

# DoD Ergonomics Working Group NEWS



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## Backpacks: A “Weighty” Issue

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Backpacks are a practical way for students to carry textbooks, notes, and supplies associated with their day-to-day school activities. Backpacks use good biomechanical principles as they are designed to distribute the weight of the load among some of the body's strongest muscles such as the back and hips. When used correctly, backpacks can be a good way to carry the necessities of the school day without taxing the body. Unfortunately, if the backpack is worn incorrectly or packed with too much weight, stress to the joints and muscles may occur. Over time, this stress can manifest into back, neck, and or shoulder pain as well as posture problems. A report from the Consumer Product Safety Commission revealed 7,300 injuries were treated in U.S. emergency rooms in 2006 because of backpacks; sprains and strains were the most frequent complaint.



***As your child heads back to school, use these helpful tips to minimize the effects of backpack use.***

First, and most importantly, do not overload your child's backpack. The amount of weight that a child should place in their backpack is based on their body weight. Guidelines for acceptable backpack weight range from 10-15 percent of the user's body weight. If your child weighs 60 pounds, the amount of weight your child should be carrying in their backpack will range from 6-9 pounds; any weight over 12 pounds is considered dangerous and can lead to injury. It is a good idea to occasionally weigh your child's backpack to guarantee that safe weight limits are not exceeded. Use this table to help you prevent overpacking your child's backpack:

Graphic courtesy of Dr. Joe Ventura, © 2011.

If your child weighs:	10% of body weight	15% of body weight	20% of body weight
50 lbs	5 lbs	7.5 lbs	10 lbs
60 lbs	6 lbs	9.0 lbs	12 lbs
70 lbs	7 lbs	10.5 lbs	14 lbs
80 lbs	8 lbs	12.0 lbs	16 lbs
90 lbs	9 lbs	13.5 lbs	18 lbs
100 lbs	10 lbs	15.0 lbs	20 lbs

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In addition to the weight of the backpack, you need to consider its design and the packing and wearing of the backpack. Follow these guidelines to minimize injury risk and make wearing a backpack more comfortable:

**Design of the Backpack.** A well-designed backpack will:

- Be as light as functionally possible to minimize the weight of the load.
- Match the size of the user. Never buy a backpack too big for the user.
- Have wide padded shoulder straps to increase comfort and avoid compressing nerves in the shoulder and reducing blood circulation.
- Have two shoulder straps and a waist strap to help evenly distribute weight.
- Have a padded back to increase comfort by minimizing items from inside the bag digging into the back.
- Have a lumbar cushion. The lumbar cushion will redistribute weight to the lower extremities facilitating an upright standing position.

**Packing the Backpack.** A well-packed backpack will:

- Be packed light, carrying only what is needed, always following the 10-15 percent body weight rule.
- Have heavier items packed closest to the center of the backpack.
- Use all of the backpack compartments to help distribute the weight of the backpack evenly.

**Wearing the Backpack.** To properly wear a backpack, your child should:

- Use both shoulder straps and adjust the shoulder straps so that the backpack does not hang loosely.
- Use the waist strap.
- Adjust the backpack so it is resting in the curve of the lower back. Avoid resting the backpack more than 4 inches below the waistline.

Finally, talk to your child about good backpack practices, encouraging packing light and wearing the backpack in a manner that reduces stress on the body. A recent study showed that nearly 8 out of 10 middle school students who changed how they loaded and wore their backpacks reported less pain and strain in their backs, necks, and shoulders.