An Imperative to "Physicalize" Our Way of Being in the World

Economic consequences regarding chronic diseases will be devastating if we wait any longer. Public schools worldwide may be the most viable agents-of-change.

Joel Kirsch, Ph.D., President of the American Sports Institute

Jouni Välijärvi, Ph.D., Professor, and former Director of the Finnish Institute for Educational Research, University of Jyväskylä, Finland

There are times when, as a species, we must set aside our differences, unite, and manifest our collective will around a common vision to combat a global threat. This is one of those times.

We are at a critical tipping point around the world. The imperative for an immediate, proactive paradigm shift regarding physicality is upon us. Without a comprehensive, global transformation in how all of humanity views and integrates the physical domain and, in particular, physical activity into its major institutions and overall way of life, the reach of personal, social, economic, and political turmoil will know no bounds.

This is not hyperbole, but rather, a preemptive call, for we are nearing the point where, relatively speaking, very little time is left. At the same time, change is possible, for just as worldwide attitudes and behaviors toward the reduction of smoking have changed substantially over the past four or five decades, this paradigm shift regarding physicality can

also happen in every country and corner of the globe. And, interestingly enough, by listening to, understanding, and engaging children in public schools worldwide to help adults and experts develop new, innovative solutions together with them, the schools may be the best place to initiate this global transformation to "physicalize" our way of being in the world.

The Issue of Chronic Diseases Worldwide

Nowhere is this global transformation needed more than with how we address the growing prevalence of chronic diseases and its implications. For our purposes here, we are referring to four of the five leading chronic diseases worldwide—diabetes; cardiovascular disease; cancer; and mental illness, especially depression and dementia. (We do not include respiratory diseases related to tobacco use because the focus of this paper is on physical activity, schools, and young children, who, for the most part, do not use tobacco.)

Over the years, various studies have done a good job examining this issue. They have accurately defined it, they have detailed the prevalence and cost analysis for each chronic disease in particular countries, they have put forth possible remedies and prevention methods, and they have set global-reduction targets. However, for quite some time, a comprehensive look at prevalence, causes, and effects in association with an actual composite cost of everything, including global-economic implications, had not been produced.

This changed with a report co-produced by the World Economic Forum (WEF) and the Harvard School of Public Health—*The Global Economic Burden of Non-communicable Diseases* (1, 2). The report was presented in September 2011 at a two-day, high-level meeting of the United Nations. And while methods for determining the aggregate costs for something of this magnitude can be debated, the report was praised for its breadth and scope.

The report's findings were sobering. Globally, 63% of all deaths are attributed to chronic diseases, with 80% of these deaths occurring in low and middle-income countries. In addition, half of those who die from chronic diseases do so while in their prime productive years.

While the personal, familial, community, and overall emotional toll chronic diseases take on those afflicted and their loved ones are anguishing, the global economic impact shocks the senses. If current trends continue, it is projected that from the date the report was presented until 2030, the worldwide direct and indirect cost of chronic diseases will be a staggering US$ 47 trillion. This will severely constrict the economies of developed nations, threaten the tentative economies of developing nations, and destabilize the fragile economies of low-income nations.

Further, developed, high-income nations currently carry the greatest economic burden of chronic diseases. However, because the overwhelming number of deaths due to these diseases occur in low and middle-income countries where populations are increasing dramatically, this will place a heightened disproportionate strain on their fragile economies and limited resources. Consternation and despair will be pervasive, and people will eventually feel as though they have nothing to lose.

This potentially forebodes failed states; demagogues rising to power; violent, extremist groups seeking control; and a massive number of displaced refugees desperately seeking safe haven flooding into developed nations, making the current refugee crisis seem like a trickle. As one member of parliament from a European Union nation put it, "It would be a disaster."

Compounding this chaotic scenario, with the UN estimating that there will be approximately two billion more humans on the planet by 2050, and with people living longer, the global personal and economic implications of chronic diseases present an unprecedented challenge that must be addressed proactively and immediately.

As with other difficult global issues confronting us, we know what the prevalences are of specific chronic diseases, what the causes are, what the human and economic tolls are, and we have thoughtful recommendations to deal with these issues. All that we know and recommend are included in colorful reports with hopeful images. However, despite all the studies and reports, and hard work and thoughtfulness that have gone into them, the situation remains a grave concern and is expected to get worse in the coming decades (1).

Recognizing this, the UN report proffers an unsettling caveat in response to this global crisis and the reports and initiatives presented to date: "Countries are developing strategies and guidelines for addressing NCDs (chronic diseases) and risk factors through innovative changes to health infrastructure, new funding mechanisms, improved surveillance methods and policy responses (WHO, 2011a). Yet, the reality is that these approaches as they stand today are severely inadequate."

Physical Activity: A Simple Lifestyle Change That Can Make a World (and Wealth) of Difference

A major reason why the reports and initiatives to date have proven to be inadequate in dealing with the global scourge of chronic disease is that they focus mostly on those afflicted with

chronic diseases. At first look, this makes sense. Our hearts and efforts reach out to those who suffer.

However, because those afflicted are overwhelmingly adults whose lifestyle patterns are well established, this is the very demographic group where a significant change in lifestyle is least likely to occur. And all of the five diseases referenced here regarding the most prevalent chronic diseases worldwide— diabetes; cardiovascular disease; cancer; respiratory diseases; and mental illness, especially depression and dementia—are, for the most part, those that develop as a result of long-term lifestyle choices.

At the same time, an extensive body of research and reports, including the WEF/Harvard one presented at the UN in September 2011 and those from the World Heath Organization (WHO), the UN's health agency, state that diabetes, cardiovascular disease, cancer, and mental illness related to depression and dementia are diseases that can be prevented, and in some cases even cured. How so? By simply engaging in what many claim to be the most effective wellness practice known: appropriate types and levels of physical activity.

(Note: While *prevention* is a term many use in describing efforts to keep chronic diseases from occurring at all, for our purposes here, we'll use the term *wellness,* which is more proactive and represents the positive side of prevention. In this context, we're not describing a way to prevent something, but rather, articulating a way of life that promotes health, fitness, and happiness, or wellness.)

A Rationale for Physical Activity as an Agent-of-Change Process

Yes, we know what the concerns are. We know what physical activity's potential is for dealing with chronic diseases globally. We know what needs to be done. We're just not implementing it. So the issue is *how* do we create real change? It is quite clear that what is lacking is the collective will to go through the difficult process of change. At the same time, as we have seen with tobacco, it is possible to generate a global collective will regarding a behavioral health issue.

As noted earlier, changing the lifestyle habits of adults is tough. Equally difficult is changing institutional behavior. People and institutions want things to change, but are too often unwilling to be the change. As Gandhi once said, "We must be the change we wish to see in the world."

So let's examine what the research says by going on a brief chronological journey from the time a fetus is viable in the womb all the way through an individual's later years to understand just how impactful physical activity is in maximizing wellness. Then we'll look at how this research can be applied in an effective, viable way to create change.

Here's what the fairly recent, current, and emerging research shows:

- The brains of babies born to women who engage in regular, aerobic exercise throughout pregnancy are more developed at birth than those of babies born to mothers who do not regularly exercise aerobically during pregnancy (3).
- For people of all ages, appropriate forms and levels of exercise, especially the aerobic type, stimulate areas of the brain related to focus, memory, and learning. The more physically active we are, the better our brains work (4).
- Appropriate forms and levels of exercise, especially the aerobic type, help protect our DNA, acting as a wellness-promoting force that plays a significant role in preventing diabetes, coronary heart disease, and cancer (5, 6).
- For children and adults, sitting is particularly harmful to their health. After four hours of sitting, the genes that regulate the amount of glucose and fat in the body start to shut down. And these negative effects cannot be compensated for by exercising other parts of the day. These effects are irreversible (7, 8, 9).
- For adults with coronary heart disease or prediabetes, there is no basic difference between exercise and drugs in effectively treating these diseases. And for adults with stroke, exercise is more effective than drug treatment. Further, with exercise, there are no drug costs or side effects in the treatment of these diseases (10).
- Physical exercise reduces the incidence of cancer, and for those who do develop it, physical exercise plays a significant role in inhibiting the growth of tumors (11),
- Depressed adults who take up regular aerobic exercise improve just as much as those treated with antidepressants. Further, aerobic exercise can prevent depression from recurring. Once again, for those who exercise, there are no drug costs or side effects (12).
- For seniors, those who exercise regularly, especially aerobically, have much better memory control and are far less likely to develop dementia than those who do not (13, 14, 15, 16, 17).

Why are all these research results so? Professor Philip Holmes, an American neuroscientist at the University of Georgia, put it this way in a 2010 *TIME* magazine article : "It occurs to us (neuroscientists) that exercise is the more normal or natural condition, and that being sedentary is really the abnormal situation" (12). To confirm this, Professor Charles Hillman, a leading neuroscientist in the area of physical activity and cognition at Northeastern University in Boston, Massachusetts, and a member of the American Sports Institute's International Board of

Advisors, was asked whether or not he believed Professor Holmes' statement to be accurate. Hillman's crisp and immediate response, "Yes."

This is also validated in two statements by Professor Fernando Gómez-Pinilla, an internationally-recognized neuroscientist at the University of California, Los Angeles, a working colleague of Professor Hillman, and also a member of the American Sports Institute's International Board of Advisors: "Humans have evolved to thrive on physical activity; without it, not only do our bodies go awry but so do our brains" (18). And when we are physically active: "Going jogging or for a run is a sort of re-encounter with our biology, with what we really are. For a moment, we re-encounter ourselves, satisfying our genes and keeping the equilibrium in our brain and body" (19).

What's at the heart of the statements from professors Holmes, Hillman, and Gómez-Pinilla? Over millions of years of evolution, human beings have been genetically programmed to engage in sustained, high levels of physical activity. When we do, we thrive physically, mentally, and emotionally in both personal and societal contexts. When we don't, we develop disease, despair, and dysfunction.

Many would say that the global rise in the incidence of chronic diseases is a pandemic problem. Even the WEF/Harvard report presented to the UN in September 2011 indicates this. Yes, this issue is certainly pandemic. However, with all due respect, it is not a problem. Rather, it is the *symptom* or outgrowth of a problem. As the research shows, the problem is that, as a species, we are not physically active enough. We are abnormally too sedentary for our genetic makeup, a makeup that has developed over millions of years of evolution and defines what we are as human beings.

The bottom line is that we are operating on the wrong side of humanity by being less physically active than our genetic makeup mandates. Our very way of life is at odds with what we are as a species, and the resulting growing incidence of chronic diseases worldwide is a symptom of this abnormal way of being in the world. Basically, we are on an evolutionary detour.

In practical terms, what millions of years of evolution and genetic programming are trying to tell us is that if we want to be healthy and happy, we need to be physically active the amount of time we are currently sedentary, and sedentary the amount of time we are currently physically active. For humans, being physically active is what is normal. Being sedentary is abnormal. We need to get off this evolutionary detour and get back on track because, as we have seen, we

are never more human than when we are physically engaged. We need our humanity returned to us.

The Age Group Best-Suited to Initiate Change

We know that there is a global epidemic concerning overweight and obesity. The WEF/Harvard report states that many refer to this as a *globesity epidemic*. This is not only true for adults, but for children as well. And one of the major, if not most important, risk factors for overweight and obesity is the declining rates of physical activity. While childhood malnutrition and its tragic effects continue to be a major concern in particular parts of the world, the prevalence of childhood overweight and obesity worldwide is presaging the devastating rates of chronic diseases as children grow into adulthood.

As is widely recognized, the lifestyle habits practiced during childhood often become the lifestyle traits of adulthood. As the WHO website notes, sedentary children who are overweight and obese in their youth are likely to be plagued by overweight and obesity as adults. On the other hand, children who are physically active in their youth are much more likely to be healthy and fit physically-active adults.

Of course we should do everything we can for those who suffer from chronic diseases. That goes without question. At the same time, the best way to deal with the prevalence of chronic diseases worldwide is to prevent it, to keep it from ever happening by introducing children at the youngest possible ages to wellness-lifestyle approaches that promote lasting physical and mental well-being.

Our Global Public Schools: A Viable, Cost-Effective Agent-of-Change Institution

Because children spend much of their waking day in school, this may be the most viable, cost-effective institution for developing healthy lifestyles that have the potential to last a lifetime. Young schoolchildren simply do whatever a caring, talented teacher asks of them. And the children just assume that what the teacher asks is the normal thing to do. Here, we have a ready and willing audience for incorporating high levels of daily, physical activity into the entire learning experience.

However, currently throughout the world, most children spend the greater part of their school day being seated and sedentary. And, as indicated earlier, this method of learning is predisposing schoolchildren to the very chronic diseases we are trying to prevent. This means that while certainly unintentional, and like other major institutions, the world's public schools

are nevertheless operating on the wrong side of humanity. In the big picture, this means that there is a great divide between current educational models and the human model, a human genetic model that has been developed over millions of years of evolution. Basically, the pedagogical methods of the world's public schools are at odds with what we are as a species, and have taken and continue to take the children's very humanity from them.

On the other hand, what happens when the schoolchildren do engage in regular physical activity? Not only are they healthy and fit for reasons stated earlier, but appropriate types and levels of physical activity are also directly related to maximizing students' academic achievement in school. An overwhelming body of research shows that:

- Students who are healthy and fit due to regular physical activity perform better academically and are healthier, happier, and better behaved than their sedentary peers. This is true for students at all levels—primary, middle, and secondary school—and is not explained by ethnic, racial, or socioeconomic factors (20, 21, 22, 23, 24, 25, 26).
- Students with ADHD (attention-deficit/hyperactivity disorder) who exercise aerobically are more focused, disciplined, persistent, and perform better on math and language-arts assignments than ADHD students who do not exercise aerobically (27).

Summarizing the Research

So now, let's take a big step back to get a broad perspective of what the research regarding physical activity is telling us from personal and learning perspectives, especially for schoolchildren. Summarizing everything, the research is telling us, once again, that physical activity is not only essential for our bodies, it is also essential for our brains and emotional makeup. It is what we have been genetically programmed to do over millions of years of evolution.

It is no wonder, then, that in the multi-dimensional, national-representative Sloan Study of Youth and Social Development, a study of schoolchildren in America conducted by the University of Chicago, these two findings were revealed when the children were asked in what locations and in what activities they were least and most engaged (28, 29):

- When comparing levels of engagement in six location areas—at home, in public, at work, in academic classes, in non-academic classes, and on schools grounds—students reported being *least engaged* in their academic classes and *most engaged* in their non-academic classes, including courses that provide physical activity.

- When comparing levels of engagement in six types of activity—school work, paid work, passive leisure, active leisure, maintenance, and other—except for maintenance and other which are incidental activities such as brushing one's teeth or taking out the trash, students reported being *least engaged* in their school work and *most engaged* in their active-leisure activities.

Large-Scale Examples and the Public Schools

This compelling research that has been growing over the past 40 years is starting to gain traction, with attitudes changing and large-scale programs taking hold. For example:

Every three years, the Organization for Economic Cooperation and Development (OECD) in Paris administers and reports on the *Program for International Student Assessment* (PISA), an international survey that evaluates public-school systems worldwide by testing the skills and knowledge of 15-year-old students. The latest test (2015) was administered to over half a million students, representing 72 countries and economies, who were assessed in science, mathematics, reading, collaborative problem solving, and financial literacy.

Of particular interest, while the first PISA test was administered in 2000, the 2015 test marked the first time the resulting report included an entire volume on the well-being of students, with a full chapter on students' physical activities and eating habits. The chapter's first page includes this: "Students' overall physical fitness and health are important pre-requisites for high academic performance, and social and emotional well-being. People who exercise regularly are less likely to suffer from diabetes or cardiovascular diseases (Haskell et al., 2007) and are in better overall health (Penedo and Dahn, 2005) than people who do not. In many high-income countries, and in a growing number of middle-and low-income countries, a sedentary lifestyle is one of the primary contributors to obesity (Bauman et al., 2012). There is strong evidence that participating in physical activity reduces depression and anxiety disorders, and boots self-esteem (Biddle and Asare, 2011). Regular physical activity also appears to improve memory, perseverance and self-regulation (Biddle and Asare, 2011)." The first page also contains this concluding statement: "Countries where students do more moderate physical activity tend to perform better in PISA tests" (30).

Having sensed these results several years ago through a mounting body of evidence, Finland has implemented a nationwide program that seeks to increase the ways and amount of time Finnish children are physically active in the school setting. This not only includes incrementally increasing the amount of time students spend in physical-education classes, but also finding creative ways to decrease sedentary time by increasing physical activity in the standard classroom learning

experience. Called *Finnish Schools on the Move,* the program started as a pilot in 2010-2012, and by the end of 2016, more than 80% of municipalities and 70% of comprehensive schools were involved (31).

In California, the attitudes of adults toward the importance of physical activity for students is coinciding with the evolving bodies of research. According to a statewide poll of voters, the proportion of Californians citing a lack of physical activity and unhealthy eating as the two top health risks for students has grown over the past 10 years and now stands at 59%. This far outranks illegal drug use (43%) and violence to children (31%), the next highest concerns (32).

Real-Life, Successful Examples in the Public Schools

The research and large-scale examples cited immediately above are certainly compelling. However, even they are limited because they involve small, incremental steps in incorporating physical activity fully into the learning experience. This incremental-step approach takes a considerably long time (as does any kind of major change) and may not specifically identify exactly *how* physical activity is increased and incorporated fully into the learning experience.

Given the urgency to change attitudes and behaviors regarding the need to significantly increase the amount of time and ways in which schoolchildren are physically active, and how this relates to the rapidly-growing incidence of chronic diseases, the question that still must be answered is: Practically, how can physical activity be increased and incorporated fully into the learning experience in a relatively short period of time while maintaining, and possibly increasing, academic performance? Here are three, practical, real-life examples that answer this question:

For 23 consecutive years, Peter Saccone's fifth-grade (10-year-old) students at Meridian Elementary School (K-5) in El Cajon, California, just east of San Diego, had the highest test scores in the school. This means that Saccone's students—the very same students—were never in a Meridian classroom that had the highest test scores until they were in his fifth-grade class (22).

What was different about the now-retired Saccone's curriculum and pedagogy? Every morning, the first thing the students did was jog, walk, or run (students choose for themselves) for 45 to 50 minutes, with Saccone joining the students.

Once back in the classroom, the students would then do math, language arts, and other assignments related to their physical activity. This might include adding together the distance covered each day for a week or month, and then figuring out what local destinations they could have reached. It might include averaging how much distance they covered each day. The students then projected what local and regional destinations they could reach over the course of the entire semester and school year.

The students also kept a daily journal about their physical activity, often relating it to what was going on with them personally. In this way, Saccone got to know his students very well. And, as Saccone raves, the behavior of the students was exemplary; no discipline problems to speak of, and the students were always supportive of one another.

In two other, real-life examples, the nonprofit, NGO American Sports Institute, based in the San Francisco area in Northern California, has successfully implemented two programs that fully incorporate physical activity into the learning experience.

In one of its programs—*Promoting Achievement in School through Sport* (PASS)—a daily, yearlong, two-semester course that uses an integrated, body-brain curriculum, middle and high-school students study the principles and practices that work in sport culture, physical education, and wellness, and then develop, implement, and eventually evaluate a plan where they apply these principles and practices to two goals: improving their academic performance and improving their physical performance in a manner of their choosing. In the PASS program, physicality and physical activity are at the center or core of the curriculum, and course work related to math, language arts, social studies, the sciences, and the arts are integrated into the plan.

The PASS program has been implemented in public schools in California, Oregon, Illinois, North Carolina, and South Carolina, with approximately 4,000 students having taken the yearlong course. The results: PASS has been called "a model for total school reform . . . . that addresses the needs of the whole learner—intellectual needs, motivational needs, and other needs such as students' physical and social needs" by researchers at a division of the United States Department of Education (25).

In another one of its programs, a pilot project at Coulterville-Greeley School, a small, K-8 school near Yosemite Valley in California, the American Sports Institute worked with the principal and faculty members, helping them turn around their under-performing school. How so? With an expanded and intensified version of the PASS program, using the same principles and practices from sport culture, physical education, and wellness in an integrated, body-brain curriculum,

with physical activity at the curriculum's center and course work in math, language arts, social studies, science, and the arts built around and integrated with the physical activity. And like the program at Meridian Elementary School in El Cajon, California, this included aerobic activity first thing every morning for every student *and teacher*.

This pilot project played a major role in Coulterville-Greeley School becoming a California Distinguished School, the highest honor a school can earn in California, as evidenced by an email to the American Sports Institute from the now-retired principal: "Just want to let you know that Coulterville-Greeley School has been selected as a California Distinguished School. One of the key findings from the evaluation committee (of the California Department of Education) was our commitment to aerobics every morning (his underline) and the PASS program woven throughout our daily school lives" (26). The principal also spoke highly of the improved behavior of the students.

As a result of these successful endeavors, the American Sports Institute is now in the process of creating its own tuition-free, privately funded pre-K—12 school in Northern California that will be based on the PASS program and the pilot project at Coulterville-Greeley School. This school—*The Arete School of Sport Culture and Wellness*—will eventually serve as resource and training center for public schools throughout the United States and around the world.

What Are the Research, Examples, and Children Trying to Tell Us?

If we want to know what to do about addressing the global crisis regarding chronic diseases and its US$ 47 cumulative economic impact, the schoolchildren of the world are providing the answers. Not necessarily with their words, but through the related research and practical, large-scale and real-life examples presented above, and in other contexts.

In effect, the children are calling out to us, trying to tell us that they need to be physically active at a high level because they want their brains to focus better, learn better, and remember more, especially in school. They are saying they want to be as healthy as possible, and don't want to eventually become afflicted with diabetes, cardiovascular disease, or cancer. They are telling us they don't want to become depressed and have to take drugs that produce side effects. And they're telling us that when they're older, they don't want to be afflicted with dementia, to not recognize their loved ones, or worse yet, to be a burden to their loved ones.

The children are calling out to us in their own way, telling us that they want to be physically active at a high level because they want their humanity returned to them so they can evolve as they have

been genetically programmed to do over millions of years, enabling them to live their lives in a way that provides the best opportunity to realize their full potential as human beings.

And the children are calling out to us, telling us that all this can be realized in the public schools of every nation, regardless of economic status.

Issues for Moving Forward

Yes, the very process currently being used to educate the vast majority of the world's schoolchildren—sitting at desks and passive learning—is the very process that is predisposing them to the chronic diseases we are trying to eradicate. At the same time, the public schools of every nation offer us the greatest opportunity to begin dealing with this issue in a substantive, comprehensive way by incorporating physical activity fully and cost-effectively into the learning experience of every child. As we have seen, the research validating this approach is quite compelling, as are the real-life examples.

Still, while this approach may be the most viable and cost-effective way to begin dealing with the global epidemic regarding chronic diseases, important changes in the schools will have to be made. And, as noted earlier, so often, change is a difficult process. Issues that will need to be addressed in the schools include the children's schedules, allocating time in an already-crowded curriculum, changing educators' attitudes and dealing with resistant teachers who believe their subject is the most important and should not be compromised, training teachers how to incorporate physical activity into how they teach, and others.

A very important matter here has to do with moving away from non-integrated teaching to a more integrated pedagogical methodology. For the most part, especially at the secondary levels, students currently learn different subjects—math, language arts, science, social sciences, international languages, the arts, and physical education—from completely different teachers in completely different classrooms. Very little, if anything, is integrated, such as schoolwork that combines social sciences with language arts or math with science. And most of all, physical activity integrated with these subjects is almost nonexistent.

Is it any wonder, then, why so many children would rather be somewhere else than sitting in a classroom? We basically have a physically-inactive, non-integrated learning modality that is leading to a dis-integration of our humanity as evidenced by the research showing children wanting to be somewhere else and doing something different than their academic classes and schoolwork, and, as the children grow into adulthood, by the scourge of chronic diseases.

However, as the research and real-life examples show, if we have schools where physical activity is integrated fully into the learning experience of all subject areas, along with doing coursework that combines the subjects, this is where schoolchildren want to be and what they want to do. This is where academic achievement is most likely to thrive, and the effects on the children's physical, mental, and social-emotional health most likely to be transformative (22, 23, 25, 26).

By addressing the needs of the whole child—physical, mental, and social-emotional—in a body-brain, integrated manner, we create integrated and balanced human beings who grow up to be healthy, fit, intelligent, and productive citizens who contribute to, rather than place a burden on, the communities and economies of their respective nations.

This Can Be Done

Physical activity is the mother's milk of education and wellness. Physical activity, figuratively and literally, is the heart of education and wellness. Physical activity is the foundation of education and wellness. In fact, given what current and emerging research is telling us, physical activity just may be the foundation stone of the entire educational enterprise. And this is why the public schools in every nation—low, middle, and high-income alike—just may be the most viable institutions for the *physicalization* of our way of being in the world to take root, grow, and expand.

This can be done. From WHO: "Overweight and obesity are largely preventable. Supportive policies, environments, schools and communities are fundamental in shaping parents' and children's choices, making the healthier choice of foods and regular physical activity the easiest choice (accessible, available and affordable), and therefore preventing obesity" (33).

This must be done. However, it will certainly not be easy. It will be fraught with obstacles, resistance, and all that homeostasis can muster. But not to be willing to assertively meet and transcend this homeostasis is not an option.

Most important, by fully incorporating physical activity in an integrated manner into the learning experience of students, we will have children who are healthy, happy, and learned, the most sacred, heartfelt qualities for which parents and a nation can wish. And, worldwide, we will create a generation of human beings that, when they become adults, will experience lives filled not with turmoil and anxiety due to chronic-disease afflictions, but the vibrancy of hope

and opportunity emanating from a wellness lifestyle for which they have been genetically programmed over millions of years of evolution.

In returning the children's humanity to them by fully incorporating physical activity into the learning experience in schools worldwide, we will begin the process of substantively addressing the chronic-disease global crisis and all its implications. And we will find ourselves once again operating on the right side of humanity with an educational model fully in sync with the human model, traveling our true evolutionary path so we can re-encounter what we are as a species, with the public schools and children of every nation leading the way.

References

1. The Global Economic Burden of Noncommunicable Diseases. *Harvard School of Public Health and World Economic Forum,* September 2011.
2. Chronic Disease to Cost $47 Trillion by 2030: WEF. *Reuters,* 18 September 2011.
3. Mother's Exercise May Boost Baby's Brain. *The New York Times*, 20 November 2013.
4. Stronger, Faster, Smarter. *Newsweek*, 26 March 2007.
5. Exercise Good for Your DNA, Too. *Philadelphia Inquirer*, 28 January 2008.
6. The Association Between Physical Activity in Leisure Time and Leukocyte Telomere Length. *Archives of Internal Medicine,* 28 January 2008.
7. Experts: Sitting Too Much Could Be Deadly. *Associated Press* and *Yahoo News*, 20 January 2010.
8. Is Sitting a Lethal Activity? *The New York Times*, 14 April 2011.
9. Sitting is Bad for Children, Too. *The New York Times*, 23 September 2015.
10. Exercise "As Good As Medicines" in Treating Heart Disease. *Reuters*, 03 October 2013.
11. Molecular Mechanisms Linking Exercise to Cancer Prevention and Treatment. *Cell Metabolism*, October 2017.
12. Is Exercise the Best Drug for Depression? *TIME,* 19 June 2010.
13. More Evidence That Exercise May Keep the Brain Sharp. *Health Day,* 19 July 2011.
14. Activity Energy Expenditure and Incident Cognitive Impairment in Older Adults. *Archives of Internal Medicine,* 19 July 2011.
15. Study: Exercise Slows Alzheimer's Brain Atrophy. *Associated Press* and *Yahoo News*, 27 July 2008.

16. Aerobic Exercise Boosts Memory. *Science News*, 01 February 2011

17. Exercise Training Increases Size of Hippocampus and Improves Memory. *Proceedings of the National Academy of Sciences,* 15 February 2011.

18. Interview, media referral, and statement for PSA from Fernando Gómez-Pinilla, Ph.D. *Email to American Sports Institute,* 27 January 2010.

19. Physical Activity, Genetics, and Evolution audio interview with Fernando Gómez-Pinilla, Ph.D. *American Sports Institute,* 05 October 2008.

20. Physical Activity and Learning Summary: Status Review. *Finnish National Board of Education*, 2012 October.

21. We Do Not Have to Sacrifice Children's Health to Achieve Academic Goals. *The Journal of Pediatrics,* Vol. 156, Issue 5, Pages 696-697, May 2010.

22. Running Helps Get Brains Up to Speed for Learning. *California Educator,* November 2002.

23. Running a Class of Fifth-Graders audio interview with Peter Saccone. *American Sports Institute,* 12 December 2009.

24. State Study Proves Physically-Fit Kids Perform Better Academically. *California Department of Education,* 10 December 2002.

25. PASS Passes the Learner-Centered Test. *Mid-continent Regional Educational Laboratory* (McREL), 1998.

26. Coulterville-Greeley School. *Principal Evan Smith Emails to American Sports Institute,* 30 April 2008, and 23 August 2007.

27. Exercise Improves Behavioral, Neurocognitive, and Scholastic Performance in Children with Attention-Deficit/Hyperactivity Disorder. *The Journal of Pediatrics*, March 2013.

28. Study Indicates Students Most Engaged in Physical Activity, Least Engaged in Academic Classes. *American Sports Institute,* 2014.

29. The Sloan Study of Youth and Social Development. *University of Chicago and Inter-university Consortium for Political and Social Research at the University of Michigan,* 20 July 2007.

30. PISA 2015 Results (Volume III): Students' Well-Being. *Organization for Economic Cooperation and Development. OECD Publishing*, April 2017.

31. Finnish Schools on the Move. *Finnish National Agency for Education,* 2016.

32. Voter Concerns About Risk Factors for Obesity and Diabetes Have Eclipsed Other Health Concerns Facing California Kids Over the Past 10 Years. *The Field Poll,* 12 February 2014.

33. Facts and Figures on Childhood Obesity. *World Health Organization,* 29 October 2014.