

▶ BRAIN DEVELOPMENT AND YOUNG WORKER SAFETY

Some of the additional risks faced by young workers relate to their age and aspects of their physical and biological development. In this article, Associate Professor Ian Glendon of Griffith University provides an overview of recent research into brain development and cognition during adolescence. He describes how this research may help to explain why young people are overrepresented in injury statistics, and comments on the implications of this research for those of us working to prevent workplace injuries.

What do we know about adolescent brain development?

More is being discovered about that uniquely human developmental stage of adolescence. Research reveals that adolescent brains undergo radical changes, some evidence suggesting that the brain may not be fully developed until the late 20s. Key features of adolescent brain development include:

- Changing balance between parts of the brain responsible for emotions and the executive function (planning, impulse control and reasoning).
- The part of the brain responsible for coordinating movement is still developing.
- Melatonin production, important in regulating our sleep-wake cycle, is different from that in children and adults.
- Nerves linking the brain's right and left hemispheres do not stabilise until early adulthood.
- Nerve fibres in the most advanced part of the brain are 'pruned' and the balance between white and grey matter changes during adolescence as higher executive areas 'settle in'.
- Brain areas affecting our ability to see and visualise things mature earlier than do the executive functions required to control them.
- Areas of the brain responsible for creating mental imagery are still developing.
- Parts of the brain responsible for regulating emotions develop later in males, and compared with females, males have less brain tissue available to regulate their emotions.

How does this knowledge help to explain why young people may be over-represented in workplace injury statistics?

Because the executive function develops later than the emotional centres, adolescents' behaviours are more likely to be driven by an immediate search for sensations, rewards and novelty, some of which could be associated with risk-taking or recklessness. Differential development of various brain regions could mean that a young worker's ability to use information to make good (e.g. safe) decisions is compromised. Young males are more prone to make aggressive responses to a range of situations. Because integrating emotions and decision making occurs over an extended period, young workers could be vulnerable to an underdeveloped ability to handle stress.

Development of movement functions means that while young workers may appear to learn many skills rapidly, they remain prone to errors arising from coordination lapses. Young workers may display a tendency to 'eveningness' so that tasks undertaken early in the day could be more inherently error-prone. Young workers who have 'mixed handedness' could be particularly liable to adverse effects from hazards involving complex tasks requiring both hands and more than one sense modality.

Young workers may experience frustration and be error-prone in tasks involving decision making, with the potential for disorganised thought patterns or behaviours. Hazards may be perceived as in adulthood, but risk perception – involving an ability to understand the full extent of a hazard, could lag behind. Young workers could also take longer to process certain types of information about inherently dangerous situations and to visualise harmful outcomes.

What are some promising strategies to help protect young people in workplaces?

Because of large individual differences, generic strategies need adjustment to suit individuals and circumstances. As young workers gain experience and maturity they can gradually be given greater responsibility and autonomy. Appropriate psychometric tests could be used to monitor young workers' developing emotions and cognitive abilities. Adolescents should be provided with opportunities to exercise their reward, novelty and sensation seeking motivated behaviours in places where the risks that they take can be adequately supervised. They should be given relevant performance feedback to help them learn about potential adverse consequences of certain risk-taking behaviours. Supervisors should ensure that young workers work on tasks that are 'forgiving' of postural lapses, so that any that occur do not result in injury. In particular ensure that work undertaken early in the day is not overly demanding.

Young workers should have adequate opportunity to practise certain tasks, particularly those requiring complex information processing. Case studies and simulations are among tools that could be used to good effect. Risk assessments on complex tasks performed by young workers should incorporate a 'young worker' factor to ensure adherence to strict guidelines on tasks that young workers can safely perform. Adequate support and guidance should be available for young workers undertaking tasks involving complex decision making.

Appropriate risk perception training is required to enhance young workers' understanding of hazards/risks associated with particular jobs/tasks. It cannot be assumed that young workers completely understand all the risks associated with a job merely because the hazards are visible. Scenarios involving danger perception can be used to improve young workers' mental imagery of undesired outcomes from job-related activities. Those responsible for supervising young workers should have appropriate expectations about what tasks they can reasonably be expected to undertake, particularly when these involve 'emotional labour', including any potentially stressful contact with customers or others.

Emphasise mentoring and support, particularly for males, from more experienced role models, and ensure that young workers who show aggressive responses are not assigned to tasks where poor control or risk-taking could compromise their own or others' safety.

Who should be involved in implementing and evaluating these strategies?

Many parties can play a role in ensuring the health and safety of young workers. These include:

- Governments – e.g. developing legislation and policies relevant to young workers.
- Workplace health and safety enforcement agencies – e.g. ensuring that specific arrangements for young and inexperienced workers are in place.
- Workplace management – e.g. ensuring that safe operating procedures derived from risk assessments incorporate control measures appropriate to young workers'

level of experience.

- Workplace supervisors – e.g. ensuring that young workers are adequately monitored and given regular and appropriate feedback on their work performance, particularly safety aspects.
- Workplace trainers – e.g. ensuring that training given to young workers includes all the features necessary to address the needs identified above.
- More experienced workers – e.g. maintaining awareness of young workers' performance and giving appropriate feedback, particularly regarding safety.
- Peers – e.g. developing a 'buddy' system in which pairs (or larger groups) of young workers look out for one another.

About the author

Associate Professor A. Ian Glendon is from the School of Psychology, Griffith University, Gold Coast Campus. He has a long-standing interest in the safety of young workers and young drivers. His authored work on this topic includes:

Glendon, A. I., Clarke, S. G., & McKenna, E. F. (2006). *Human safety and risk management* (2nd edn.). Boca Raton, FL: CRC Press/Taylor & Francis.

Glendon, A. I. (2006). Brain development during adolescence: Some implications for risk-taking and injury liability. *Journal of Occupational Health and Safety – Australia and New Zealand*, 22, 137-150.

Glendon, A. I. (2005). Young drivers' attitudes towards risks arising from hazardous driving behaviours. In L. Dorn (Ed.). *Driver behaviour and training*. (pp. 193-206). Aldershot, UK: Ashgate.

Glendon, A. I., & Cernecca, L. (2003). Young drivers' responses to anti-speeding and anti-drink driving messages. *Transportation Research Part F: Traffic Psychology and Behaviour*, 6, 197-216.

Glendon, A. I., & Boyle, A. J. (1987). *YTS accident injury statistics: YTS accident injuries April 1983 - September 1986*. Sheffield, UK: Manpower Services Commission.

Glendon, A. I., & Hale, A. R. (1986). Accidents to young people on the UK Youth Opportunities Programme, In G. Debus & H-W. Schroiff (Eds.), *The psychology of work and organisation* (pp. 329-336). Amsterdam: Elsevier.

Hale, A. R., & Glendon, A. I. (1985). *A study of 1700 accidents on the Youth Opportunities Programme*. Sheffield, UK: Manpower Services Commission.