38 Child and Adolescent Workers[1]

Letitia Davis, Dawn N. Castillo, and David H. Wegman

- A 15-year-old working in a restaurant was severely burned while changing the oil in a fryer. The youth slipped while carrying the hot oil and sustained second- and third-degree burns over 14% of his body.

A 15-year-old was killed in a tractor rollover incident on a tobacco farm. The youth, along with his brother and another boy, was using a tractor to plow a field. As he tried to turn the tractor around near the edge of a small ravine, one of the wheels went over the ravine and the tractor overturned. It landed on the boy, and he died immediately.

A 17-year-old dietary aide in a hospital was blinded for 2 weeks after the chemical she was using to wash pans splashed into her eyes.

A 17-year-old underwent amputation of both legs after he fell inside a paper baler at a resource recovery center. Investigators found that he was employed in violation of child labor laws and that the energy source to the baler was not turned off as it should have been.

- A 17-year-old working in a sandwich shop was sexually assaulted and robbed at gunpoint. The crime occurred while the youth was working alone after 11:00 p.m.

Millions of adolescents and children in the United States work. Although work can provide important benefits for youth—enhanced self-esteem, job skills, and income—it also poses substantial health risks. Young workers, here defined as workers younger than 18 years of age, routinely confront safety and health hazards on the job, and each year in the United States tens of thousands are injured, hundreds are hospitalized, and at least 70 are killed. In addition, working more than 20 hours per week while going to school has been linked with a number of adverse psychosocial outcomes such as increased daytime fatigue and substance abuse, issues important to consider within a broad definition of child and adolescent health (1).

This chapter provides an overview of youth employment and what is known about occupational injuries and illnesses. It discusses factors that raise special health and safety concerns about youth in the workplace and describes child labor laws, which establish extra protections for working youth. Finally, it discusses innovative opportunities for prevention.

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Box 38-1. International Child Labor: The Impact of Economic Exploitation on the Health and Welfare of Children

David L. Parker

Social policy questions concerning child labor are neither unique to the current era nor the Western world. Perhaps the earliest regulation of child labor dates to 1284, when a statute of Venetian glass makers forbade the employment of children in certain dangerous aspects of the glass trade (2). Efforts at reform have been and continue to be impaired by a lack of substantive data on the effects of child labor on health and development.

In 1919, the first meeting of the International Labor Organization (ILO) fixed a minimum age for the employment of children at 14 years. Subsequently, many international conventions and regulations have been adopted by the ILO and many nations have set a minimum age for employment. However, as judged by educational data, a substantial number of nations report large numbers of children leaving school below the nation's specified minimum age.

The right of children to an education and freedom from exploitation are clearly stated in the Convention on the Rights of the Child adopted by the United Nations General Assembly in 1989. The passage of this declaration represents a commitment on the part of member nations to work toward a future in which the rights of all children are respected. International law also provides a clear and generally accepted consensus on the nature and definition of child labor.

The Magnitude of Child Labor

In the 1970s, the ILO estimated that there were approximately 150 million working children in the world; more recently, the ILO has estimated that the number may be as high as 250 million (3). Even the latter estimate may be low. There are an estimated 1.1 billion children between 5 and 16 years of age in developing and the least developed nations in the world. In many nations, fewer than 50% of children complete primary school. If most of these children work, the number of working children may be closer to 500 million (Figs. 38-1 and 38-2).

In spite of the lack of comprehensive data, it is clear that working children in developing nations spend long hours at work and often have little or no time away from the

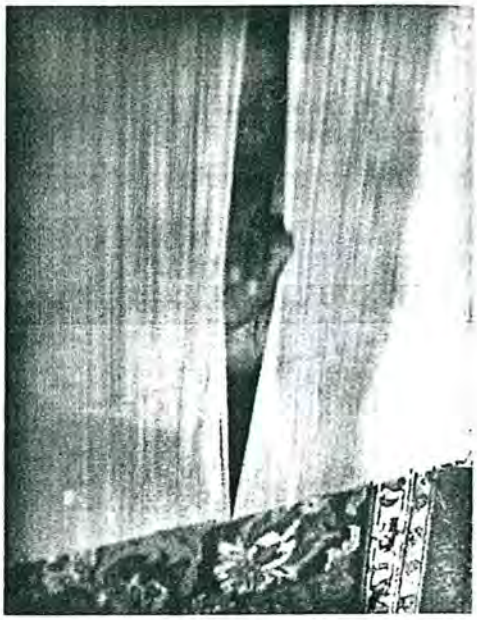

FIG. 38-1. Child carpet weaver in India. (Photograph by David Parker.)

FIG. 38-2. Young brick workers in Colombia. Thousands of children work as forced labor in brick kilns, rock quarries, or mines. (From the International Labor Office, Geneva, Switzerland.)

Box 38-1 (*continued*)
workplace. In one study of 210 Malaysian children, the children worked an average of 10 hours per day. Thirty-eight children reported that they worked 7 days per week, and 132 had only a half-day off per week (4). Although sometimes combined with school, similar numbers of hours worked have been reported from Sudan, Turkey, and Nigeria.

The Health Effects of Child Labor

The impact of child labor should be seen in four parts: the effect of work on growth and development; job-specific hazards as they relate to injury and illness morbidity; the effect of latency on the future health of children; and sexual and emotional abuse.

Perhaps the most obvious impact of child labor is on intellectual development, and child labor has been frequently associated with adult illiteracy. Studies have also demonstrated the impact of child labor on lost educational opportunity. For example, in one study in Bangladesh, children of women with no education had a four- to fivefold risk of severe malnutrition compared with children of mothers with a university education (5). Studies have also demonstrated the general poorer health of child workers (4).

It is not surprising that there are few studies on the impact of specific work-related exposures on the health of children. First, children are often working illegally. Second, children are rarely the beneficiaries of any type of labor contract. Third, such studies are expensive and difficult to conduct. What is known is that working children can be found around the world cutting rock in stone quarries, working in heavy construction, tanning leather, electroplating metals, scavenging garbage for food, tending goats and sheep, and any of hundreds of menial tasks. Too often, work in developing nations is performed without adequate protections and, when available, personal protective equipment has been designed for use by adults and is virtually useless for a child.

Young workers in many developing nations are at substantial risk of developing both work-related and non–work-related illness. Most data indicate that the health status of young workers is poor. These health problems are compounded by the all-too-often intolerable work conditions. Although data on the toxic effects of occupational exposures to children are limited, existing disease models amply support the hypothesis that children are likely to acquire disease at an early age as a result of hazardous work. For example, young children are known to be more susceptible than adults to the adverse health effects of lead.

The focus of the chapter is limited to the health and safety risks faced by young workers in the United States. Many of the issues are relevant to youth employment in other industrialized countries, but less so to child labor in newly industrializing and developing nations, where there are many basic human rights as well as health and safety concerns. (Box 38-1 provides a discussion of child labor in these countries.) Exploitative child labor continues to be a reality for some young people in the United States. In considering the health and safety concerns of young workers in the United States, however, it is important to distinguish between children employed in frankly exploitative situations, such as sweatshops in the apparel industry, and what is here called *youth employment*. The former typically involves minority children working out of economic necessity and hidden from public view. It involves a comparatively small number of young people in the United States. Youth employment, on the other hand, is the norm in American society. Failure to differentiate between frankly exploitative child labor and youth employment enables society at large to distance itself from the problems—to focus on the extreme conditions and overlook risks faced by youth in common, everyday jobs. Both issues need to be addressed (6).

YOUTH EMPLOYMENT IN THE UNITED STATES

Youth employment is more extensive than often realized. According to the U.S. Department of Labor, an average of 34% of 16- to 17-year-olds—over 2.6 million teens—were employed at any given point during 1997. An additional 10% were in the workforce looking for work (7). These official estimates undercount the true number of employed youths. For example, they exclude 14- and 15-year-olds, who are allowed to work under child labor laws, as well as younger children, who can legally work under federal law as news carriers and on family farms and in other family businesses. Surveys of youth themselves indicate that 80% have worked for pay by the time they leave high school. Although working youth historically contributed to the support of their families, most youth today report that they primarily work for discretionary income. Although comparisons with other countries are difficult, available data suggest that more children in the United States work while going to school than in other industrialized nations (1).

Young workers are typically employed in part-time, low-paying jobs, and move in and out of the workforce. When employed, they spend substantial numbers of hours at work. In a nationwide survey, 18% of high school students reported working more than 20 hours per week during school (8). As shown in Fig. 38-3, close to half of working youth are employed in the retail sector, predominantly at grocery stores and restaurants, where they constitute approximately 10% of the workforce. More than one-fourth of working youth are employed in service industries, such as at nursing homes, and approximately 8% are employed in agriculture. Youth from low-income families and minority youth are less likely to be employed and to reap the potential benefits of work. When they do work, they are more likely to be engaged in higher-risk occupations such as agriculture, manufacturing, and construction (9). Although official statistics on the numbers of children employed in frankly exploitative situations are not available, it has been estimated that as many as 13,000 children in the United States may be employed in sweatshops (10).

OCCUPATIONAL HEALTH OF YOUNG WORKERS

Concern about young workers in the United States cannot simply be relegated to the past. There is considerable evidence that occupational injuries to working youth are a significant public health problem today (Figs. 38-4 and 38-5). Each year, at least 70 workers younger than 18 years of age are killed on the job. Close to half of those killed are younger than 16 years of age. The leading causes of these deaths include traffic-related incidents, homicides, and machine-related deaths.

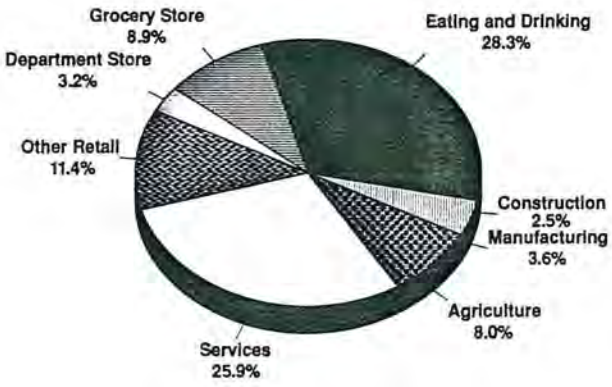

FIG. 38-3. Distribution of working youths, 15 to 17 years of age, by industry in the United States, 1996. (From Bureau of Labor Statistics, 1997).

FIG. 38-4. An underage supermarket meat packer unjams store machinery. Jobs in meat packing place adolescent workers at high risk for serious injuries. (Photograph by Earl Dotter.)

FIG. 38-5. Adolescent worker in a dietary department of a hospital. Burns, sprains and strains, and lacerations are common injuries in food service jobs. (Photograph by Elise Morse.)

Agriculture, which has a number of special exemptions under the child labor laws, accounts for more fatalities than any other industry. Half of these fatalities involve youth working on family farms. The overall fatality rate for young workers has been found to be similar to that for adults, despite the fact that child labor laws prohibit youth from working in particularly dangerous jobs (11).

Nonfatal injuries far outnumber fatalities. In New York State, from 1980 to 1987, more than 1,200 youths annually received compensation for occupational injuries resulting in 8 or more lost workdays; 44% of the injured youth sustained permanent disability (12). In Washington State, which tracks all injuries regardless of lost work time, over 4,400 adolescents received workers' compensation benefits each year from 1988 to 1991 (13).

Workers' compensation data, however, reveal only part of the problem because many young workers who are injured may never enter workers' compensation systems. In a Massachusetts study, 7% to 13% of all medically treated injuries among 14- to 17-year-olds occurred at work. In 1996, an estimated 105,000 youth were treated in emergency departments nationwide for work-related injuries. Surveys of young workers themselves underscore the extent of the problem. Between 7% and 16% of teens who have worked report being injured at work seriously enough to seek medical care (1).

The numbers of teen work injuries alone raise concern. Because youths usually work in part-time, temporary jobs, these numbers lead to estimates of high injury rates *per hour worked.* Several studies indicate that the overall injury rate per hour worked for teens is actually higher than that for adults. In 1996, for example, the rate of work-related injuries treated in emergency departments for 16- to 17-year-old workers was 4.9 per 100 full-time equivalent workers, compared with the rate of 2.8 for all workers aged 16 years and older.

These rates are crude and do not take into account the different types of jobs held by teens and adults; further research is necessary to determine whether teens have higher injury rates than adults doing comparable work.

As would be expected, most nonfatal injuries occur in those industries in which the greatest numbers of youth are employed—in retail trades, predominantly restaurants and grocery stores. Other leading locations include general merchandise stores, nursing homes, and farms. Agricultural injuries are especially common among youth younger than 16 years of age, and it appears that injuries sustained in agriculture are more severe than injuries in other industries. Lacerations, sprains, and strains are the most common nonfatal work injuries to youth. Similar to adults, half of the sprains and strains involve the back. Burns and fractures are also common. As shown in Fig. 38-6, the types of injury vary by industry.

Although little is known about the long-term disability associated with these injuries, the impact should not be underestimated. Such injuries, identified through emergency department records and workers' compensation claims, are serious enough to result in medical care. The longer-term human and economic costs associated with these injuries need to be documented.

Although surveillance studies have greatly improved our understanding of occupational *injuries* to youth, little is known about the extent to which youth experience acute or chronic *illnesses* as a result of work-related exposures. There are incidence reports of young workers with acute occupational disease. For example, youth were among the ill in an outbreak of green tobacco sickness in Kentucky. There is also evidence that youth are potentially exposed to a number of hazardous conditions at work that can contribute to latent illness. In a North Carolina survey, for example, 27% of youth who had worked reported exposure to very loud noises, 24% reported working with gasoline, and 19% reported working with pesticides or other chemicals. Because youth typically work part time, their exposures may not exceed existing standards that assume a lifetime of 8-hour workdays and 40-hour workweeks. Their short periods of exposure may reduce the likelihood of long-term health impacts. On the other hand, the fact that they are exposed at all raises important research questions about the potential increased susceptibility of young workers, the effects of age at first exposure, and the combined effects of multiple exposures over a working lifetime. Youth employment also raises important policy considerations about what are acceptable health risks for working youth (1). Washington State, for example, has revised its child labor laws to prohibit youth

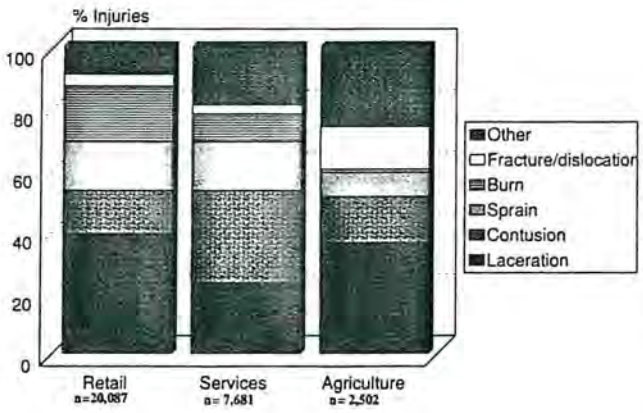

FIG. 38-6. Type of injury by industry in youth 14 to 17 years of age treated in emergency departments for work-related injuries in the United States, July to December, 1992. (From Layne LA, Castillo DN, Stucte N, Cutlip P. Adolescent occupational injuries requiring hospital emergency department treatment: National Representative Sample. Am J Public 1994:84:657–660.

from working in occupations involving potential exposure to carcinogens or bloodborne pathogens.

RISK FACTORS SPECIFIC TO YOUNG WORKERS

In considering the risk factors specific to young workers, it is critical that the focus on unique attributes of youth should not detract attention from the work environment itself. Young workers, like adult workers, are injured on the job because there are hazards in the jobs where they work. Notably, many of the industries in which youth are commonly employed—grocery stores, nursing homes, farms—have high injury rates for workers of all ages. The primary prevention goal for workers of all ages is the elimination and control of hazards in the workplace.

A number of factors do, however, raise special concerns about the health and safety of children and adolescents at work. Like all *new* workers, young workers are at increased risk of injury simply from lack of experience. Inexperienced workers are unfamiliar with the requirements of work, are less likely to recognize hazards, and are commonly unaware of their legal rights on the job. Lack of health and safety training is also a problem for young workers, even more so in light of their inexperience. In several surveys of working teens, approximately half report that they have not received health and safety training on the job. In addition, teens typically do not receive training about workplace health and safety or labor laws in school, except for some training in vocational education. Inadequate supervision is likewise a concern.

Developmental characteristics—physical, cognitive, and psychological—may also place young workers at increased risk. There is tremendous variability in the size of adolescents, for example, and smaller youth may not be able to reach parts of machines or may lack strength required to do the tasks demanded of them. Some organ systems, such as the musculoskeletal, reproductive, and endocrine systems, undergo periods of rapid growth or activity during adolescence. It is not known if this introduces unique youth susceptibilities to chemical or ergonomic insults at work.

Adolescence is well recognized as a period of profound psychological change. The psychological transition typically lags behind physical maturation, and psychological immaturity may be obscured by the physical appearance of the adolescent who may be assigned tasks for which he or she is neither emotionally nor cognitively prepared. Because adolescence is a time of exploration and risk taking, occupational injuries in this age group are commonly attributed to irresponsible acts associated with risk-taking behavior. Interviews with adolescents injured at work in Massachusetts, however, suggest the opposite is often the case. It is frequently young workers trying to act responsibly and demonstrate new independence and skills who are injured at work. Many of adolescents' positive traits—energy, enthusiasm, a need for increased challenge—combined with a reluctance to ask questions or make demands on employers can result in adolescents taking on tasks they are not capable of doing safely.

Young workers face the added challenge of balancing work and school. Federal child labor laws allow 14- and 15-year-olds to work 18 hours during school weeks; there are no federal restrictions on hours for older teens, although such time restrictions do exist in some states. Heavy part-time work schedules of adolescents have been linked with inadequate sleep and increased daytime fatigue, which may increase risk of injury in other arenas as well as work. Working more than 20 hours per week has also been associated with increased substance abuse—increased smoking and use of alcohol and illicit drugs (1).

THE CHILD LABOR LAWS

Early concerns about child labor led to passage of state child labor laws and, eventually,

TABLE 38-1. *Hazardous jobs under the Fair Labor Standards Act*

Nonfarm work

Seventeen hazardous nonfarm jobs are prohibited under the Fair Labor Standards Act. In general, youth younger than 18 years of age cannot do work involving the following:

- Manufacturing or storing explosives
- Driving a motor vehicle and being an outside helper on a motor vehicle
- Coal mining
- Logging and sawmilling
- Power-driven wood-working machines[a]
- Exposure to radioactive substances and to ionizing radiations
- Power-driven hoisting equipment
- Power-driven metal forming, punching, and shearing machines[a]
- Mining, other than coal mining
- Meat packing or processing (including power-driven meat slicing machines)[a]
- Power-driven bakery machines
- Power-driven paper products machines[a]
- Manufacturing brick, tile, and related products
- Power-driven circular saws, band saws, and guillotine shears[a]
- Wrecking, demolition, and ship-breaking operations
- Roofing operations[a]
- Excavation operations[a]

Farm work

Children working on their parents' farms are exempt from the prohibitions of the Fair Labor Standards Act. For other children younger than 16 years of age working in agriculture, the following occupations/tasks are prohibited:

- Operating tractors with horsepower greater than 20 power take-off (PTO).
- Operating corn pickers, cotton pickers, grain combines, hay mowers, forage harvesters, hay balers, potato diggers, mobile pea viners, feed grinders, crop dryers, forage blowers, auger conveyors, nongravity-type self-unloading wagons or trailers, power post-hole diggers, power post drivers, or nonwalking-type rotary tillers
- Operating trenchers or earthmoving equipment, forklifts, potato combines, or power-driven saws
- Handling breeding animals, sows with suckling pigs, cows with newborn calves
- Felling, bucking, skidding, loading, or unloading timbers with a butt diameter of more than 6 inches
- Using ladders or scaffolds more than 20 feet high
- Driving a bus, truck, or car while transporting passengers or riding as a passenger or helper on a tractor
- Working inside fruit, forage, or grain storage units, silos, or manure pits
- Exposure to agricultural chemicals classified as category I or II of toxicity
- Working with explosives
- Being exposed to anhydrous ammonia

[a] Limited exemptions are provided for apprentices and student-learners under specified standards.

in 1938, of federal law to protect the educational opportunities, health, and well-being of young workers. These laws reflect the long-standing societal viewpoint that there are different levels of acceptable risk for youth in the workplace. They provide an additional layer of protection, above and beyond occupational safety and health standards that apply to all workers.

The child labor laws establish minimum ages for employment, limit the hours and times of day youth can work, and prohibit employment of youth in certain jobs deemed to be too hazardous. Most state laws require young workers to obtain work permits, typically issued by schools. The hours of work and prohibited jobs vary significantly for children working in agricultural and nonagricultural occupations (Table 38-1). The basic minimum age of employment is 14 years in nonagricultural occupations, except that under the federal law, children of any age may work in family businesses as long as they are not engaged in the prohibited jobs. Children working on family farms are completely exempt from the federal child labor laws, as are news carriers. State laws vary widely and may be less or more protective than the federal law. Federal law applies only to businesses that are engaged in interstate com-

merce or have an annual gross income of $500,000 or more. Therefore, many small businesses are exempt from federal regulations. When both federal and state laws are applicable, the most stringent law applies.

Substantial revisions in federal and many state laws have not been made in decades. Consequently, many laws do not reflect changes in patterns of youth employment and education, changes in the nature of work, and new knowledge about occupational health and safety risks. For example, at the federal level, virtually all of the prohibited occupations for youth in nonagricultural jobs are prohibited on the basis of safety hazards; none of the restrictions addresses health hazards in the workplace; nor do they address issues of violence in the workplace. In addition, enforcement of the laws is limited. In 1998, the National Research Council issued a report calling for federal limits on hours of work for 16- and 17-year-olds, elimination of the differences between the restrictions for children working in agricultural and nonagricultural jobs, and updating of the list of prohibited occupations in an effort to address new and emerging technologies and working conditions (1). Additional research and input from public health professionals are needed to provide the scientific basis for updating these regulations.

OPPORTUNITIES FOR INTERVENTION

Although the presence of youth in the workplace raises special health and safety concerns, there are also special opportunities for prevention of occupational injuries and illnesses in this population. These include not only use of the federal and state child labor laws to protect young workers, but innovative efforts that involve the broader set of stakeholders for youth. Multiple adults, in addition to employers, have important roles to play in safeguarding the health and safety of young workers. Parents and guardians retain legal and social responsibility for their children's well-being. Educators also play a role in the work lives of youth: in approving work permits, providing or facilitating work experiences, and preparing students for the world of work. In some states, health care professionals are required to sign off on work permits.

This expanded set of stakeholders provides an important opportunity for using the community at large to promote the health and safety of working youth. Examples of ongoing efforts include incorporation of health and safety education into school-to-work initiatives or middle and high school curricula; development of peer leadership programs that include occupational health and safety among the list of topics addressed by peers; and information dissemination about health, safety, and workers' rights to both young workers and their parents through community organizations and the local media. Health care professionals who provide services to children and adolescents also have a potentially important role to play in providing guidance to young patients about work (Table 38-2). It remains the ultimate responsibility of the adult employer, who profits economically from the labor of youths, to provide a safe, appropriate work environment, including adequate supervision and training. Community resources can be marshaled to shift community norms and help ensure that this responsibility is met.

Preventing occupational injuries and illnesses among young workers ultimately requires a comprehensive approach that includes regulation and enforcement, engineering advances to control hazards in the workplace, and education of adults and youth. It calls for new alliances between occupational health experts and other stakeholders, including pediatricians and maternal and child health professionals, child labor regulators, educators, and community leaders. Although safeguarding youth at work poses unique challenges, it also has tremendous potential for influencing the safety and health of the next generation. Health and safety education that goes beyond task-specific safety training can provide young work-

TABLE 38-2. *Advice to health care professionals about protecting working teens*

As health care professionals, you have an excellent opportunity to counsel teenage patients during the high-risk transition period from childhood to adulthood. You can play an important role by providing them with information, promoting safe work practices, and encouraging them to know their rights and to speak up when there are problems.

- Ask your teenage patients whether they work, and if so, where.
- Ask if they or their friends have ever been injured at work.
- Ask how many hours they work in a week, especially during the school year, and discuss whether the number of hours interferes with other activities and contributes to fatigue.
- Ask about work tasks, both regular and occasional. Are the tasks appropriate to your patients' developmental and physical abilities? Are they prohibited by the child labor laws?
- Encourage your patients to follow safety rules at work, including using protective clothing and equipment as required.
- Encourage your patients to tell someone (parent, boss, older coworkers) if they encounter problems at work.
- Provide material to teens and their parents or guardians about child labor laws and resources for more information. These materials are available in many states.
- Contact the Occupational Safety and Health Administration or the relevant state agency about workplaces where you believe young workers may be at risk of serious injury.

Adapted from educational materials prepared by the Massachusetts Department of Public Health with funding provided by the National Institute for Occupational Safety and Health.

ers with transferable knowledge and skills—hazard recognition and an understanding of the principles of hazard control as well as legal rights and responsibilities—that they will carry with them throughout their working lives. This education is especially relevant in looking toward intervention models that focus on joint labor–management health and safety efforts and greater involvement of workers who are empowered to effect change in the workplace. Working with youth now to provide them with knowledge and skills in occupational safety and health will better enable them to be active participants in creating and ensuring safe and healthful workplaces of the future.

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