



Mind, Brain and Whole-Child Coaching

DR. SHEILA OHLSSON WALKER

If there was one “magic pill” we could take to optimize life-long brain function, mental and physical health, and quality of life, the major “active ingredient” would be regular exercise. Biopsychosocial research shows that physically active youth, on average, have stronger academic outcomes, better mental and physical health, lower incidences of obesity and high-risk behavior, and are more likely to go to college.^{1,2,3} Beneficial effects are further strengthened by the availability of natural green space.⁴

Despite this broad and time-tested body of research, attrition from youth sport accelerates strongly in the teenage years, primarily due to a lack of engagement. According to the National Alliance for Youth Sports, about “70% of young athletes quit organized sports by the age of 13.” Moreover, participation rates are lower for girls than boys, and attrition rates are higher,^{5,6} perhaps partially stemming from the fact that women comprise less than one-quarter of all coaches in youth sport.⁷ Clearly equity and access are significant contributors to both participation and attrition for our disadvantaged youth,⁸ a topic we aim to address more fully in the future. For the present moment, considering both the economic and quality of life cost in unfulfilled human potential, our primary focus is on engagement. Which begs the question: how can we foster youth engagement in sport early in life in a way that’s fun,⁹ during neurobiological “sensitive periods” that make behavior the most likely to stick for life?^{10,11}

It all begins with informed, intentional, and thoughtful development of coach-athlete relationships. Research shows that having one safe, trusted, supportive relationship with an adult can make the difference between a child sinking, surviving, or thriving, particularly for children who have experienced discrimination, trauma, or early-life adversity.^{12,13} Strong relationships are a core feature of well-run youth programs of all types, and substantial evidence demonstrates a positive impact on social-emotional skills, intentional self-regulation, resilience, sense of purpose, greater contribution to community, and development of other important life assets.^{14,15} Human beings operate in relational dynamic systems, with quantum- and biologic-level energy infusing our brains and bodies in a way that, through social relationships, can either degrade or promote cognition, mood, and health.^{16,17} Nonetheless, despite the important role of coaches in whole child development, between 10 and 30% receive any formal training, with little to no education on how children grow, develop and learn.^{18,19}

Science tells us that nurture shapes nature through the process of epigenetics, a biopsychosocial phenomenon that continues to highlight the context-dependent, malleable nature of human biology.²⁰ Given the power of environmental context to influence how our DNA is read and expressed, and the pivotal significance of key adults in youth development, it follows that strengthening coach-athlete relationships, the central link to youth



engagement, is the essential starting point. Enhancing skills, mindsets, and tools will bolster the opportunity to more effectively confer myriad benefits we know sport can offer – benefits that pay dividends throughout life.

For pragmatic inspiration, we turn to the science of learning and development to make a case for leveraging the success of Mind, Brain, and Education Science into the field of athletics. Educators, from early childhood to higher education, public, private, charter, and international schools, have increasingly harnessed bio-social research findings to inform teaching and learning in both formal and informal educational settings. What if this same research were to be applied to the professional development of more than 6.5 million youth, high school, college, elite, Olympic, and professional level coaches in the United States, who are responsible for shaping our tens of millions of developing athletes?

To examine this question, let's start with an overview of where sport participation takes place. Athletics is offered during the school day, though in ever-decreasing amounts throughout our country

– a trend which must be reversed given physical activity's integral role in healthy life course development. This begs a redefinition of the role of the Athletic Director in school settings, with an intentional focus on cross-department collaboration to bolster the social emotional, academic, health and other student outcomes that are endemic to sport participation.

Youth athletes often spend more time with their coach-educators than with their classroom teachers. This interaction occurs in sport-specific contexts, full of emotional highs and lows, and rich with “teachable moments” to absorb and integrate core life skills such as resilience, perseverance, teamwork and leadership. As an example, a high school history student at St. Andrew's Episcopal School, home of the Center for Transformative Teaching and Learning, spends 200 minutes a week studying the past. The same student, as a varsity or junior varsity interscholastic athlete, will spend no less than 20 hours a week (1200 minutes) participating in various school sports, “studying” for the future. This six-fold increase in time is rich with opportunity to impact the athletic experience, hence the broader lives of developing

student-athletes.

After the school day ends, athletics is the overwhelming out of school time (OST) activity, engaging a broad and diverse group of youth.²¹ Moreover, fields, courts, and gymnasiums are places where phones must remain on the sidelines, making sport a major ally in the ongoing battle to reduce excessive screen time. Indeed, under most ecological conditions, athletics is linked to indicators of positive youth development.²² Sports reach a majority of youth both during and after school, in sans-technology settings, positioning them for growth through human interaction, physical activity and positive brain chemistry.

Excellent coaches, like teachers, educate, inspire, and shape their athletes by virtue of a strong, safe, and trusted relational bond that crosses emotional, physical, and intellectual domains. At their best, “coach-educators” leverage a mixture of art and science to help their student-athletes thrive. However, they often cannot articulate their methods, which emerge organically from an integration of past experience both on and off the field or court. We hypothesize that by tapping into this



established knowledge base and fortifying it with basic principles of the learning sciences, a great opportunity exists to elevate the practice of coaching.

All athletes deserve a coach-educator who understands how the mind learns, a process that can only be described as nonlinear based on what we know from the learning sciences.²³ Rather than a one-directional neurocognitive ladder which serves as a base to scaffold new information, the reality of learning is more accurately portrayed by a highly variable and jagged “constructive developmental web” in which mastery of complex skills takes place in a manner uniquely suited to the individual.²⁴ A broad body of biopsychosocial research is already informing classroom-based strategies to refine instruction based on these principles. Leveraging and advancing this body of work to reconceptualize practice design and communication techniques could provide coaches with

differences in an individual’s “biological sensitivity to context”, a concept embodied in the analogy of “dandelion” (hardy and highly resilient) and “orchid” children (who thrive in idyllic conditions, though can wilt when stress becomes overwhelming)?^{26,27} Built-in human variability holds important implications for coach-athlete communication patterns and relationships. The bottom line – while some level of stress is appropriate in sport contexts, as it fuels attention and performance, there are important individual differences in how it is processed and internalized. Importantly, chronic or punitively imposed stress, such as a coach yelling in frustration at an athlete, works in direct opposition to the ultimate goal: that of engagement.

Imagine if coaches had a more holistic understanding of the young person on their field, inside and out – akin to a basic human operating manual. If they held introductory level knowledge about how

Imagine if coaches had a more holistic understanding of their athletes, inside and out – like a basic instruction manual. If they held basic knowledge about how the three major neural networks, the Executive Control Network, the Default Mode Network and the Salience Network, collaborate in the brain, how might this influence how practices or pre-game gatherings are structured?

tools to enhance sport-related attention and memory, foster positive mindsets, and play a critical role in optimizing the biological “raw materials” of their athletes both on and off the field.

Like students in the classroom, every student-athlete brings their own unique mind to each practice, game, meet, match, or competition. This uniqueness confers variability in how athletes receive, filter, and apply physical, technical, tactical, and psychological information related to their sport. Although biosocial science clearly shows that multi-model learning is far and away the most effective way to teach new information, the predominant method of coaching continues to be by oral communication, often in highly stressful environments such as training sessions or mid-competition.²⁵

How do individual athletes receive information in these contexts? What is said by the coach, versus what is heard by the athlete? Would it be helpful for coaches to understand that there are major

the three major neural networks, the Executive Control Network (attention to the outside world), the Default Mode Network (internally directed attention) and the Salience Network (the on-off switch between the two), and how they collaborate in the brain.²⁸ Might this influence how practices or pre- and post-game gatherings are structured and conducted? Imagine, too, if coaches had insight into how the amygdala (the brain’s “emotional smoke detector”) and hippocampus (a key brain center for learning and memory) might operate in high-pressure sport contexts.²⁹ Might coaches be more effective in their roles if aware of a phenomenon Dr. Mariale Hardiman from the Johns Hopkins University School of Education calls “downshifting”, a term for how a teacher can derail learning and growth simply by the manner and tone in which information is delivered? Because of the way in which the brain is wired and develops over time, information from the outside world first passes through emotional filters. This results in

a subjective, personalized interpretation of the message – both for better, and for worse.³⁰

The science of “downshifting” extends further into the arenas of physical and emotional safety between coaches and athletes. As we have seen in incidences of abuse, these brief moments in time for an adult can live on for a lifetime in a young athlete, negatively reorienting otherwise healthy life trajectories. While stress in the proper dose is a necessary and important part of healthy development, chronic stress is another story. Importantly – what’s real in the mind is real in the body – and the biochemical “marinate” of hormonal stress molecules, in high and persistent dosages without buffering from positive sources, can have a similar effect to neurotoxins.^{31,32}

Ramifications of trauma can include reshaping of the structure and function of key brain areas and networks important for learning and life. Chronic stress can also wreak havoc, through primary inflammatory pathways, on the gut microbiome, immunity, and health.^{33,34} Moreover, because we humans are social animals, and both joy and stress are contagious at a biochemical level, the relational dynamic systems within which youth operate – families, schools, and communities – can also pay a heavy price.^{35,36,37}

Fortunately, the science of “upshifting” is equally as powerful. Research shows that physical activity can be as effective as medication in supporting mental wellness.^{38,39} Engagement in team (e.g. basketball, soccer or football) or individual sports (e.g. tennis, bicycling or gymnastics) are good examples of such buffers, and are particularly powerful in decreasing anxiety and depression for youth who have suffered from adverse childhood experiences (ACEs).⁴⁰

When sport-related experiences also offer positive, sustained relationships with an engaged, competent, and caring adult (e.g. coach-educator), the upside is immense.

In this context, and when youth can absorb important life skills as well as have opportunities to enact these skills in valued family, school, or community settings, this cohort of factors has been called “The Big Three” in the relational strengths-based approach embodied by the field of Positive Youth Development (PYD).⁴¹ It is important to note that emotional and physical safety as well as trust must be present for this recipe to work, highlighting the vital importance of sound accreditation and certification standards for our youth athletic coaches.

The PYD Big Three, when present, undergird the many lifelong assets that can

develop through positive experience with sport. They foster the development of what Rich Lerner at Tufts’ Institute for Applied Research in Youth Development calls “The 5 C’s”: Competence, Confidence, Character, Connection, and Caring. An intentional focus on building these attributes in youth can serve to foster a 6th C – Community, which promotes both mental and physical health over the lifespan by elevating human connection and sense of purpose outside oneself, hence buffering isolation. Turning to physical health, coaches who understand the repercussions of early over-specialization in sport, and the long-term vulnerability conferred by early life head injury can take concrete steps to develop sport contexts that provide their athletes with safe spaces and places to play and train.^{42,43,44}

At a societal level, coaches have an important role to play in reducing obesity, which is the #1 risk factor for chronic disease in the US, for which physical activity is the #1 solution. From a public health frame, 90% of our nation’s \$3.5 trillion annual healthcare expenditure (17.9% of 2018 GDP) goes towards individuals with chronic and mental health issues.^{45,46} As related to our youth-sport focused work, the critical element to bear in mind is that chronic disease and mental health issues are largely modifiable and even preventable with early detection and intervention.^{47,48} While we are never too old to make lifestyle changes that promote health, the developmental periods of childhood and youth are exponentially more powerful.

Collectively, the biological sciences tell an optimistic story of how human potential can flourish when the context is safe, healthy, stimulating, and well-suited to the individual. Because our DNA is neither fixed nor deterministic, and instead adapts and develops based on context, human malleability – particularly that of youth – is our ally in shaping meaningful attributes in a way that can have a broad and multi-generational impact on lives and communities. By way of example, children of physically active parents are likelier to be active themselves, enhancing the odds of healthy virtuous cycles.⁴⁹

Long-term behavior change requires culture change, and as the saying goes, you can’t change what you can’t measure. While new measures and metrics are being developed for the learning sciences, the same thesis applies to the field of whole child coaching. This underscores the need for asset-based metrics that are sensitive to change over time, and offer both relevant and practical information at the level of the individual.

We have already seen what elevating a classroom teacher or school leader’s understanding of the Science of Learning can do to enhance both individual and group mindset, collective efficacy, knowledge, research-to-classroom translation and implementation skills. We’ve also seen that educators in both classroom and sport contexts hold tremendous power to shape young lives when the recipe includes the right ingredients. These include physical activity, adequate sleep, nutrition, mindfulness/meditation practices, mental health support as needed, and the key ingredient – safe, trusted, supportive relationships.

Taken as a whole, this is the blue-ribbon-winning recipe for upshifting, and the way in which coaches can help diverse youth not only beat the odds, but change the odds. In closing, by purposefully and strategically integrating the fields of youth sport, education, and public health, a tremendous opportunity exists. Elevating the profession of coaching by developing a research-informed and data-driven approach to bolstering athlete engagement, one which reduces attrition, promotes health, advances equity, cultivates athletic excellence and global citizenship – all grounded in the science of how each unique brain develops, learns, adapts, and thrives – is our call to action

Dr. Sheila Ohlsson Walker is a Senior Scientist at the Institute for Applied Research in Youth Development, Tufts University & Assistant Visiting Professor, Johns Hopkins School of Education, and Adjunct Assistant Professor of Pediatrics at the George Washington University School of Medicine and Health Sciences/Children’s National Hospital.

Reference Notes

- 1 <https://www.aspenprojectplay.org/kids-sports-facts>
- 2 Sammi R Chekroud, Ralitz Gueorguieva, Amanda B Zheutlin, Martin Paulus, Harlan M Krumholz, John H Krystal, Adam M Chekroud. Association between physical exercise and mental health in 1.2 million individuals in the USA between 2011 and 2015: a cross-sectional study. *Lancet*.
- 3 Erickson, K. I., Voss, M. W., Prakash, R. S., Basak, C., Szabo, A., Chaddock, L., Kramer, A. F. (2011). Exercise training increases size of hippocampus and improves memory. *Proceedings of the National Academy of Sciences*, 108(7), 3017–3022.
- 4 Bowler, D. E., Buyung-Ali, L. M., Knight, T. M., & Pullin, A. S. (2010). A systematic review of evidence for the added benefits to health of exposure to natural environments. *BMC Public Health*, 10(1), 1–10. doi:10.1186/1471-2458-10-456
- 5 <https://www.aspenprojectplay.org/kids-sports-participation-rates>;
- 6 <https://www.dyc.edu/academics/research/crpush/docs/mapping-attrition-us-sports.pdf>
- 7 <https://www.aspenprojectplay.org/kids-sports-participation-rates>
- 8 <http://youthreport.projectplay.us/the-problem>
- 9 Amanda J. Visek, Sara M. Achrafi, Heather Manning, Karen McDonnell, Brandon S. Harris and Loretta DiPietro. (2015) The Fun Integration Theory: Towards Sustaining Children and Adolescents Sport Participation. *J Phys Act Health*, 12(3), 424–433. doi:10.1123/jpah.2013-0180
- 10 Mary Helen Immordino-Yang, Linda Darling-Hammond, and Christina Krone (2019). The Brain Basis for Integrated Social, Emotional and Academic Development: How emotions and social relationships drive learning. <https://www.aspeninstitute.org/publications/the-brain-basis-for-integrated-social-emotional-and-academic-development/>
- 11 Mary Helen Immordino-Yang, Linda Darling-Hammond & Christina R. Krone. (2019). Nurturing Nature: How Brain Development Is Inherently Social and Emotional, and What This Means for Education, *Educational Psychologist*, 54(3), 185–204.
- 12 David Osher, Pamela Cantor, Juliette Berg, Lily Steyer & Todd Rose (2018). Drivers of human development: How relationships and context shape learning and development. *Applied Developmental Science*, DOI: 10.1080/10888691.2017.1398650
- 13 Linda Darling-Hammond, Lisa Flook, Channa Cook-Harvey, Brigid Barron & David Osher (2019). Implications for educational practice of the science of learning and development. *Applied Developmental Science*, DOI: 10.1080/10888691.2018.1537791
- 14 Ettekal, A. V., Callina, K. S., & Lerner, R. M. (2015). The promotion of character through youth development programs: A view of the issues. *Journal of Youth Development*, 10(3), 6-13.
- 15 Zarrett, N., & Lerner, R. M. (2008, February). Ways to promote the positive development of children and youth. *Child Trends Research-to-Results Brief*. Publication 2008-11.
- 16 Pamela Cantor, David Osher, Juliette Berg, Lily Steyer & Todd Rose (2018). Malleability, plasticity, and individuality: How children learn and develop in context. *Applied Developmental Science*, DOI: 10.1080/10888691.2017.1398649
- 17 <https://www.amazon.com/Dancing-Wu-Li-Masters-Overview/dp/0060959681>
- 18 <https://www.prweb.com/releases/sports/coaching/prweb907124.htm>;
- 19 <https://www.aspenprojectplay.org/kids-sports-participation-rates>
- 20 Pamela Cantor, David Osher, Juliette Berg, Lily Steyer & Todd Rose (2018). Malleability, plasticity, and individuality: How children learn and develop in context, *Applied Developmental Science*, DOI: 10.1080/10888691.2017.1398649
- 21 *Child Trends*, March 2014
- 22 Zarrett, N., & Lerner, R. M. (2008, February). Ways to promote the positive development of children and youth. *Child Trends Research-to-Results Brief*. Publication 2008-11.
- 23 Todd Rose, "The End of Average": <https://www.amazon.com/End-Average-Succeed-Values-Sameness/dp/0062358367>
- 24 Pamela Cantor, David Osher, Juliette Berg, Lily Steyer & Todd Rose (2018). Malleability, plasticity, and individuality: How children learn and develop in context, *Applied Developmental Science*. DOI: 10.1080/10888691.2017.1398649
- 25 <https://www.amazon.com/Neuroteach-Brain-Science-Future-Education/dp/1475825358>
- 26 <https://www.amazon.com/Orchid-Dandelion-W-Thomas-Boyce/dp/0670070106> and
- 27 B. Ellis & T. Boyce (2011). Differential susceptibility to the environment: An evolutionary–neurodevelopmental theory. *Development & Psychopathology*.
- 28 Mary Helen Immordino-Yang, Linda Darling-Hammond & Christina R. Krone. (2019). Nurturing Nature: How Brain Development Is Inherently Social and Emotional, and What This Means for Education, *Educational Psychologist*, 54(3), 185–204.
- 29 Bessel Van Der Kolk: The Body Keeps the Score // <https://www.amazon.com/Body-Keeps-Score-Healing-Trauma/dp/0143127748>
- 30 Marc Brackett, "Permission to Feel", <https://www.amazon.com/Permission-Feel-Unlocking-Emotions-Ourselves/dp/1250212847>
- 31 Center for the Developing Child, Harvard; <https://developing-child.harvard.edu/science/>
- 32 Johnson, Riley, Granger & Riis (2013). The Science of Early Life Toxic Stress for Pediatric Practice and Advocacy. *JAMA Pediatrics*.
- 33 Nadine Burke Harris, *The Deepest Well*: <https://www.amazon.com/Deepest-Well-Long-Term-Childhood-Adversity-ebook/dp/B01N7HZ73B>;
- 34 Mary Helen Immordino-Yang, Linda Darling-Hammond & Christina R. Krone. (2019). Nurturing Nature: How Brain Development Is Inherently Social and Emotional, and What This Means for Education, *Educational Psychologist*, 54(3), 185–204.
- 35 U. Bronfenbrenner & P. A. Morris (2006). The Bioecological Model of Human Development. In W. Damon & R. M. Lerner (Eds.) & R. M. Lerner (Vol. Ed.), *Handbook of child psychology: Vol. 1. Theoretical models of human development* (6th ed., pp. 793-828). Hoboken, NJ: Wiley.
- 36 Bowers, E. P., Geldhof, G. J., Johnson, S. K., Hilliard, L. J., Hershberg, R. M., Lerner, J. V., & Lerner, R. M. (Eds.). (2015). *Promoting Positive Youth Development: Lessons Learned from the 4-H Study*. New York, NY: Springer.
- 37 Overton, W. F. (2015a). Process and relational developmental systems. In W. F. Overton & P. C. M. Molenaar (Eds.), *Handbook of Child Psychology and Developmental Science, Volume 1: Theory and Method* (7th ed., pp. 9-62). Editor-in-chief: R. M. Lerner. Hoboken, NJ: Wiley.
- 38 *Front* (2017). Is the comparison between exercise and pharmacologic treatment of depression in the clinical practice guidelines of the American College of Physicians? *Pharmacology*, 8, 257. Published online 2017 May 15. doi: 10.3389/fphar.2017.00257 PMCID: PMC5430071 PMID: 28555108
- 39 <https://www.nami.org/blogs/nami-blog/may-2016/exercise-for-mental-health-8-keys-to-get-and-stay>.
- 40 Molly C. Easterlin, Paul J. Chung, Mei Leng, and Rebecca Dudovitz. Association of Team Sports Participation With Long-term Mental Health Outcomes Among Individuals Exposed to Adverse Childhood Experiences.
- 41 Lerner, R. M., Lerner, J. V., Bowers, E., & Geldhof, G. J. (2015) Positive youth development and relational developmental systems. In W. F. Overton & P. C. Molenaar (Eds.), *Theory and Method. Volume 1 of the Handbook of Child Psychology and Developmental Science* (7th ed.). Editor-in-chief: R. M. Lerner. (pp. 607-651). Hoboken, NJ: Wiley.
- 42 David Epstein, "Range": <https://www.amazon.com/Range-Generalists-Triumph-Specialized-World/dp/0735214484>;
- 43 Popkin C.A., Bayomy, A. F., & Ahmad, C. Ss. J (2019). Early Sport Specialization. *American Academy of Orthopedic Surgery*, 27(22), e995-e1000. doi: 10.5435/JAAOS-D-18-00187
- 44 Chris Feudtner & Steven H. Miles (2018). Traumatic Brain Injury News Reports and Participation in High School Tackle Football. *JAMA Pediatrics*, 172(5), 492-494. doi: 10.1001/jamapediatrics.2017.5242
- 45 <https://www.cms.gov/research-statistics-data-and-systems/statistics-trends-and-reports/nationalhealthexpenddata/nhe-fact-sheet.html> ;
- 46 <https://www.cdc.gov/chronicdisease/about/prevent/index.htm>
- 47 <https://developingchild.harvard.edu/science/deep-dives/lifelong-health/>;
- 48 <https://www.cdc.gov/chronicdisease/about/prevent/index.htm>
- 49 Mitchell, J., Skouteris, H., McCabe, M., Ricciardelli, L. A., Milgrom, J., Baur, L. A., et al. (2012). Physical activity in young children: A systematic review of parental influences. *Early Child Development and Care*, 182, 1411–1437.