

# Adolescent Mild Traumatic Brain Injury in Primary Care

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## ABSTRACT

The issue of mild traumatic brain injury has been an underdiagnosed problem for many years. This was frequently due to a lack of insight that, although there was no evidence of injury on computed tomography scan, the impact/injury had created functional changes within the brain that could cause long-term complications. Over the past 10 years, health care providers and the public have become more aware of the true impact of this form of injury on adolescents (13–19) in sports and other trauma-related injuries. This is not an injury to ignore; the consequences can be life-threatening.

**Keywords:** adolescents, mild traumatic brain injury, ongoing care, primary care assessment

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## INTRODUCTION

There are 1.6–3.8 million sports- and recreation-related traumatic brain injuries (TBIs) each year in the United States.<sup>1</sup> Most of these are mild TBIs and do not receive medical attention. Of the 1.4 million TBI-related deaths, hospitalizations, and emergency department visits, 75%–90% are some form of mild TBI.<sup>1</sup> In the adolescent population, mild TBIs account for 8.9% of all high school sports-related injuries.<sup>2</sup> Studies have indicated that adolescents and children may require a longer recovery time related to the continued growth process and more fragile state of the brain.<sup>2</sup> In addition, researchers have determined that multiple concussions can increase symptoms and worsen long-term prognosis.<sup>3</sup> Examining the recovery process of adolescents who have had a mild TBI will help guide understanding and future treatment approaches.

Although the recovery period varies after a mild TBI, the majority of those affected often recover in a 7- to 10-day period.<sup>4</sup> Unfortunately, as many as 15% of adolescents with concussion have a postconcussive syndrome that usually takes 3–6 months to resolve.<sup>5</sup> Coping with this process of recovery, especially as an adolescent, can require significant adjustment. It may require backing off on important college prerequisites, no longer playing a sport or participating in a hobby

that they love, losing important friendships, and not being able to drive and be independent at a time in their lives when this is extremely important. They also may require increased support from family and friends for headaches, memory lapses, cognitive slowness, and emotional fluctuation.

This article includes a review of the literature relevant to adolescent mild TBI and coping through the postinjury process as well as information on how to diagnose, treat, and manage mild TBI in primary care. To begin, I will examine the research relevant to how adolescent mild TBI can affect the child postinjury physically, cognitively, psychologically, and socially. I then review the literature concerning non-injury-related life factors affecting coping. This will include pre- and postinjury factors. I then review how to diagnose concussion, the treatment process, and management for best long-term outcomes.

## COPING WITH ADOLESCENT MILD TBI

### Physical Coping

The adolescent brain has several key physical differences in composition when compared with the adult brain. Because the body and brain are still in the midst of maturing, both body and brain structures are more vulnerable from mild TBI. Physical symptoms often encountered are headaches, fatigue and decreased

energy, sleep changes, nausea, problems with vision, ringing in the ears, dizziness and other balance issues, and an increased sensitivity to light and noise.<sup>6</sup> When compared with adults, the bone and muscle structure is not as equipped to support the weight of the head.<sup>7</sup> Also, the central and peripheral nervous system and myelin sheath are still in phases of development.<sup>7</sup> In addition, the brain's protection is limited because cranial bones are thinner and not fully developed.<sup>7</sup>

### Cognitive Coping

Cognitive symptomatology and coping with related effects are a major part of the recovery process postinjury. Cognitive issues often seen postconcussion are delayed or slow thinking, lack of mental clarity, difficulty concentrating, increased distractibility, problems with learning and remembering, and difficulty with problem-solving.<sup>6</sup> These symptoms can trouble adolescents as they attempt to focus on increasingly complex schoolwork and it may limit their learning at a crucial time in their academic lives. Although these cognitive symptoms usually dissipate within several months of injury, they can have a lasting impact on learning. Eisenburg and associates illustrated this in their study of the time resolution of postconcussive symptoms.<sup>3</sup> They determined that cognitive symptoms were often present initially but could also develop during the course of recovery and tended to last longer than other types of symptoms.<sup>3</sup> The researchers found that forgetfulness was the only symptom that usually resolved within a 2-week period after trauma.<sup>3</sup> All other cognitive symptoms had a much slower progression toward recovery.<sup>3</sup>

Cognitive issues can be particularly difficult to deal with when faced with meeting important academic milestones and deadlines to prevent losing important scholastic ground. Brown and associates studied the effect of cognitive activity level on duration of postconcussion symptoms.<sup>8</sup> Their study showed that reducing some cognitive activity level was beneficial and resulted in shorter symptom duration.<sup>8</sup> The researchers also determined that complete withdrawal from cognitive activity was probably not necessary.<sup>8</sup> In fact, they found that only the group engaged in the highest level of cognitive activity postinjury had any lengthening of cognitive symptomatology. All other groups with reduced

cognitive activity had better results and improved symptom resolution.<sup>8</sup>

To decrease unnecessary cognitive stress and expectations, special guidelines should be encouraged to allow appropriate levels of cognitive rest, such as shortened school days and extended deadlines for completion of schoolwork.<sup>3</sup> Each child must be evaluated individually because symptoms are so varied. They then should be closely watched by health care providers, school officials, and family to ensure they are coping adequately.<sup>3</sup> Any new issues that develop must be addressed and the education plan revised accordingly.

### Psychological Coping

The effects of mild TBI on the adolescent age group psychologically is eye-opening. In a Canadian study, Ilie and associates found that, after surveying 4,685 students, 19.5% had suffered some form of TBI in their young lives.<sup>9</sup> Of these adolescents, a significantly greater number identified having elevated levels of psychological distress, suicide attempts, counseling on a crisis hotline, and prescribed medication for depression, anxiety, or both. They also reported being bullied or cyberbullied, threatened with a weapon, bullying others, and displaying violent and nonviolent conduct problems.<sup>9</sup> Although it is impossible to determine the exact etiology and whether their behaviors came first or after, it is important to note that this at-risk group should be closely monitored and early interventions established and provided to reduce long-term and possibly lifelong effects.

Chrisman and Richardson presented another poignant statistic.<sup>10</sup> They found a connection that links a history of concussion with a 3-fold increased risk for depression.<sup>10</sup> Due to the potentially dangerous outcomes of depression, adolescents having experienced a mild TBI should be watched closely so that early intervention can take place and, hopefully, prevention or moderation of severe depression issues.

Unfortunately, with increased depression, suicide risk also increases. Mackelprang and associates studied suicidal ideation risk in the first year after TBI.<sup>11</sup> They found that an alarming 25% of study participants identified some form of suicidal ideation in the first year after their injury. This number is 7-fold greater than that of the general population.<sup>11</sup> Sadly, this high

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