Mind the Gap: The Psychiatric Consequences of Traumatic Brain Injury in Children

A Psychiatric Perspective for Legal Professionals: Mental Health Sequelae, Differential Diagnosis from Neurodevelopmental Disorders, and What to Ask Your Expert Witness

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Session Overview

1. What TBI in children actually does — and why psychiatric harm matters most
2. PTSD, depression, anxiety and personality change after TBI
3. What to ask a psychiatric expert witness
4. TBI, mental health and the criminal justice system
5. The 'mild' TBI problem and persistent post-concussion syndrome
6. Family psychiatric impact and the risk of early settlement

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The depression, anxiety, PTSD, personality change, and behavioural disorder that follow TBI are not footnotes to the cognitive damage — they are frequently the dominant source of suffering.

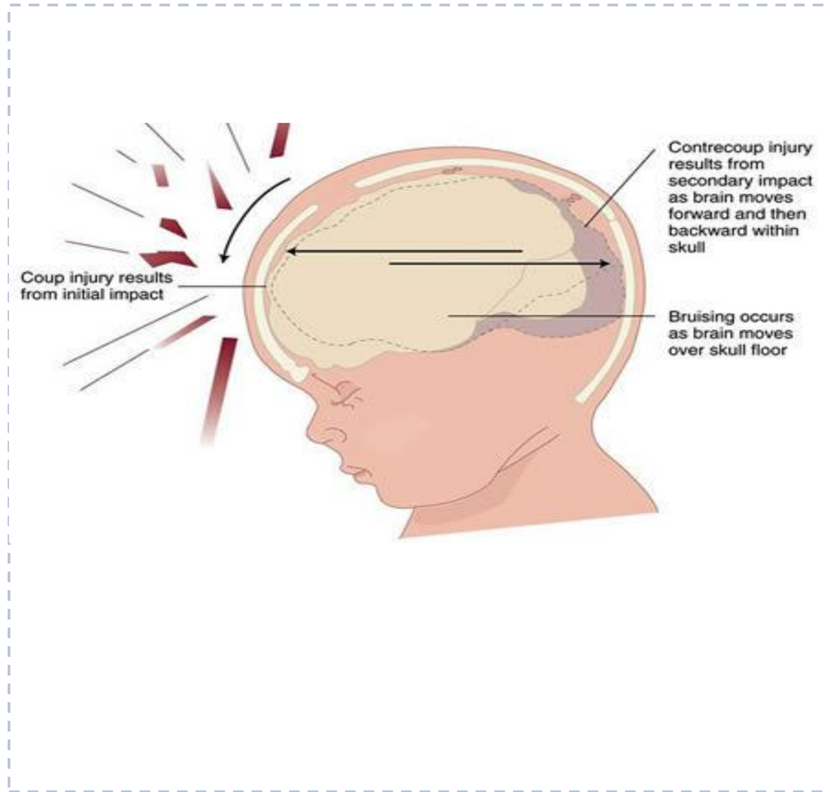
Why This Matters for Legal Practice

- >4 million children sustained a TBI in 2021 — psychiatric harm drives most long-term disability (Agrawal et al., 2026)
- Consistently under-diagnosed or overlooked
- Misattributed to 'character' or 'bad parenting' — clients lose recognition
- Hardest harm to quantify — often the most significant
- Concussion: 60%+ increased suicide hazard vs orthopaedic injury (Yang et al., 2026)
- Correct framing can substantially change claim value
- Legal teams need clinical vocabulary to instruct experts

SECTION 1

What TBI in Children Actually Does

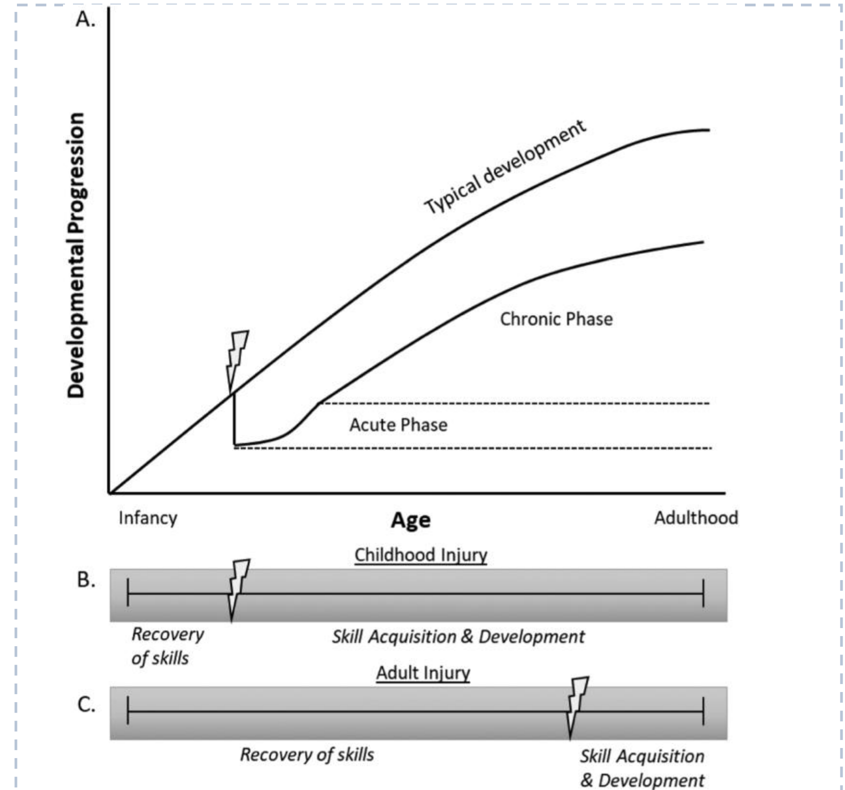
Traumatic Brain Injury — A Working Definition



- External mechanical force → temporary or permanent brain impairment
- Classified mild/moderate/severe — severity doesn't predict outcome
- Children aren't small adults: brain is more vulnerable, yet more plastic
- Frontal lobes (impulse control, social reasoning) mature last — hit hardest
- Timing of injury vs developmental stage shapes the disruption
- Common causes: RTAs, falls, assaults, sports, non-accidental injury

Why the Developing Brain is Different

- Greater plasticity — but "growing into" a deficit is real
- Injury at age 6 may not show effects until adolescence
- Frontal lobes mature into mid-20s — damage compounds over time
- Emotional regulation & impulse control: late-developing, vulnerable
- Hippocampus normally grows with age — shrinks instead after mild TBI with LOC/PTA (Nathaniel et al., 2025)
- Consequences may only surface years after injury
- Early settlement risks missing harm not yet visible



The Scale of Psychiatric Impact After Paediatric TBI

~15%

develop a new psychiatric disorder within the first year after mild TBI

Risk pattern over time differs significantly from orthopaedic injury — Max et al., J Neurotrauma, 2025

Anxiety

most robust psychiatric sequela of mild TBI, even controlling for pre-existing mental health

Revill et al., JCPP, 2025 — ABCD cohort, n > 11,000

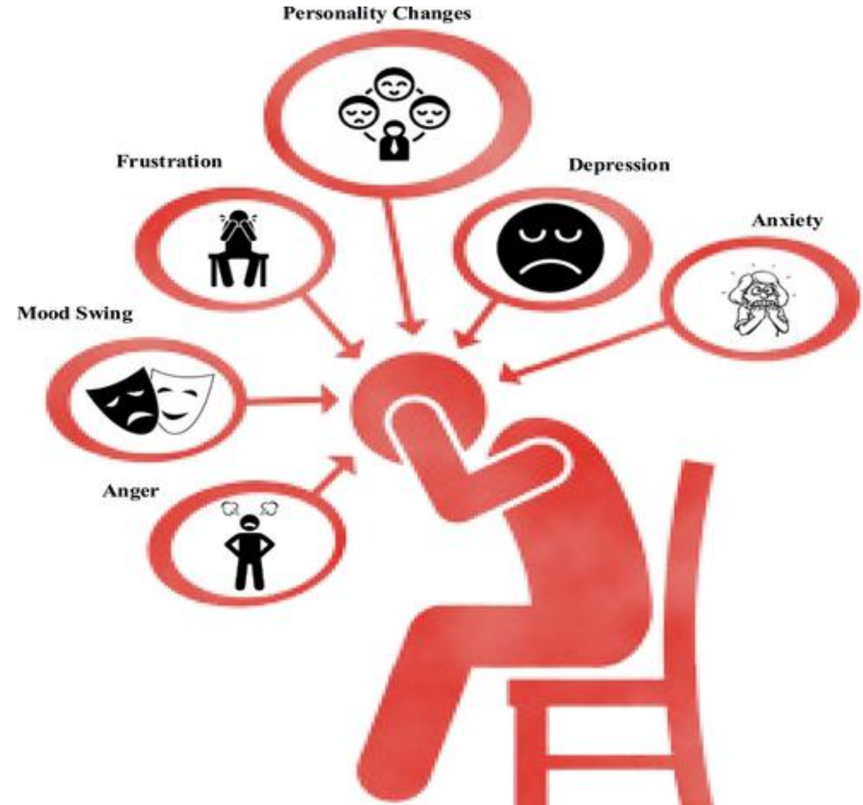
1 year+

of persistent executive, memory, and emotional deficits on clinical follow-up after mild TBI

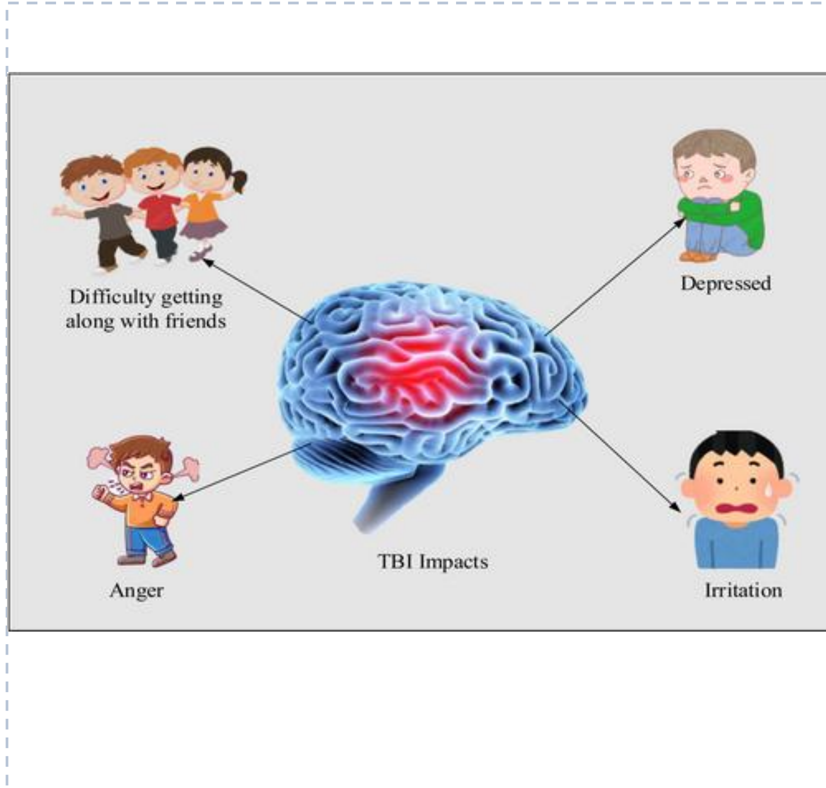
Nathaniel et al., Annals of Neurology, 2025

The Psychiatric Disorders That Follow TBI

- Anxiety — most robust sequela of mild TBI (Revill et al., 2025)
- PTSD — from the event, hospitalisation, loss of self; amnesia doesn't preclude it
- Major depression — organic + reactive; stronger evidence after moderate-severe TBI
- ADHD-like syndromes — secondary to injury; often resolves within 12 months (Max et al., 2025)



Psychiatric Disorders That Follow TBI (continued)



- Personality change — recognised diagnosis; frontal involvement; often missed
- Behavioural/emotional difficulties — no recovery at 1 year (Nathaniel et al., 2025)
- Neurocognitive deficits — typically resolve once pre-injury factors controlled (de Souza et al., 2025)
- Suicide risk — 60%+ increased hazard vs orthopaedic injury (Yang et al., 2026)
- Strongest evidence: moderate-severe TBI. Mild TBI: anxiety most established; normal cognitive testing doesn't rule out psychiatric sequelae

Why Psychiatric Consequences Are Missed

Clinical

- Cognitive rehabilitation gets the attention
- Physical recovery is the visible priority
- Psychiatric symptoms emerge gradually — not dramatically at time of injury
- Children under-report subjective distress
- Parents normalise changed behaviour

System

- Professionals attribute symptoms to 'adjustment'
- Pre-existing difficulties (ADHD, learning needs) create a confusing baseline
- Schools and GPs lack TBI-awareness
- Psychiatric referral is delayed or never made
- Medicolegal teams focus on neuropsychology, not psychiatry

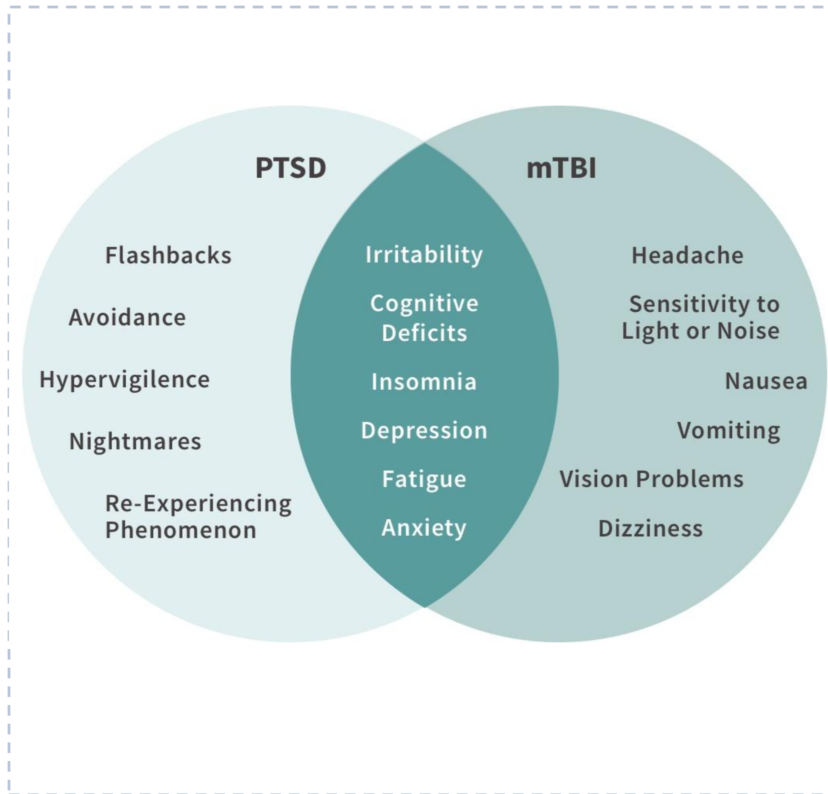
SECTION 2

PTSD, Depression, Anxiety & Personality Change

PTSD After Paediatric TBI

- Occurs in 10–35% of children after TBI
- Fragmented memories from loss of consciousness — PTSD still occurs
- Trauma sources: the event, A&E/ICU care, parental distress, fear of dying
- Symptoms: intrusive memories, hypervigilance, avoidance, sleep disruption
- In children: trauma re-enactment in play, regression, separation anxiety
- Compounds cognitive deficits — attention, memory, learning
- Must distinguish from pre-existing anxiety — expert assessment essential
- Amnesia for the injury does not rule out PTSD

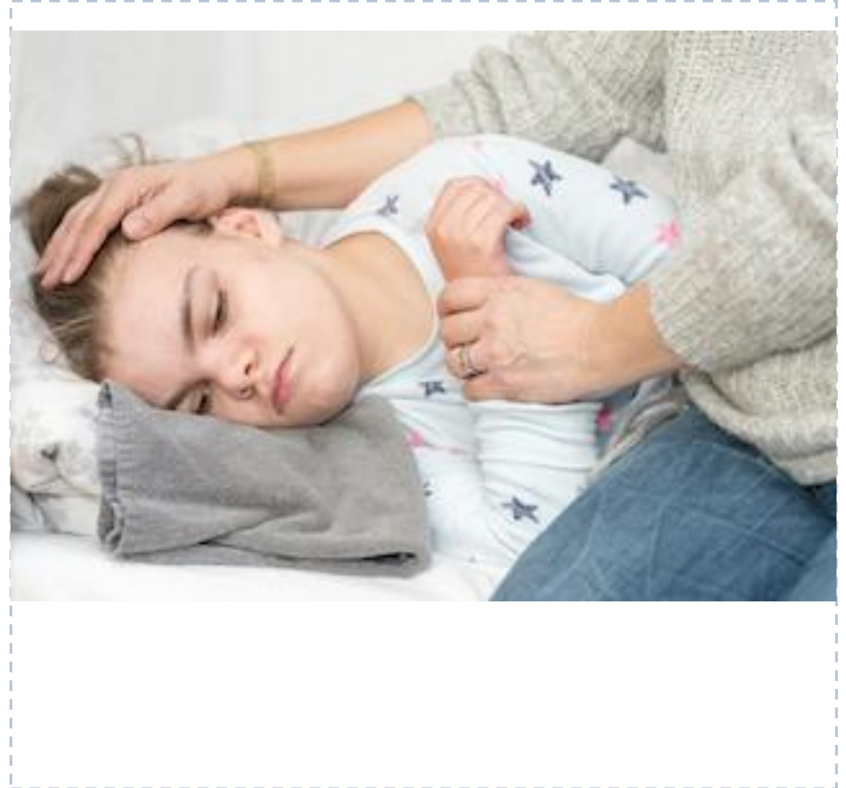
PTSD After TBI — What Legal Professionals Need to Know



- PTSD is compensable — but must be properly diagnosed
- Fragmented recall is often misused to deny PTSD claims
- Comorbidity is the rule — rarely occurs in isolation
- Overlaps with depression/anxiety/adjustment disorder — needs expert analysis
- Duration & treatment-resistance matter — many need specialist input
- Failure to treat PTSD after TBI may itself be negligence
- Ask the expert: how does PTSD interact with cognitive sequelae?

Depression Following Paediatric TBI

- Well-evidenced after moderate-severe TBI; more complex after mild TBI
- Not reliably linked to mild TBI at 2yr once pre-existing health is controlled for (Revill et al., 2025)
- Yet no recovery at 1yr on objective measures, esp. with LOC/PTA (Nathaniel et al., 2025)
- Two pathways to assess: organic (neurochemical) and reactive (grief, loss of self)
- Pre-existing depression is a risk factor — doesn't extinguish the claim
- Children may present as irritable/withdrawn, not 'sad'
- Suicide risk up 60%+ after concussion, compounding per concussion (Yang et al., 2026)
- Expert must distinguish pre-existing vs new-onset depression



Anxiety Disorders After TBI

- Most consistently evidenced psychiatric outcome after mild TBI
- ABCD cohort (n=11,000+): anxiety was the only outcome linked to mild TBI at 2yr (Revill et al., 2025)
- Re-emerges at 1yr after apparent 4-month improvement (Nathaniel et al., 2025)
- Specific phobia a common novel diagnosis; also generalised/separation/social anxiety (Max et al., 2025)
- Mechanism: both neurological (affect circuits) and psychological (fear-avoidance)
- School avoidance is common — major educational/social impact
- Not mere 'adjustment' — has a biological basis and causal pathway

Personality Change Due to TBI

- Formally recognised in ICD-11 & DSM-5
- Follows mod-severe TBI, esp. frontal/orbitofrontal injury
- Features: irritability, dysregulation, disinhibition, apathy, aggression
- Child is 'not the same person' — distressing for families
- Distinct from premorbid personality — needs pre-injury history
- Needs expert longitudinal assessment and informant history
- Often misattributed to adolescence, parenting, or conduct disorder

TBI vs ADHD

- TBI: new onset after injury, no prior attentional issues — clear deterioration from baseline
- ADHD: pervasive inattention/hyperactivity since early childhood — no post-injury change
- Key question: was there a pre-injury diagnosis, or do difficulties predate the injury?

TBI vs Autism Spectrum Disorder

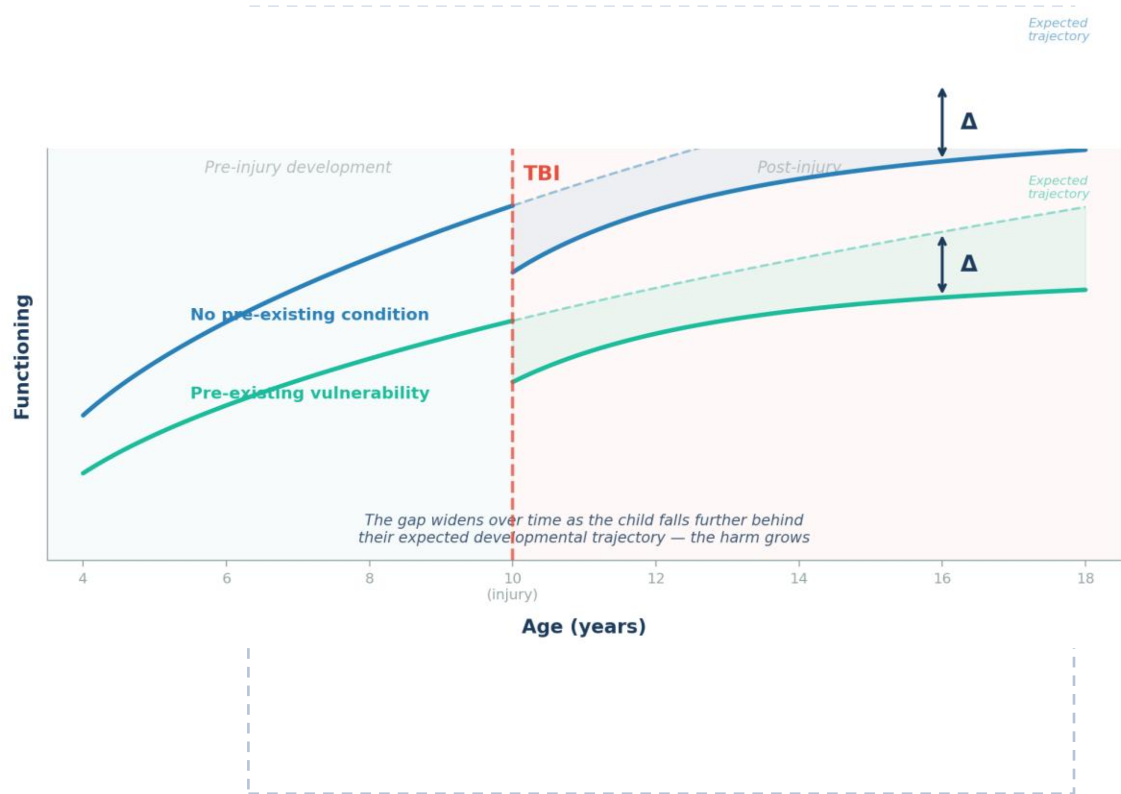
- TBI: social withdrawal, reduced empathy, rigidity emerging after injury in a previously typical child
- ASD: lifelong social-communication differences, restricted interests, sensory sensitivities — predates injury
- NB: pre-existing ASD increases TBI risk — consider co-occurrence, not either/or

TBI vs Learning Disorders

- TBI: acquired decline in reading/writing/numeracy after injury in a previously achieving child
- Dyslexia/dyscalculia: long-standing pattern present before injury
- Key evidence: pre-injury SATs, school reports, teacher observations — baseline is the comparator

The Overarching Principle

- Hallmark of TBI-related disorder: change from an established baseline
- Pre-existing conditions don't extinguish TBI claims — they complicate the baseline
- School records, GP notes, parental history are essential — never rely on post-injury presentation alone
- TBI is itself a recognised risk factor for new ASD, ADHD, and mood/anxiety diagnoses (Agrawal et al., 2026)



Distinguishing Personality Change from Pre-Existing ADHD

Personality Change (Post-TBI)	Pre-Existing ADHD
New onset following injury — no pre-injury history	Symptoms typically present from early childhood
Marked change from baseline — reported by family	Persistent pattern consistent with developmental history
Affective dysregulation prominent	Inattention/hyperactivity are core features
Disinhibition, aggression, apathy may dominate	Impulsivity is present but emotionally triggered less often
School records show change in functioning post-injury	School records show long-standing difficulties
Neuroimaging may show frontal pathology	Neuroimaging usually normal

When psychiatric symptoms are attributed to pre-existing character, parenting, or ADHD rather than TBI, the client loses their diagnosis, their treatment, and their claim.

The psychiatrist's job — and the lawyer's job — is to establish the correct causal attribution.

SECTION 3

What to Ask a Psychiatric Expert Witness

Psychiatric Expert vs Neuropsychologist

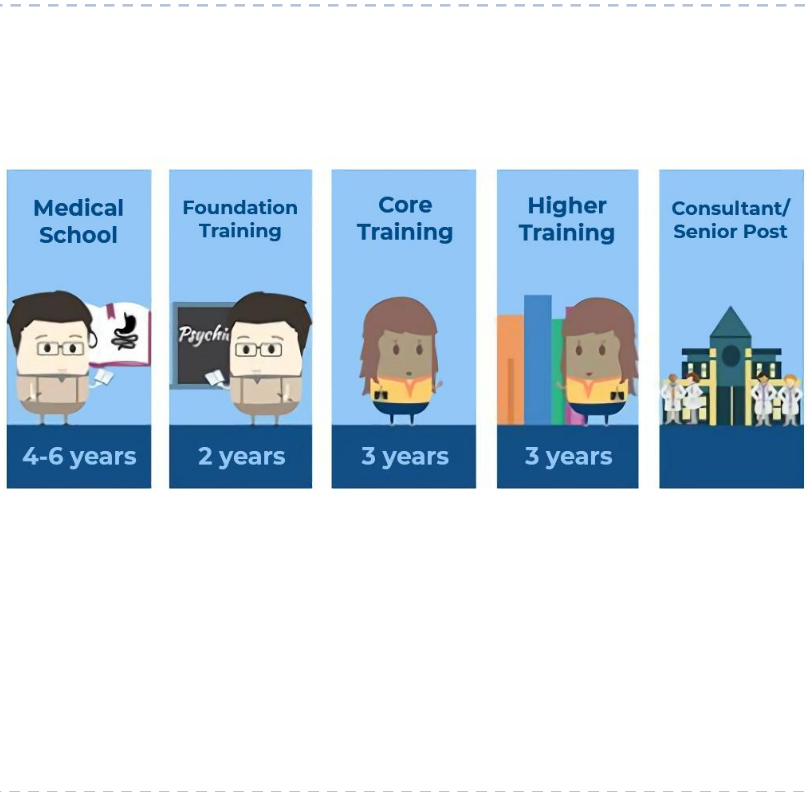
Child & Adolescent Psychiatrist

- Diagnoses psychiatric disorders (PTSD, depression, personality change)
- Assesses psychiatric symptom burden and treatment response
- Addresses causation: what caused this psychiatric disorder?
- Considers premorbid psychiatric history and vulnerability
- Advises on psychiatric treatment, prognosis, and future needs
- Addresses fitness to plead, police interview, sentencing

Neuropsychologist

- Assesses cognitive function (memory, attention, executive function)
- Administers and interprets neuropsychological tests
- Characterises the cognitive profile of the injury
- Addresses educational and vocational impact
- Does not diagnose psychiatric disorders
- Cannot address PTSD, personality change, or depression as diagnoses

When Should You Instruct a Psychiatric Expert?



- Any case with emotional, behavioural, or personality change after TBI
- When PTSD is alleged or suspected — needs psychiatric diagnosis
- When CAMHS contact, medication, or school-reported behaviour change is present
- Where premorbid history is used to minimise the claim
- Criminal justice cases: fitness, interview reliability, mitigation
- Cases valued on cognitive grounds alone — psychiatric harm may be larger
- When family psychiatric impact needs addressing

Questions to Ask Your Psychiatric Expert Witness

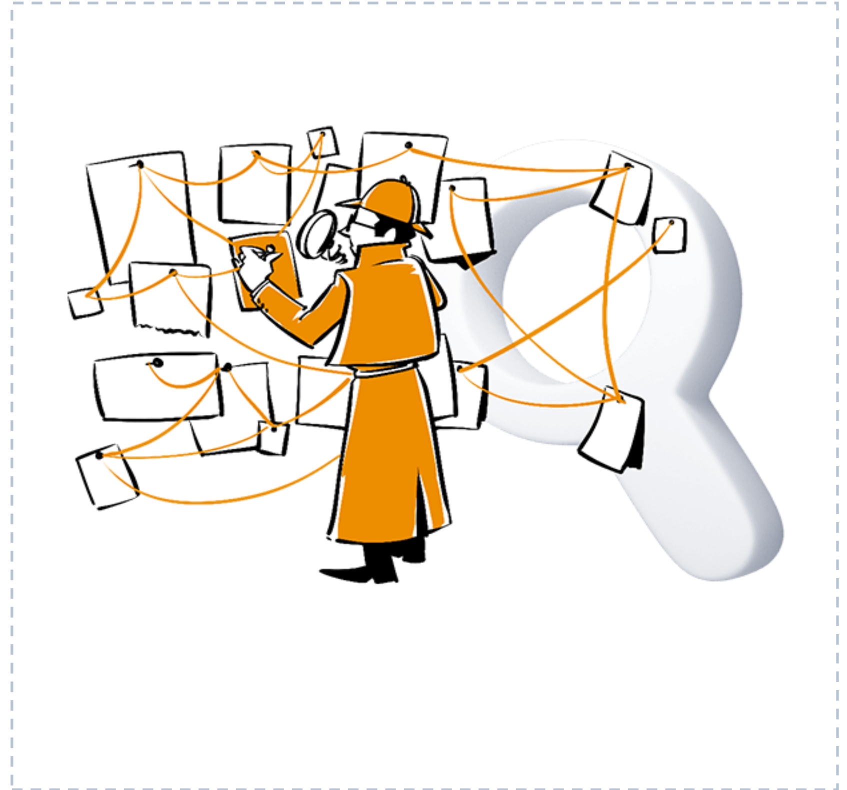
- What disorders does this child meet criteria for?
- Premorbid baseline vs current presentation?
- Is there a causal link to the disorder(s)?
- What proportion is attributable to the TBI?
- What treatment given, and what's needed next?
- Prognosis with and without optimal treatment?
- Do psychiatric and cognitive sequelae interact?
- Impact on daily functioning and relationships?

Challenging the Opposing Psychiatric Expert

- Is the premorbid baseline backed by contemporaneous evidence (GP/school/CAMHS)?
- Is the expert conflating cognitive with psychiatric sequelae?
- Is personality change wrongly blamed on conduct disorder or 'adolescence'?
- Has latent emergence of frontal deficits in adolescence been considered?
- Does the opinion properly address PTSD and its trauma sources?
- Is the prognosis evidence-based, or assumption?

Causation — The Psychiatric Analysis

- TBI need not be the sole cause — just a material contributor
- Pre-existing mental health is a genuine confounder (Revill et al., 2025) — doesn't extinguish the claim
- Pre-injury family/psychiatric history predicts new disorder either way — risk diverges over time vs OI (Max et al., 2025)
- Objective biomarkers outperform self-report (Nathaniel et al., 2025)
- Expert must explicitly address attribution — what was the likely trajectory without the TBI?



SECTION 4

TBI, Mental Health & the Criminal Justice System

TBI and Youth Justice — Why It Matters

- Over-represented in youth justice — est. 30–70% of young offenders
- Often undiagnosed — in the history, not the records
- Psychiatric disorder from TBI sharply raises offending risk
- Disinhibition, impulsivity, poor regulation, impaired social cognition are criminogenic
- Non-accidental injury victims face compounded vulnerability
- Criminal justice system is poorly equipped to identify TBI-related need
- Psychiatric expert evidence can change how these cases are handled

Fitness to Plead and TBI

- Fitness to plead: understand charge, plead, instruct counsel, follow proceedings, give evidence
- TBI can impair all of the above — cognitive and psychiatric sequelae both contribute
- Working memory deficits hinder instructing counsel; executive dysfunction hinders decisions
- PTSD/anxiety may render a young person unable to function in court
- Test isn't whether unwell — it's whether they can participate meaningfully
- Assessment must address each component of the test explicitly
- Unfit defendants require a trial of the facts — key consequences follow

Police Interview Reliability After TBI

- TBI impairs suggestibility, acquiescence, and resistance to coercive questioning
- Frontal lobe damage may drive compliance with leading questions to end distress
- PTSD-related hyperarousal further impairs coherent recall
- Poor working memory — may lose track of what's been said
- Confabulation — filling memory gaps with false information — can occur
- Psychiatric evidence should inform admissibility of interview evidence

Psychiatric Evidence in Sentencing Mitigation

- TBI-related psychiatric disorder is relevant to culpability — context, not excuse
- Impaired impulse control, dysregulation, and disinhibition reduce moral culpability
- Psychiatric disorder is a recognised mitigating factor in sentencing guidelines
- Highlight treatment/rehab potential — psychiatric care may address offending
- Untreated TBI-related PTSD/depression/personality change raises reoffending risk
- Secure or community psychiatric treatment may suit better than custody

TBI and psychiatric disorder together markedly increase vulnerability in youth justice settings.

Identifying this combination — and presenting it compellingly to the court — is a core advocacy skill.

SECTION 5

The 'Mild' TBI Problem & Persistent Post-Concussion Syndrome

What Is 'Mild' TBI?

- Defined by GCS 13–15, LOC < 30 min, post-traumatic amnesia < 24hrs
- 'Mild' describes acute severity — not outcome
- ~80–90% of all TBI presentations are classified as mild
- Most recover within days–weeks — but ~30% have symptoms beyond 4 weeks
- Within 'mild', LOC/PTA shows dose-dependent injury — hippocampal atrophy at 1yr, frontal changes at 4mo (Nathaniel et al., 2025)
- Self-reported symptoms don't predict structural injury — objective signs matter more
- Pre-existing anxiety/learning differences raise risk of persistent difficulties

Physical injury to the brain is graded as mild, moderate, or severe. A mild traumatic brain injury is a traumatically induced physiological disruption of brain function characterized by:

Any period of loss of consciousness

Any loss of memory for events immediately before or after the accident

Any alteration in mental state at the time of the accident

Focal neurological deficit(s) that may or may not be transient

Persistent Post-Concussion Syndrome — Symptom Profile

Physical / Cognitive

- Headaches — often daily, treatment-resistant
- Cognitive: poor concentration, memory difficulties, slowed processing
- Fatigue — profound, not improved by rest
- Sleep disturbance — 15% develop new clinical sleep problems, a driver of dysregulation (Betz et al., 2026)
- Light and noise sensitivity

Psychiatric / Behavioural

- Mood symptoms: depression, anxiety, irritability
- PTSD symptoms — frequently comorbid
- Emotional dysregulation — disproportionate to triggers
- School failure and social withdrawal
- Somatic complaints — often dismissed as functional but may result from anxiety

Why 'Mild' TBI Is a Medicolegal Problem

- Initial injury often dismissed in ED — 'no significant injury, discharged home'
- No formal diagnosis → no psychiatric/neuropsych referral
- Defence experts use the 'mild' label and sparse records to minimise claims
- Key argument: absence of documented symptoms ≠ absence of injury (Nathaniel et al., 2025)
- LOC/PTA — often buried in records — are more informative than reported symptoms
- Deficits persist at 1yr even after somatic symptoms resolve
- Expert must address what records show AND what they miss

1 **Murphy's Law**
Things will go wrong

2 **Wilson's Law**
You can't do everything

3 **Gilbert's Law**
Not everything is clear

4 **Falkland's Law**
Not every decision is urgent

5 **Kidlin's Law**
Clarity solves half the problem

Neuroimaging Evidence: Persistent Brain Changes After 'Mild' TBI

1 year

Hippocampal atrophy documented at 1 year post-injury in children with LOC/PTA

Ongoing volume loss — not just acute injury — in a dose-dependent pattern (Nathaniel et al., 2025)

Reversed

Age-hippocampus relationship after LOC/PTA: grows in healthy children; shrinks after mild TBI

Direct evidence of disrupted neurodevelopment, not merely acute damage

No link

Post-concussive symptom burden does NOT predict structural brain abnormalities

Objective signs (LOC/PTA) are more informative than self-report — critical for medicolegal cases

Building the Mild TBI Psychiatric Case — A Checklist

- → Obtain full school records, pre and post injury
- → Request GP records flagging post-injury mood/behaviour/headache visits
- → Obtain CAMHS/paediatric referral letters, even if unattended
- → Take a detailed parental history of pre-injury functioning
- → Consider neuropsychological testing even in 'mild' TBI
- → Instruct a TBI-experienced child psychiatrist
- → Address prognosis with and without appropriate treatment

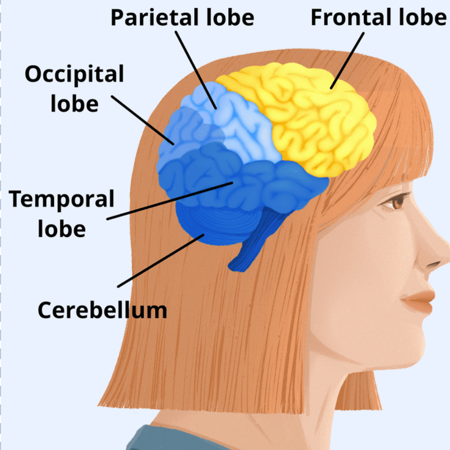
SECTION 6

Family Psychiatric Impact & the Risk of Early Settlement

The Psychiatric Impact on Parents and Siblings

- Witnessing the TBI is itself traumatic — parents are at high risk of PTSD
- Caring for a personality-changed child is distressing and isolating
- Parental depression/anxiety are common, compound recovery, and are independently compensable
- Siblings may feel grief, resentment, and anxiety, esp. if they witnessed it
- Family relationships strained by disinhibition, aggression, dysregulation
- Siblings may face behaviour that wouldn't occur but for the TBI
- Evidence should address the whole family system, not just the child

Latent Emergence of Deficits in Adolescence



- Frontal lobe functions (planning, impulse control, emotional regulation) mature into the mid-20s
- Injury at 7 may seem to resolve — then deteriorate at 13–17 as demands rise
- Imaging confirms it: hippocampal age-volume relationship reverses after LOC/PTA (Nathaniel et al., 2025)
- Executive/working/long-term memory remain below controls at 1yr
- Anxiety re-emerges at 1yr after apparent 4-month improvement — trajectory isn't linear
- Early settlement on current presentation may badly undervalue long-term harm
- Expert must address the likely trajectory through adolescence

Cases settled before the child enters adolescence may significantly undervalue long-term psychiatric harm.

Frontal lobe deficits, personality change, and mood disorders may only fully manifest years after the injury — and years after settlement.

Psychiatric Future Needs

- Psychological therapies: trauma-focused CBT for PTSD; CBT/IPT for depression
- Psychiatric medication management: may be long-term, with specialist review
- Educational support: specialist teaching, exam accommodations, reduced timetable
- Neuropsychiatric rehabilitation via specialist multidisciplinary team
- Sleep intervention: hygiene, behavioural therapy, delayed school start (Betz et al., 2026)
- Parental/family support: parent therapy, sibling support, family therapy
- Transition to adult services is a particularly vulnerable period
- Occupational impact: reduced earning capacity if disorder persists
- Suicide risk monitoring: risk up 60%+ post-concussion (Yang et al., 2026)

Red Flags in the Psychiatric Report — What to Look For

- ✗ Fails to diagnose PTSD as there was to amnesia
- ✗ Symptoms attributed entirely to pre-existing ADHD
- ✗ Personality change dismissed as 'adolescence'
- ✗ Conflates neuropsychology with psychiatry
- ✗ Uses 'mild' label without addressing symptoms
- ✗ Future needs lack evidence-based treatment
- ✗ Doesn't address family psychiatric impact
- ✗ Prognosis ignores latent deficits in adolescence

Study A — Nathaniel et al., Annals of Neurology, 2025

Background

Investigated whether mild TBI causes persistent, objectively measurable brain changes beyond what symptom self-report would suggest.

Design

Prospective neuroimaging cohort; n=269 children with mild TBI; structural MRI and clinical follow-up to 1 year.

Key Findings

- Hippocampal atrophy and accelerated brain ageing were present at 1 year post-injury; frontal cortical thickening was significant at 4 months and had normalised by 1 year.
- Changes were dose-dependent — greater in children with LOC or PTA at the time of injury.
- Self-reported symptom burden did NOT correlate with these structural changes — children who said they felt fine still showed measurable injury.

Why It Matters

Provides objective neuroimaging evidence that apparent clinical recovery does not equal absence of injury — directly supports causation arguments where records show no documented ongoing symptoms.

Study B — Max et al., Journal of Neurotrauma, 2025

Background

The first controlled psychiatric interview study to compare new-onset psychiatric disorder after mild TBI against an orthopaedic-injury control group, addressing whether it is the head injury specifically — not just being injured — that drives psychiatric outcomes.

Design

n=330 children; mild TBI vs orthopaedic injury comparison groups; structured research psychiatric interviews (not questionnaires) at baseline, 3-, 6-, and 12-month follow-up.

Key Findings

- ADHD, oppositional defiant disorder, and anxiety disorders (incl. specific phobia, generalised, separation, and social anxiety) were the most common novel diagnoses in both groups.
- Overall 12-month rates of new disorder were similar between groups, but the trajectory differed significantly: risk rose sharply over time in the orthopaedic-injury group while remaining flat in the mTBI group.
- Pre-injury family dysfunction was the strongest predictor of psychiatric outcome — a stronger predictor than injury severity itself.

Why It Matters

Shows that head injury and orthopaedic injury carry similar overall psychiatric risk but on a different timeline, and underscores why pre-injury family history — not injury type — must be central to any expert's causation assessment.

Study C — Revill et al., Journal of Child Psychology and Psychiatry, 2025

Background

Addressed the central confound in mild TBI psychiatric research: that pre-existing mental health vulnerability, rather than the injury itself, may explain apparent psychiatric outcomes after TBI.

Design

ABCD cohort (Adolescent Brain Cognitive Development study); n>11,000 children; propensity-score matched for pre-existing mental health; 2-year follow-up of children with new mild TBI.

Key Findings

- Anxiety was the only outcome that remained reliably associated with new mild TBI after matching: OR 2.23 (95% CI 1.26–3.94) vs uninjured; OR 1.79 (1.03–3.06) vs orthopaedic injury directly.
- Depression, behavioural disorder, and most other outcomes were substantially explained by pre-existing vulnerability rather than the injury itself.
- Psychiatric service use (CAMHS contact, medication) was not reliably mTBI-specific once matched — general injury, not the head injury itself, predicted contact.

Why It Matters

The most rigorous large-scale evidence to date of a genuine causal link between mild TBI and anxiety, with effect sizes that survive direct comparison to orthopaedic injury — while cautioning that service contact alone is not a reliable marker of TBI-specific harm.

Study D — de Souza et al., Journal of the International Neuropsychological Society, 2025

Background

Asked whether the cognitive decline commonly reported after mild TBI reflects the injury itself, or pre-existing individual differences that were never properly accounted for in earlier research.

Design

ABCD cohort; prospective design; n=83 children with mild TBI; cognitive testing referenced against pre-injury baseline data; 1-year follow-up.

Key Findings

- The mTBI group actually scored higher than the orthopaedic-injury group before injury occurred — so the later finding of 'no difference' means no decline despite a pre-injury advantage.
- The apparent cognitive effects reported in many earlier, less rigorous studies appear to reflect pre-existing individual factors rather than injury-caused decline.
- Differences between injured and non-injured groups reflect injury-prone traits (impulsivity, low harm-avoidance, sensation-seeking) — a general injury effect, not one specific to head injury.

Why It Matters

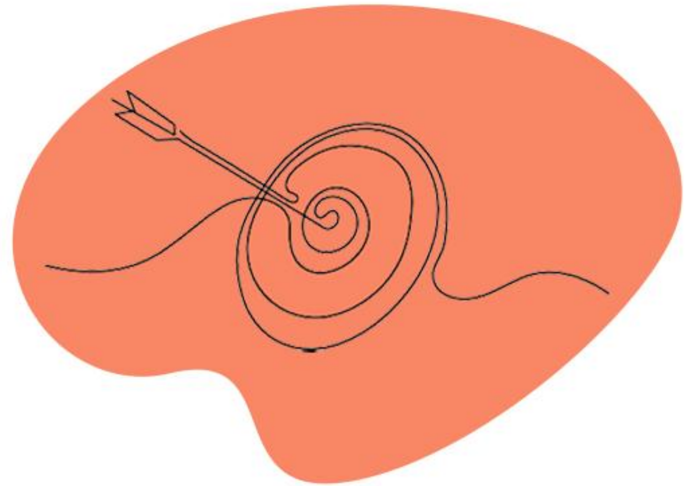
A caution against assuming post-injury cognitive complaints are caused by the TBI itself rather than pre-existing traits that also predispose to injury — reinforces the need for genuine pre-injury baseline data, and helps explain why psychiatric outcomes (per Revill et al.) may be a more robust focus than cognitive ones in mild TBI litigation.

Summary — Key Take-Home Messages

- Anxiety is now the most robustly evidenced sequela of mild TBI
- Objective signs (LOC/PTA) predict injury better than self-report
- Pre-existing mental health is a genuine confounder — eggshell skull still applies
- Neuroimaging shows disrupted neurodevelopment persisting to 1yr — supports the latent deficit argument
- Risk trajectory differs significantly from orthopaedic injury over the first year — timing matters
- Family psychiatric impact is independently significant and compensable
- Early settlement risks undervaluing long-term harm into adolescence

Summary — Key Take-Home Messages (continued)

- Normal neurocognitive testing doesn't exclude psychiatric sequelae — they dissociate and need separate expert assessment
- Suicide risk up 60%+ after concussion, compounding per concussion — screening is essential (Yang et al., 2026)
- New sleep disturbance drives dysregulation and is modifiable — belongs in the rehab plan (Betz et al., 2026)



Thank you for your attention

Any questions?