanied by more aggressive 'play policies'. NGO play bodies can provide guidance and advise on specific measures that can be taken to achieve improvements in net amounts of child play and play provision, especially for disadvantaged children.

Paediatric health professionals can and must provide the credibility and building blocks to bridge the gap between child health and play.

## **References**

1. Tremblay M et al. Position Statement on Active Outdoor Play. *Int. J. Environ. Res. Public Health* 2015;12:6475-6505.

doi:10.3390/ijerph120606475

2. AAP (2007) The importance of play in promoting healthy child development and maintaining strong parent-child bonds. Ginsburg KR; American Academy of Pediatrics Committee on Communications; American Academy of Pediatrics Committee on Psychosocial Aspects of Child and Family Health. *Pediatrics* 2007;119(1):182-91.
3. American Academy of Pediatrics: The Importance of Play in Promoting Healthy Child Development and Maintaining Strong Parent-Child Bond: Focus on Children in Poverty. Regina M. Milteer, Kenneth R. Ginsburg, and Council On Communications And Media Committee On Psychosocial Aspects Of Child And Family Health. *Pediatrics* 2012;129(1):e204-13. doi: 10.1542/peds.2011-2953
4. Harvard University Center on the Developing Child. *Enhancing and Practicing Executive Function Skills with Children from Infancy to Adolescence*. 2015 <http://www.developingchild.harvard.edu>
5. Janssen, I. Active Play as a Strategy for Preventing Childhood Obesity Can J Diabetes 2015;39: S6 <http://dx.doi.org/10.1016/j.jcjd.2015.01.032>
6. Howard J, McInnes K. The impact of children's perception of an activity as play rather than not play on emotional well-being. *Child Care Health Dev* 2013;39(5):737-42. doi: 10.1111/j.1365-2214.2012.01405.x. <http://www.nhs.uk/Livewell/childhealth6-15/Pages/Involve-the-whole-family-in-your-childs-weight-management.aspx> Accessed August 2015
7. Morris J et al. The Impact of Toys and Play on Children's Physical Activity. The Institute of Youth Sport, Loughborough University January 2012
8. Sandford, R., Duncombe, R., Mason, C & Butler, C. (2015). Ability to be active: exploring children's active play in primary schools. *International Journal of Play*. Published online: 05 Oct 2015  
DOI: 10.1080/21594937.2015.1060569
9. Chief Medical Officer. Annual Report of the Chief Medical Officer 2012, Our Children Deserve Better: Prevention Pays. Chapter 7 p10. Department of Health 2013. Crown Copyright.
10. Public Health England. Change4Life Evidence Review: Rapid evidence review on the effect of physical activity participation among children aged 5 – 11 years. June 2015. Crown copyright. <https://www.gov.uk/government/publications/change4life-evidence-review-on-physical-activity-in-children>
11. Vogel L. Active play key to curbing child obesity. *Can Med Assoc J* 2015; 187(9):E269-270.

12. Aronsson J, Waite S, Tighe Clark M. Measuring the impact of outdoor learning on the physical activity of school age children: The use of accelerometry. *Education and Health* 2015;33(3):57-62.
13. Jago R, Macdonald-Wallis K, Thompson JL et al. Better with a buddy: the influence of best friends on children's physical activity. *Med Sci Sports Exerc* 2011;43:259-65. doi:10.1249/MSS.0b013e3181edefaa
14. Greve W. Does playing pay? The fitness-effect of free play during childhood. *Evol Psychol* 2014;12(2):434-47.
15. Gray P. The Decline of Play and the Rise of Psychopathology in Children and Adolescents. *Am J Play* 2011;3(4):443-63
16. Mammen G, Faulkner G. Physical Activity and the Prevention of Depression: A Systematic Review of Prospective Studies. *Am J Prev Med* 2013;45(5):649–657
17. Du WJ. Physical activity as a protective factor against depressive symptoms in older Chinese veterans in the community: result from a national cross-sectional study. *Neuropsychiatric Disease and Treatment* 2015;11: 803–813
18. Crockford C et al. Endogenous peripheral oxytocin measures can give insight into the dynamics of social relationships: a review. *Front. Behav. Neurosci* 2014;8:68. doi: 10.3389/fnbeh.2014.00068
19. Domes G et al. Oxytocin Improves “Mind-Reading” in Humans. *Biological Psychiatry* 2007;61(6):731-733
20. Lane A et al. Oxytocin increases willingness to socially share one's emotions. *International Journal of Psychology* 2013;48(4):676–681 DOI: 10.1080/00207594.2012.677540
21. Alves E (2015) Early social environment affects the endogenous oxytocin system: a review and future directions. *Front Endocrinol (Lausanne)*. 2015 Mar 11;6:32. doi: 10.3389/fendo.2015.00032.
22. Zak P. *The Moral Molecule: How trust works*. Plume Books 2013.
23. Brussoni M et al. What is the Relationship between Risky Outdoor Play and Health in Children? A Systematic Review. *Int. J. Environ. Res. Public Health* 2015;12:6423-6454 doi:10.3390/ijerph120606423
24. Barker JE et al. Less-structured time in children's daily lives predicts self-directed executive functioning. *Front. Psychol* 2014;5:593 doi: 10.3389/fpsyg.2014.00593

25. Harvard 2011. Center on the Developing Child at Harvard University (2011). Building the Brain's "Air Traffic Control" System: How Early Experiences Shape the Development of Executive Function: Working Paper No. 11. <http://www.developingchild.harvard.edu>
26. Hillman CH et al. Effects of the FITKids Randomized Controlled Trial on Executive Control and Brain Function. *Pediatrics*. published ahead of print September 29, 2014 DOI: 10.1542/peds.2013-3219
27. Chaddock-Heyman L et al (2014) Aerobic fitness is associated with greater white matter integrity in children. *Frontiers in Human Neuroscience* August 2014;8:584 doi: 10.3389/fnhum.2014.00584
28. Singh A. Physical Activity and Performance at School: A Systematic Review of the Literature Including a Methodological Quality Assessment. *Arch Pediatr Adolesc Med* 2012;166(1):49-55. doi:10.1001/archpediatrics.2011.716
29. Lee MY et al. Alteration of Synaptic Activity–Regulating Genes Underlying Functional Improvement by Long-term Exposure to an Enriched Environment in the Adult. *Neurorehabil Neural Repair* 2013;27:(6):561-574 doi: 10.1177/1545968313481277
30. Li C et al. Effects of enriched environment on gene expression and signal pathways in cortex of hippocampal CA1 specific NMDAR1 knockout mice. *Brain Res Bull* 2007;71(6):568-77
31. Avants B et al. Early childhood home environment predicts frontal and temporal cortical thickness in the young adult brain. Paper presented at Society for Neuroscience annual meeting. Oct 17 2012, New Orleans. Abstract 908.02
32. Avants, B. B.; Hackman, D.; Betancourt, L.; Lawson, G. M.; Hurt, H. & Farah, M.J. "Relation of Childhood Home Environment to Cortical Thickness in Late Adolescence: Specificity of Experience and Timing," *PLOS One*, in press, 2016.
33. Lawson GM, Duda JT, Avants BB et al. Associations between Children's Socioeconomic Status and Prefrontal Cortical Thickness. *Dev Sci* 2013;16(5): 641–652. doi:10.1111/desc.12096.
34. Yuan P, Raza N. Prefrontal Cortex and Executive Functions in Healthy Adults: A Meta-Analysis of Structural Neuroimaging Studies. *Neurosci Biobehav Rev* 2014;42:180–92. doi:10.1016/j.neubiorev.2014.02.005.
35. Sigman A. Time for a view on screen time. *Arch Dis Child* 2012;97(11):935-942. doi:10.1136/archdischild-2012-302196

36. Sigman A. Virtually addicted: why general practice must now confront screen dependency. *Br J Gen Pract* 2014;64(629):610-11.  
DOI: 10.3399/bjgp14X682597
37. NHS Choices. Get healthy as a family. 5. Decrease screen time.
38. Straker LM, Abbott RA, Smith AJ. To remove or to replace traditional electronic games? A crossover randomised controlled trial on the impact of removing or replacing home access to electronic games on physical activity and sedentary behaviour in children aged 10–12 years. *BMJ Open* 2013;3:e002629. doi:10.1136/bmjopen-2013-002629
39. Määttä S, Ray C, Roos E. Associations of parental influence and 10–11-year-old children's physical activity: Are they mediated by children's perceived competence and attraction to physical activity? *Scand J Public Health* 2014;42(1):45-51 doi:10.1177/1403494813504506
40. Health and Safety Executive. Children's Play And Leisure – Promoting A Balanced Approach. Statement. September 2012.  
<http://www.hse.gov.uk/entertainment/chlds-play-statement.htm>