Return to Drive After a Traumatic Brain Injury

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Outline

1. How can a TBI affect driving ability?
2. When is it safe to return to drive after a TBI?
   • Research on return to drive after a mild TBI
   • Research on return to drive after a moderate to severe TBI
3. How to facilitate a TBI survivor returning to drive?
The first thing coming to our mind when thinking about driving after TBI?

Driving is an important part of a person’s independent lifestyle and integration into the community.

A decision on return to drive safely after a TBI needs to be made collectively by the injured person, family members, and health professionals.

A brain injury can affect the skills needed to drive safely.

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Driving is a complex task requiring motor coordination, attention, perception, and higher-order cognition (e.g., planning, decision making).

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How can a TBI affect driving ability?
Physical Impairments

TBI survivors may suffer from:

- **Hemiplegia** -- causing paralysis or weakness on one side of the body after a TBI, is one of the most common results of TBI and the biggest obstacle to driving.

- **Hemiparesis** -- causing paralysis or weakness in one's hands, arms, legs, or even trunk after a TBI.

- **Spasticity** -- can greatly restrict movement, making it difficult to drive.

- **TBI symptoms** such as severe headaches, sensory problems, and dizziness.

Many of these challenges can be overcome with therapy and adaptive driving equipment.
Vision Impairments

Many TBI survivors suffer from vision problems:

• Blurred or double vision
• Problems with depth perception
• Loss of central vision
• Loss of peripheral vision
• Hemianopsia/Visual Field Cut (loss of vision in half of the visual field)

Vision therapy and eye exercises can often treat these issues. TBI survivors with vision problems should get cleared by a medical professional and local driving agency before attempting to drive again after a TBI.
Cognitive Impairments

TBI can impair cognitive skills needed to drive safely, which makes driving too dangerous for some TBI survivors.

- Memory
- Concentration
- Problem-solving
- Multitasking
- Organization

Cognitive Impairments
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Post-Traumatic Fatigue

It is important to make sure fatigue is under control before starting to drive.

Post-traumatic fatigue can make it difficult to stay focused on the road or make quick judgments, and in severe cases, it can cause one to fall asleep at the wheel.
According to data from the CDC, about 5-10% of TBI patients will experience a seizure after a head injury. Some may even go on to experience multiple seizures and develop post-traumatic epilepsy. An individual most likely can still drive if only experiencing one seizure after TBI, as long as there are no other impairments and they are cleared by a doctor. If an individual develops epilepsy, it will be more difficult to get a driver’s license approved.
Basic Driving Skills

• Ability to maintain a constant position in a lane
• Having accurate vision
• Maintaining concentration over long periods of time
• Having accurate vision
• Ability to maintain a constant position in a lane

Even mild thinking difficulties, which may not be recognized by the injured person, may add to increased risks while driving.
When is it safe to return to drive after a TBI?
Is it Safe to Drive Again after TBI?

Regard the driving fitness before returning to drive.

After waiting the recommended time, one should consult their doctor.

Doctors suggest waiting 6-12 months before attempting to drive again.

For a more serious TBI, especially one that requires a hospital stay,

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For a mild TBI, such as a concussion, doctors recommend at least 24-48 hours after their injury.

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• Is it Safe to Drive Again after TBI?
Research on return to drive after a moderate to severe TBI
Aim: Describe who is able to return to driving (RTD) after moderate-to-severe TBI, when this occurs, who maintains that activity, and the association with outcome.

Method: A survey of 618 participants enrolled in the 8 TBIMS and 88 caregivers.

Of 706 respondents, 78% (N = 552) RTD, but 14% (N = 77) did not maintain that activity.

43% (N = 192) RTD within 6 months of the injury and 92% RTD within 24 months post-injury.

Employment, race, family income, seizures, and severity of injury were strongly associated with RTD.
Methods: Cross-sectional design with 162 adults: (a) 48 with TBI whose drivers' license was suspended and reinstated following a driving evaluation during rehabilitation (TBI-DE); (b) 24 with TBI who maintained their driving privileges without undergoing a driving evaluation (TBI-NE); (c) 90 non-injured controls.

Results: Compared to non-injured controls, the TBI-DE group reported significantly lower scores for self-reported driving violations/errors. Conversely, their official driving records showed significantly more demerit points for the last 2 years, and a significantly higher frequency of serious post-rehabilitation reported driving violations/errors. Conversely, their official driving records showed significantly more demerit points for the last 2 years, and a significantly higher frequency of serious post-rehabilitation accidents.

Rehabilitation: A Multicenter Case-Control Study
Driving Behaviors 2–3 Years After Traumatic Brain Injury
Participants: Individuals with moderate-severe TBI in the TBI Model System at 16 centers and followed at 1 (n = 5942), 2 (n = 4628) and 5 (n = 2324) years after injury.

Results: Five years after injury, half the sample had returned to driving. Those who were driving expressed a higher life satisfaction. Functional status at rehabilitation discharge, age at injury, race, pre-injury residence, pre-injury employment status and education level were associated with returning to driving. Those with less severe injuries were quicker to return to driving, but, by 5 years, severity was not a factor. Those who were driving expressed a higher life satisfaction. Functional status at rehabilitation discharge, age at injury, race, pre-injury residence, pre-injury employment status and education level were associated with returning to driving.
On the Road Again After Traumatic Brain Injury: Driver Rehabilitation

Interventions for Resuming Driving After Traumatic Brain Injury

Model System Study Following Moderate to Severe Traumatic Brain Injury: A TBI Driving Patterns, Confidence, and Perception of Abilities

Research Articles
Research on return to drive after a mild TBI
Longitudinal Assessment of Driving After Mild TBI in Teens

PIs: Yang, JZ, Stavrinos, D (9/11/20 - 7/31/25, NIH/NICHD)
What We Know

Mild TBI

• Highest crash rates of all age groups

Teen Drivers

• Still learning complex task of driving

• An mTBI can impact driving ability

• Mild TBI can have detrimental effects on developing brains, causing headache, dizziness, confusion, and other cognitive impairments

(CDC, 2015; Vang JZ et al, 2018)


(Higher risk for mild TBI/concussion

What We Don't Know

How might an mTBI affect teens' driving performance post-injury? When can teens safely return to driving following an mTBI?
Study Goal

To longitudinally evaluate the driving performance of teen drivers following an mTBI as compared to matched healthy controls.
Participants

- mTBI cases: 9 Drivers 16 to 24 years old, 9 Physician-confirmed mTBI diagnosis recruited from concussion clinics at two university hospitals within 96 hours of injury.

- Matched controls: No history of mTBI, matched on sex, age (± 6 months), athlete status (yes/no), and type of licensure (e.g., intermediate). Matched on sex, age, sex, and athlete status (yes/no), and type of licensure (e.g., intermediate).

Matched controls:

- No history of mTBI
- Matched on sex, age, sex, and athlete status (yes/no), and type of licensure (e.g., intermediate).

- Recruited from concussion clinics at two university hospitals within 96 hours of injury.
- Physician-confirmed mTBI diagnosis.
- Drivers 16 to 24 years old.

mTBI cases:

- Matched controls:
Study Implications

Understand how driving may be affected by mTBI, acutely post-injury and during course of recovery.

Inform clinical decisions and recommendations on when teen drivers can safely return to driving after mTBI.

Support the development of empirically-based guidelines.
How to facilitate a TBI survivor returning to drive?
Learn to Drive Safely Again After Brain Injury

• For many people, driving after brain injury represents the ultimate goal of recovery. The freedom to go where a person wants, when they want to, is a crucial aspect of independence.

• However, if cognitive or physical abilities are impaired, one can jeopardize the lives of both themselves and others.

• The best way to ensure that one can safely drive again after TBI is to consult an occupational therapist who can help them navigate the complex driving rehabilitation process.
Assessing Signs of Unsafe Driving

• Getting lost easily, even in familiar areas
• Driving across lane markings into other lanes
• Having crashes or near misses
• Becoming easily frustrated or confused
• Becoming slow to make decisions
• Becoming slow when turning
• Judging distance inaccurately when stopping
• Not observing signs or signals
• Driving too fast/slow
Step-by-Step: Should They Be Driving?

1. Discuss the ability to drive with a doctor and/or health professionals, and family members

2. Get a professional evaluation to determine driving ability

3. Based on the evaluation, one may be allowed to drive, need training or vehicle modification before returning to driving, or will need to use other transportation options

Driving Evaluations and Training

A driving evaluation is a crucial step in determining a person's ability to drive following recovery from a TBI.

• Preliminary Evaluation: A review of cognitive (thinking) abilities, including reaction time, judgment, reasoning and visual spatial skills to determine the need for adaptive equipment.

• On-the-Road: A test of the mechanical operation of a vehicle, either using a driving simulator or driving a vehicle on the roadway in the presence of the evaluator---to assess safe driving skills in various traffic environments, as well as basic driving skills while using the appropriate adaptive driving equipment.

• Following recovery from TBI, a driving evaluation is a crucial step in determining a person's ability to drive.
Adjustment of Driving Habits

To lessen the risk of crashes, people with TBI may modify their driving habits:

- Drive less frequently than they did before the injury.
- Drive on familiar routes, or when there is less traffic.
- Drive only at certain times (such as during daylight).
- Drive less frequently than they did before the injury.

Habits of Driving Adjustment

To lessen the risk of crashes, people with TBI may modify their driving habits.
If an individual with TBI has physical disabilities but has well-preserved cognitive functions, they may resume driving with adaptive equipment and/or other modifications to the vehicle. Examples of adaptive equipment and modifications include:

- Hand-controlled gas and brake systems
- Left foot accelerator
- Spinner knobs for steering
- Lifts for entering and exiting the vehicle
- Other adaptive equipment and/or other modifications to the vehicle.
Legal and Insurance Considerations

• A person who wishes to resume driving must have a valid driver's license.

• In some states, a formal evaluation is required and performed by a licensing bureau before resuming driving after a TBI.

• Considerations vary based on individual state laws.

Other Transportation Options

• If a person is not able to drive, there may be other options for transportation.

• Family members can provide transportation, and public transportation such as buses can be used.

• Some communities provide public transportation specifically for riders with disabilities.

• Insurance may also be required.

• If a person is not able to drive, there may be other options for transportation.
Recommended Resources

Brain Injury Association of America. www.biausa.org

State Vocational Rehabilitation Office. www.jan.wvu.edu

Association for Driver Rehabilitation Specialists. www.driver-ed.org

National Mobility Equipment Dealers Association. www.nmeda.org
Any questions?

Thank you!

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