

## How exercise jogs the brain

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The morning sun dazzles and the air is bracing. On a peaceful cul-de-sac in Aurora, all you can hear are 31 pairs of lungs exhaling and 62 running shoes slapping the pavement.

A couple of blocks away at Regency Acres Public School, the bell rang 10 minutes ago. Norma Moffitt's Grade 6 students are not at their desks. Before puzzling over mathematical probabilities or conjugating French verbs, the

11- and 12-year-olds are priming their brains with a half-hour workout. On this Tuesday morning, the 28 students and three teachers are on the road for a 2.5-kilometre run around the neighbourhood.

"I'm already tired," puffs one grinning boy as the mob rounds a corner and one by one reaches out to high-five a stop sign held by a crossing guard.

That's what Jennifer Burt likes to hear. She's the teacher who has spearheaded this experiment in morning exercise, which the kids have named Fit for Life.

"You have to get their heart rates up. They have to be out of breath a little, sweaty, red in the face," says Burt.

In an era when kids are fatter, weaker and spend more time in front of screens than in playgrounds, it's easy to assume that what's going on at Regency is yet another anti-obesity program. But it's not.

Burt is one of a handful of innovative teachers in the country who are harnessing exercise to help kids focus, learn and remember.

Dr. John Ratey calls it "Miracle-Gro for the brain." In his 2008 book *Spark: The Revolutionary New Science of Exercise and the Brain*, the Harvard Medical School professor argues that we turn on our "thinking brain" when we run, skip or cycle to get the heart pumping.

"A bout of exercise is like taking a little bit of Prozac and a little bit of Ritalin," the psychiatrist says in an interview,



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Teacher Melanie Jefferson, centre, runs with Regency Acres Public School students Jacob Fulford, right, Morgan Frost, second from right, Brittany Gardiner, left, and Jennifer Moody, second from left.

citing common medications used to adjust the brain's neurotransmitter balance to treat depression and attention deficit hyperactivity disorder.

When the kids at Regency go for a run in the morning it boosts blood flow, which carries more oxygen and nutrients to the brain. It also increases levels of a protein called brain-derived neurotrophic factor, which nourishes brain cells and promotes the growth of new neurons and synapses. So as well as boosting efficiency and speed, the brain gets bigger.

Three mornings a week, Moffitt's class starts the day with 30 minutes of structured cardiovascular exercise to elevate their heart rates. Sometimes they play high-aerobic games like scooter hockey; other days they have intense skipping drills or go through a circuit of aerobics stations in the gym. In April, they started running.

The other two mornings, they have phys ed class, which stresses skills and strengthening but still gets them moving.

The workouts are part of the mandatory 20 minutes a day of daily physical activity (DPA) introduced to Ontario elementary schools six years ago, but implemented haphazardly across the province. "It's the DPA, but in a more structured and intentional way," says Burt.

So far the improvement — in school work, attendance, behaviour and self-esteem — has been convincing enough that the entire school of 450 students will adopt the morning workouts next year. The routine "gave me more energy, and you feel like answering questions," says 11-year-old Dorsa Fathianpour.

Burt, 38, is a runner and the kind of teacher who can't wait to tell you about her students' triumphs. The recent avalanche of research on exercise and learning had been on her radar for awhile.

Then someone handed her a copy of Ratey's book. Her idea suddenly had legs. She's one of a growing number of Ontario teachers — others are in Etobicoke, Niagara Region, Barrie and Milton (see sidebar) — who are in the early stages of initiatives inspired by *Spark* and Ratey's presentations to educators.

"When we move, we turn on our thinking brain," Ratey explains during talks sprinkled with fascinating tidbits about neuroscience and jokes about his hyperactive Jack Russell terrier, who calms down after a long run.

He cites the story of Naperville, Ill., where in the past 20 years teachers turned their school district into one of the fittest and smartest in the country. They did it with 40 minutes a day of mandatory aerobics aimed at creating "everyday athletes" who are used to moving and running.

This is not sports, where there are winners and losers and awkward kids are relegated to the sidelines. Students in these programs compete only against themselves using heart-rate monitors to ensure they are working at optimal intensity.

The link between aerobics and academic success has been replicated in other U.S. studies. In a study released this month, researchers at the Medical University of South Carolina Children's Hospital put an inner-city elementary school in Charleston on a routine of 40 minutes a day of physical activity for a year, instead of their usual 40 minutes a week. The percentage of students who reached target marks on state tests jumped to 69 per cent from 55 per cent the previous year.

Now, thanks to brain imaging technology, neuroscientists are starting to understand why.

The crux of it is biology and evolution, Ratey says. Human genes haven't changed at the same pace as our increasingly sedentary lifestyles. Ten thousand years ago, we were hunter-gatherers with brains that regulated and were stimulated by movement. Our thinking brain for communication and abstract thought evolved, but is still interconnected with that "moving brain." When we don't move enough, "our brains begin to erode."

As primitive foragers, humans travelled more than 20 kilometres a day on foot, Ratey says. Today, put a pedometer on our hips and most of us wouldn't hit the recommended daily minimum of 10,000 steps, or 8 km.

Too much food and too little activity is a defining adage for the youngest generation. But despite the cacophony of warnings and ominous statistics being churned out by health and phys ed experts, little seems to be changing. Ratey believes proving the link between exercise and learning will get educators' and parents' attention.

At a Barrie high school in March, Ratey hooked a student up to sensors that projected an image of his brain onto a screen, and then had him perform some exercises. His peers watched the screen in awe as the brain lit up the harder he worked.

Moffitt says the impact of Fit for Life has been more dramatic than anything she's seen in 22 years of teaching.

Class literacy levels, measured by a standard classroom tool called the Developmental Reading Assessment, improved 2 per cent between October and February, compared with 0.2 per cent among Grade 6 students in the two other classes at Regency.

Learning skills measured on the most recent two report cards — such as ability to work independently, organization and responsibility — improved an average of 12 per cent, compared with 8 per cent among other students in the same grade.

"Definitely, my kids are more attentive and productive," says Moffitt. The roughly 90 minutes of time spent on aerobics is made up for in improved productivity. "Back in class, we get down to business. They just seem more motivated."

Brittany Gardiner, 11, agrees, and so does her mom, Suzanne. Brittany is an athletic soccer player who finds school work more challenging.

"Since the program started, she's had the best grades she's ever had and her confidence has soared," says Suzanne. "She (answers) in class, things are clicking generally. She's working better independently."

Moffitt started to see a difference in her students within the first month. Today, there's less absenteeism and disruptive behaviour, while self-esteem has improved. More kids are participating in school life, with 22 volunteering as peer tutors for younger kids, compared with the dozen or so in Moffitt's previous classes. Aerobic fitness levels measured in standard tests are higher across the board.

Ratey argues passionately that the best hope to change the culture is through mandatory universal programs incorporated into the school day. Schools are an equalizer, and can ensure all kids — athletic, overweight, with or without access to regular sports — take part and reap the rewards.

While Ontario's DPA is an attempt to incorporate moderate to vigorous activity into a student's day, some kids get none and some get it five days a week, according to preliminary results of a recent survey by Ophea, a non-profit group that works with Ontario schools, public health and sports groups to promote phys ed and health. The group invited Ratey to speak to teachers, public health and phys ed experts at a downtown Toronto hotel this spring.

In high schools, there is no DPA and phys ed isn't mandatory past Grade 9.

The key to making exercise a priority is building evidence, especially in Ontario, that proves it's an academic issue "and not just a nice thing to do," says Jennifer Cowie Bonnie, Ophea's director of partnerships and public affairs.

Moffitt's students at Regency are on the cusp of adolescence, with braces on their teeth and Justin Bieber's name sprinkled through the morning conversation. They're at an age when they're starting to think critically. In a recent survey, all but a couple said their school work has benefitted from Fit for Life.

But you don't need a formal survey to detect their enthusiasm.

Just after 9 a.m. on that crisp morning, the first runners arrive back at the front of the school, assembling in clusters.

Asked why they like Fit for Life, they crowd around, chiming in about their sense of accomplishment, how it wakes them up for the day and gets their energy out before they hit the books.

"It's fun," says Jacob Fulford, 11. "When we run, we get more done in school."

Doing some exercise "makes us feel better about ourselves," says 11-year-old Morgan Frost.

The running is a challenge for Jonathan Jeyanthan, 12, because he has asthma. He was hesitant about aerobics until he understood he could work at his own pace, rather than competing. "It's kind of hard, but I try my best," he says. And there's an upside: "Every morning, I feel like I want to go to school."

It certainly doesn't hurt that when the last breathless runners trickle up the front walk, they are greeted with claps and cheers from their waiting classmates.