**Heavy Backpacks Can Spell Chronic Back Pain for Children**

**By Jane Brody**, New York Times, APRIL 23, 2012

My 11-year-old grandsons, Stefan and Tomas, weigh about 80 pounds each. On the 20-minute walk to their middle school and the uphill walk home, they carry backpacks that weigh about 12 pounds each, or 15 percent of their body weight.

When extra books or clothing, a musical instrument or other equipment are added, the weight they carry can reach 20 pounds. But whatever the figure, those packs are simply too heavy for their still-forming bones and muscles.

Heavy backpacks don’t just sap children of energy that might be better used doing schoolwork or playing sports. Lugging them can also lead to chronic back pain, accidents and possibly lifelong orthopedic damage.

Among the risks described by Dr.[Pierre D’Hemecourt](http://specialists.childrenshospital.org/Default.asp?pageID=PHY000598" \o "Web site" \t "_blank), a sports medicine specialist at Children’s Hospital Boston, are stress fractures in the back, inflammation of growth cartilage, back and neck strain, and nerve damage in the neck and shoulders.

The federal Consumer Product Safety Commission calculated that carrying a 12-pound backpack to and from school and lifting it 10 times a day for an entire school year puts a cumulative load on youngsters’ bodies of 21,600 pounds — the equivalent of six mid-sized cars.

The issue has been raised repeatedly in countries all over the world for more than a decade. In December 1999, doctors in Milan reported in The Lancet that [34.8 percent of Italian schoolchildren carried more than 30 percent of their body weight at least once a week](http://www.thelancet.com/journals/lancet/article/PIIS0140-6736%2899%2904520-1/fulltext), “exceeding limits proposed for adults.”

The load carried by these sixth-graders was equivalent to a 176-pound man hauling around a 39-pound backpack each day.

But even in this digital era, when at least some schoolwork can be done online, there has been no apparent decrease in the burdens we ask the younger generation to tote around all day.

**Pack Animals**

In the [newest study](http://adc.bmj.com/content/early/2012/02/24/archdischild-2011-301253.abstract), published in March in the Archives of Disease in Childhood, researchers in Spain assessed [the backpacks and back health of 1,403 pupils ages 12 to 17](http://adc.bmj.com/content/early/2012/02/24/archdischild-2011-301253.abstract?sid=aaf2170e-3a78-4038-8c20-d840c62100f4.). More than 60 percent were carrying packs weighing more than 10 percent of their body weight, and nearly one in five had schoolbags that weighed more than 15 percent of their own weight.

Not surprisingly, one in four students said they had suffered back pain for more than 15 days during the previous year; [scoliosis](http://health.nytimes.com/health/guides/disease/scoliosis/overview.html?inline=nyt-classifier) — curvature of the spine — accounted for 70 percent of those with pain. The remaining 30 percent had either [low back pain](http://health.nytimes.com/health/guides/symptoms/back-pain-low/overview.html?inline=nyt-classifier) or contractures — continuous, involuntary muscle contractions. Girls faced a greater risk of back pain than boys, and their risk increased with age (and, presumably, years of lugging around their heavy packs).

Pain often results when the weight of the pack pulls children backward, prompting them to bend forward or to arch their backs to keep the pack centered. This position can compress the spine, pressing the vertebrae on the discs between them.

If the child has to lean forward when walking with a loaded pack, it is too heavy. At the very least, it is a recipe for poor posture and chronically rounded shoulders. And if these forward-bending children must raise their heads to see where they are going, [neck pain](http://health.nytimes.com/health/guides/symptoms/neck-pain/overview.html?inline=nyt-classifier) and pinched nerves can be the result.

Children also accidentally whack schoolmates with heavy backpacks while walking in crowded hallways. Sometimes the pack falls from a shelf or desk, or trips someone while resting on the floor. A too-heavy pack can throw the wearer off-balance on a staircase.

**Reducing the Load**

In the interest of sanity and safety, my son (the [twins](http://topics.nytimes.com/top/news/health/diseasesconditionsandhealthtopics/twins/index.html?inline=nyt-classifier)’ father) purchased used instruments for them to keep at home so they would not have to lug a trombone or clarinet back and forth to school along with their other paraphernalia.

Then he conducted an inventory of their packs and sent it by e-mail to their teachers to find out just how many of the items had to be carried to and from school each day.

One teacher responded with some helpful suggestions, including having the boys take a few minutes at the end of the school day to determine what they really needed to take home with them.

“They don’t have to bring everything home every night,” Aimee Fournier, their English teacher, wrote. “But a lot of kids don’t take much time at their lockers to sort out what they do need.”

Rather than lug around the entire load all day, most books can be left in the child’s locker, if there is enough time between classes. Only those needed for the next class or two need be taken along.

In schools facing less of a financial pinch than New York City’s, teachers might be able to provide duplicates of at least some of the often-used heavy textbooks to keep at home.

Dr. Bryan Lane, an osteopath in Temple, Tex., urges parents to peek inside their children’s backpacks and suggest items that could be left at home or at school. He studied 188 children in kindergarten through fifth grade and found that on average [the children toted packs equaling 14 percent of their body weight](http://adc.bmj.com/content/88/1/18.abstract?sid=6ebf97e4-3c26-4bd2-9742-a51083ee4348). A third of the parents had never checked the contents of the packs, and 96 percent had never weighed them.

Also helpful is selecting a well-designed backpack and adjusting it to sit properly on the child’s back. Although for the last 15 years I have used a rolling backpack to go to and from work, I know that teens and preteens today consider them unfashionable. Plus, they can be a trip hazard in hallways and difficult to carry up and down stairs.

Select a backpack that is no bigger than absolutely necessary — the more room in the pack, the more the child is likely to carry. The pack should have wide, padded, adjustable shoulder straps (narrow ones can cause nerve damage), a padded back, and compartments within so that the heaviest items can rest against the child’s back.

A waist strap would be ideal, but I doubt many children would use it. Adjust the shoulder straps so that the bottom of the pack when filled lands no lower than four inches below the waist.

Children should be cautioned never to carry the pack on one shoulder. Decades of carrying nearly everything heavy on my right shoulder has left me with significant scoliosis that I’m now trying to minimize with a yoga exercise.

**Digital Textbooks May Help Ease Backpack Burden**

The issue of overloaded backpacks could well become moot if President Obama and his education gurus have their way. The president wants every student to be using e-textbooks by 2017.

In January, Education Secretary Arne Duncan and Julius Genachowski, the chairman of the Federal Communications Commission, recommended that states redirect budgets for printed books to the purchase of iPads, Kindles and the like and the software needed to foster modern education.

Publishers and tablet makers will be urged to work together, and to lower costs, in order to supply the nation’s 50 million schoolchildren with electronic products for educational use.

Although not everyone endorses the idea of moving from words printed on paper to those delivered electronically, there are certain undeniable advantages.

For one, updates to e-textbooks are relatively easy to make, which means schools with limited finances would not have to replace outdated texts every five or six years. Learning would be more efficient and interactive, and materials supplied by teachers could be tailored to better meet individual student needs.

In addressing a summit of industry and education officials in January, Mr. Genachowski said that $7 billion a year is now being spent on textbooks that often are out-of-date. He predicted that in five years, “we could be spending less as a society on textbooks and getting more for it.”

He acknowledged the greater up-front costs of moving from paper to digital books and other materials but insisted that in the long run the switch would bring huge savings to the country’s educational system.

The first challenge will probably be finding the money with which schools could buy devices like the [iPad](http://topics.nytimes.com/top/reference/timestopics/subjects/i/ipad/index.html?inline=nyt-classifier), which runs about $500 at retail. In school districts that cannot afford such purchases, strategies will be needed to help low-income students get their own.

Then there is the issue of safekeeping (although if every child has one, the risk of theft is somewhat diminished).

Costs aside, the educational advantages are perhaps limitless on devices that allow students to do research, check their work and get feedback from teachers without leaving their classrooms or homes. Digital books can also provide interactive diagrams, audio and video that are not possible with traditional texts.

Apple has already introduced three types of educational software intended to make the iPad a fixture in the classroom: an updated electronic bookstore called iBooks 2 that allows students to download more interactive textbooks; iBooks Author, a program for creating books; and iTunes U, an app that instructors can use to produce digital curricula and share course materials with students.

Protections are needed to prevent students from cheating — say, by e-mailing test answers to their pals or submitting work that someone else has created. And much to the distress of one of my digitally oriented grandsons, whose penmanship is atrocious, students still must learn how to write with a pen or pencil.

A remaining impediment: Will e-textbooks permit students who once complained that “the dog ate my homework” to find a new ream of excuses?

“The battery died, and I couldn’t charge it.” “My iPad got wet in the rain/a puddle/the bathtub.”

Or even: “My little brother hammered it to death.”