

## **Mounting Research on Backpack Use**

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Dr. Marvin Arnsdorff

Originally published in **I.C.P.A. Newsletter May-June 2002**

For many students, "hitting the books" leads to academic achievement. Students who carry those books in overloaded backpacks may be unknowingly participating in the beginning of a health epidemic.

Scientific research reveals an alarming danger associated with improper childhood backpack use. This research stems from the increasing number of reports of childhood back pain in recent decades. By the end of their teen years, close to 60 percent of youths experience at least one low-back pain episode. And new research indicates that this may be due, at least in part, to the improper use of backpacks on young spines. That's why Dr. Marvin Arnsdorff and his partner John Carroll created Backpack Safety America/International™ to curb the rising tide of injury due to improper use of backpacks. "Back pain leads to more than 19 million doctor visits per year, according to the U.S. Department of Human Health and Services," said Dr Arnsdorff. "What will that figure be when the members of the "Backpack Generation" are in their thirties and forties?"

An increase in back pain appearing most frequently during the period of rapid growth -- ages 11 to 16 is cause for concern.

### **BACKPACKS' ATTACK ON BACKS**

Watch children in any schoolyard struggle to walk while bent sideways under the weight of an overloaded backpack on one shoulder. You will quickly realize the potential danger of this commonplace item. How exactly does carrying a backpack affect the spine? Common sense tells us that a load, distributed improperly or unevenly, day after day, indeed causes stress to a growing spinal column. The old adage "As the twig bends, so grows the tree" comes to mind. There is a growing concern about the improper use of backpacks and the relatively scarce amount of instructional and preventative information available to young people. It is not the backpack's fault that kids have not been given the guidelines.

### **CHECK THE NUMBERS**

The Consumer Product Safety Commission estimates that 7,277 emergency room visits each year result from injuries related to book bags. The CPSC also reports that backpack-related injuries are up 330% since 1996. "That is the beginning of an epidemic, one that will cause serious damage to a child's health for a lifetime," said Dr. Arnsdorff.

### **GETTING OUT OF LINE**

Hauling a heavy backpack over one shoulder everyday may cause serious postural misalignments. These postural imbalances often trigger a condition called vertebral subluxation. Vertebral subluxations are dysfunctional areas in the spine where movement is restricted or bones (vertebrae) are out of alignment. This disorder predisposes patients to a number of ailments, such as neck and back pain, headaches, and osteoarthritis.

In addition, a recent scientific experiment found that carrying a backpack alters the mobility of spinal bones and can lead to restricted movement-a risk factor for pain. Yet another study used magnetic resonance imaging (MRI) to examine the effect of backpacks on the intervertebral disc of the spine, the fluid-filled "pillows" between spinal bones. According to the report, backpacks alter the fluid content of these discs-a risk factor for disc herniation ("slipped" disc) and osteoarthritis.

### **BACKPACKS ARE NOT JUST CAUSING PROBLEMS IN THE UNITED STATES**

The amount of weight carried by children in their backpacks is an important issue that deserves serious consideration. To quantify how much weight children are likely to carry in their backpacks, researchers in Milan, Italy, determined the weight of all the backpacks used by sixth graders at several schools.

The average load carried daily 20.5 pounds, reaching as much as 27.5 pounds, with the maximum daily load averaging 25.3 pounds. Over one-third of students carried more than 30% of their body weight at least once during the week.

### **A QUESTION OF BALANCE**

Research presented at the American Academy of Physical Medicine and Rehabilitation's annual meeting in San Francisco exposes yet another potential danger of heavy backpacks: they promote falls in students who wear them.

Specifically, students who carried packs weighing 25% of their body weight exhibited balance problems while performing normal activities such as climbing stairs or opening doors, which in turn increases their risk of falls. In contrast, students who carried packs weighing 15% of

their body weight maintained their balance moderately well. Those carrying 5% of their body weight were most effective at maintaining balance, compared with their peers who carried more weight.

In another recent study, children aged 10 to 13 stood on a platform that measured force. The children stepped from the platform onto a high step and back down to the platform.

The children did this three times -- once without a book bag, once with the book bag carrying a load equaling 15 percent of the child's body weight, and another time with a load equaling 20 percent of the child's body weight.

The heavier the book bag, the greater the force children exerted to step up. There was also a trend toward greater impact forces when they stepped back down, the study found.

Dr. Mary Ellen Franklin, research supervisor commented, "Your body tries to keep the center of mass between the feet, so with a backpack, the trunk is in a more forward position, placing abnormal forces on the spine."

"This requires shifting the head forward ... but this would mean looking down. You compensate by bringing the head up, which makes part of the neck curve to a greater extent. It's very stressful on the neck."

## **ROLLER BAGS ARE NOT CURE-ALLS**

An empty roller bag can weigh up to 80% more than an empty backpack. Factor in that there is a tendency to add more things to a roller bag, it can end up weighing 50 pounds or more. At some point during the day, a child needs to lift that bag, and proper guidelines still should be followed.

Students, parents, and teachers are in need of specific safety guidelines necessary to prevent future spinal conditions due to improperly worn backpacks.

## **BACKPACK SAFETY TIPS**

\*Make sure the backpack is sturdy and appropriately sized. Some manufacturers offer special child-sized versions for children ages 5-10. These packs weigh less than a pound and have shorter back lengths and widths so they do not slip around on the back.

\*Consider more than looks when choosing a backpack. An ill-fitting pack can cause back pain, muscle strain, or nerve impingement. You want to have padded shoulder straps to

avoid pressure on the nerves around the armpits. Some backpacks have waist straps designed to stabilize the load. These should be used whenever possible.

\*The proper maximum weight for loaded backpacks should not exceed 15% of the child's body weight. For example, an 80-pound child should not carry more than 12 pounds in a pack. If the pack forces the carrier to bend forward, it is overloaded.

\*In loading, it is obvious that excessive backpack weight can cause problems. Prioritizing the pack's content is very important. Avoid loading unnecessary items. It is important to balance the weight of the contents or the body shifts into unnatural postures to compensate.

\*Often ignored is the act of lifting and positioning the pack. Lifting 20 pounds improperly can cause damage.

**Follow these simple steps:**

1- Choose a back pack with padded shoulder straps that fits your child's size. ( A backpack that's too large will sag towards the buttocks, stressing the child's lower back and shoulders.)

2- Lighten the load. Children should carry loads no heavier than 15 percent of their body weight.

3- Face the backpack before you lift it.

4-- Bend at the knees.

5- Using both hands, check the weight of the pack.

6- Lift with your legs, not your back.

7- Carefully put one shoulder strap on at a time. Never sling the pack onto one shoulder.

8- Use both shoulder straps. Make them snug but not too tight. Carrying the backpack on one shoulder, while fashionable, can cause long-term neck, shoulder, back, and postural problems.

9- Use the stabilizing waist strap around the waist.

10- Look for signs -- pain, red marks from straps, poor posture -- indicating if a backpack fits poorly or is overloaded.

This article was contributed by the founders of Backpack Safety America/ International TM, the world's first comprehensive education program designed to help students, parents and teachers prevent injuries related to the improper use of backpacks among school-age children. Doctors across North America and around the world have presented the program to more than a million students, parents, teachers and administrators. Their informative website offers practitioners, parents and children the opportunity to educate about the need for Backpack Safety measures.

Visit them at: [www.backpacksafe.com](http://www.backpacksafe.com)