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# A Framework for Evaluating Movement and Sedentariness in Schools

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For thousands of years, doctors used bloodletting to treat a variety of illnesses. This continued through the early/mid-1800s before the field of medicine pivoted, realizing that the best place for the blood was *inside* the body, especially for the weak and infirm. Once bloodletting was no longer an endorsed option, practitioners adjusted (Cohut, 2020). After all, "do no harm" is the first rule of ethical work.

Doctors, educators and servant leaders of all kinds are tasked with staying current with evolving science and methods for their given domain. No matter how pure their intentions, they must take care not to make situations worse. Education, the epicenter of ethical work, has been coming to terms with similar concepts in recent years. For example, if school start times influence mental health outcomes, schools should adjust—and many are (Davis, 2021, 2022).

A 2018 systematic review and meta-analysis of school-age youth revealed that U.S. students are spending about 63% of their time fully sedentary (Egan et al., 2019). The number is high, although the true average is likely much higher than that, as the only schools included in the review were interested in improving those outcomes. In a recent consulting engagement, teachers at a California school reported that 89% of student time was spent in level one (described below), wherein the bulk of their day comprises sitting, with most movement occurring only as they walk between classes.

Sedentariness has regularly been connected to mental health issues like major depressive disorder (Schuch et al., 2017) and physical health issues like heart disease (Michos, 2021). In one of the most decisive and declarative reviews of the adverse effects of a sedentary lifestyle, Park et al. (2020) claimed that "it is indisputable that the negative health impacts intensify with increases in the total daily sedentary times." Their findings indicate that prolonged sedentary behavior decreases important functions like protein transporter activities, lipid and carbohydrate metabolism, cardiac output, and blood flow. Park found that sedentariness decreases insulin sensitivity, alters hormone production, and increases chronic inflammation in the body. These conditions result in an increased risk of a variety of metabolic disorders like diabetes and hypertension, and ultimately increase all-cause mortality (Park et al., 2020). Creating an environment full of sedentary behavior is not only boring, it's dangerous.

Educational systems too often standardize sedentariness. Educators and administrators should be aware of the risks, especially when the flip side of sedentariness, exercise, is regularly linked to improvements in affect (Reed & Buck, 2009), focus and calm (Davis & Newlon, 2022), and improved cardiovascular health (Pinckard et al., 2019). Affect is suggested to improve alongside increases in essential neurochemicals, namely dopamine, serotonin and norepinephrine. Cardiovascular health is improved through a variety of methods; Pinckard et al. highlight vasodilation and angiogenesis, mitochondrial biogenesis, and increases in system-wide antiinflammatory effects.

When reevaluating the educational landscape and aiming to incorporate movement into the day, remember that all exercise is not created equal. We recommend creating a

**Good Athlete Project: 4 Levels of Exercise in Education**

| | One *minimal exertion* | Two | Three | Four *full exertion* |
|---|---|---|---|---|
| **Overview** | Mostly sedentary. Movement occurs when moving between classes and other basic ways, but time is mostly spent sitting. | Mobile classrooms and initiatives built to get people moving. Breathing, stretching, power poses, low-level yoga. Mobile but low levels of exertion. | Intentionally challenging movement for a specific time to elicit a specific result. ***The Exercise MVP.*** | Sport practices and competition. Full exertion to elicit a specific training response (strength, speed, endurance) at a high level. |
| **Duration** | minimal | 1-10 minutes | 20-40 minutes | 60-120 minutes |

**Figure 1. Four levels of exercise in the educational setting. © Good Althete Project.**

model to evaluate the level of student exercise within an organization. This framework can be used to evaluate exercise and sedentariness within an organization.

## Four Levels of Exercise: An Evaluation Framework

We have had the great privilege of consulting a variety of leaders in education and other industries, focused on optimizing health, wellness and overall performance. When evaluating activity levels, many leaders have found it helpful to examine relationships to movement using our Four Levels of Exercise (Figure 1) framework. At *level one*, we find that students are mostly sedentary. The is the all-too-standard, schoolhouse, sit and listen model. The bulk of a student's movement (which would be tough to call *exercise*) occurs as they move about the building from classroom to classroom.

Depending on the size of the school, this adds up to an embarrassingly limited amount of movement between class periods. If these students were to be picked up from school, or dropped off by a bus, then go home to work on homework, eat dinner and go to bed, then there is no way they would accomplish the Centers for Disease Control and Prevention–recommended 60 minutes per day.

In addition to the emotional and cognitive issues that accompany prolonged sedentariness, negative health impacts intensify with increases in total sedentary time. Too much time spent in this "level one" state aligns with major public health concerns. The World Health Organization claims that "sedentary lifestyles increase all causes of mortality, double the risk of cardiovascular diseases, diabetes, and obesity, and increase the risks of colon cancer, high blood pressure, osteoporosis, lipid disorders, depression and anxiety." Educators need to confront this truth.

*Level two* is where we find many of the active classroom initiatives. Thoughtful teachers will deliberately engage students in a learning environment that allows them to move around the space and engage with their surroundings. Edutopia, SHAPE America – Society of Health and Physical Educators, Harvard Health, and other trusted journals share helpful examples of how and why one should build movement into lessons and across the course of the day. In this category we also find thoughtful approaches to breathing, stretching, power-posing and low-level yoga-like interventions. This is the "brain break" space. Many of these efforts would fall short of true exercise but can serve as wonderful additions to the school day and should be incorporated as often as possible.

During level two interventions, educators should be aware of how a movement-filled environment impacts focus. Exercise has been shown to increase focus in students, but not *while* the student is exercising. There should be a balance. Exercise can enhance the learning environment for those with attention deficit hyperactivity disorder (ADHD) and other concerns, but expectations should be managed, as mobile classrooms also risk overstimulation (Matlen, 2021). These spaces should also allow for students to find stillness and quiet, if deep work is a priority.

*Level three* is where the bulk of the SPARK-like research lives. John Ratey's 2008 book, *Spark: The Revolutionary New Science of Exercise and the Brain*, highlighted the positive connection between exercise and brain function. He notes that the positive impact requires semivigorous activity for an extended amount of time. In these exercised states, studies have demonstrated exercise-induced increases in neurochemicals such as dopamine, serotonin and norepinephrine (Lin & Kuo, 2013). Here, facilitators create situations where a student must challenge their physiological state past the degree to which other learning might occur (e.g., it is difficult to retain information while jogging). Unlike an active classroom, level three initiatives pause learning to exercise, with an intention to enhance future learning. For methods, check out the 8-2-8-2 Model we created back in 2016.

In this state, the human system is activated to a level that inspires a cascade of neurochemicals linked to improved cognition, concentration, mood and executive control. This is what we refer to as the *exercise minimum viable product* for exercise-induced enhancement for a school intervention. In a recent white paper published by Brain Co. Technologies, we used electroencephalogram technology to measure brainwaves before and after a level three exercise intervention. Results showed a nearly 40% improvement in a student's focus and calm (Davis & Newlon, 2022).

Level three interventions can be paired with level two initiatives to enhance positive impact. Consider the Mindful Movement initiatives, where students exercise before practicing mindfulness, which show encouraging results. In one study, the "collaborating teacher said that he 'witnessed (his) high-anxiety, and significantly dysregulated students learn and apply meaningful mindfulness techniques throughout the course of the year.'" This instructor not only assisted in the facilitation of sessions, but participated as well (Davis, 2018).

Level four moves the human system closer to full exertion—sport practices and competition would allow someone to reach level four. Here, heart rate levels are higher and more sustained. The challenge is greater. This sort of exercise will result in improved physical performance. However, this sort of physical challenge will take the participant into a state where rest and recovery would be prioritized over cognitive function. Where level three left someone in a state of increased mood, focus and wakefulness, level four might have some of the positive "feel good" benefits (likely a combination of chemical production, social experiences, psychological sense of accomplishment), but the stress put on skeletal muscles and the cardiorespiratory system will require the person to rest. When physical stress is high, the body prioritizes the body. Recovery is prioritized over affect at this level. Level four is good, but should probably be reserved for after school, as return to the standard day would be a challenge.

| Period | Subject | Activity Level |
|---|---|---|
| 1 | Science | 1 |
| 2 | Science | 1 |
| 3 | English | 1 |
| 4 | Lunch | 1-2 |
| 5 | P.E. | 2-3 |
| 6 | Math | 1 |
| 7 | Social Studies | 1 |

**Figure 2. Sample school-day evaluation using the four levels of exercise framework.**

Not all exercise is created equal. The Four Levels of Exercise framework can help evaluate the total amount of movement within a system. If a school's goal is to promote learning and set students up for a lifetime of success, then creating a system that promotes sedentariness is countermission. That behavior does not align with the stated goal. In pursuit of health, wellness and lifelong learning, schools should create systems with regular level two movement, access to level three interventions, and thoughtful opportunities to play sports and safely engage in level four options.

Level two can be a schoolwide expectation, while level three can be used situationally, student-by-student, and in individualized education plans. Does a student have difficulty in their double-period biology class? Perhaps a level three exercise intervention just before (within a physical education class or an intramural on-campus option) would be beneficial. Perhaps they have been diagnosed with an attention disorder—exercise at this level has positive impacts on dopamine production in those with ADHD (Mehren et al., 2020).

Reimaging the school day will be a challenge. It will take thick skin, as their will be skeptics. It will take hard work, because crafting the ideal environment will take some hand-scheduling, but it will be worth it. And, if the intervention does not improve academic outcomes, was any harm caused? The school will not have prescribed a pill, some pharmaceutical enhancement with unknown or variable side effects—they will have exposed students to exercise. Outcomes might include improved health and wellness. The biggest challenge might be that this requires a different and highly informed way of thinking. Change is hard.

## Call to Action

Look in the mirror. Leaders, if you agree with the scientific research and want to incorporate exercise and other active learning into the school day, ask yourself an honest question: *Are you actually doing it?* Does a traditional day in your educational environment allow for the benefits of movement or are students mostly subject to sedentariness?

An easy self-check would be to give a simple report card (Figure 2) to a set of students. Ask for their feedback. Have them fill out the second two columns to identify classes and level of activity in those classes.

You might find some disturbing patterns. Change them. Or you might be pleasantly surprised that many of your teachers are intentionally folding level two activities into the day. Celebrate that. Either way, shining a light on the true activity levels that define the student experience is always helpful.

Teachers should do a similar evaluation. Administrators, parents and everyone within the system of education would benefit from a quick self-check. Companies, organizations and everyone should take stock of how much there are moving—or not moving—across the course of the day. That awareness might offer us the ability to change for the better.

It is time for leaders to reimagine an educational system that too often standardizes sedentariness and create an environment more conducive to healthy outcomes. When research calls systems into question, practitioners adjust.

If "do not harm" is the first rule of ethical work, then sedentary educational systems must go. Leaders, let's move.

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### Submissions Welcome!

Readers are encouraged to send "Theory into Practice" submissions to column editor Anthony Parish at aparish@georgiasouthern.edu.

The purpose of the Strategies Theory into Practice column is to distill high-quality research into understandable and succinct information and to identify key resources to help teachers and coaches improve professional practice and provide high-quality programs. Each column (1,000–1,300 words or roughly four typed, double-spaced pages) summarizes research findings about a timely topic of interest to the readership to enable practitioners to apply research, knowledge and evidence-based practice in physical education and sports.