

**Supplementary Table S1.** Additional summary information for data extracted from structural magnetic resonance imaging studies.

<b>Study</b>	<b>Race/Ethnicity</b>	<b>Socioeconomic Status</b>	<b>Mechanism of Injury</b>	<b>Primary Injuries</b>	<b>Acquisition Parameters</b>	<b>Functional Domains</b>
Dennis et al., 2017b	NR	NR	14% MVA passenger 29% MVA pedestrian 57% RVA 5% Assault 5% BFT	29% Depressed SF 33% Non-depressed SF 24% SAH 29% SDH 14% IVH 43% EDH 48% ICH 5% DAI 38% Contusion 14% Increased ICP	3T Siemens Trio 3D T <sub>1</sub> MP-RAGE TR/TE = 1900/3.26 ms FOV = 250×250 mm Voxel size = 1×1×1 mm Flip angle = 9°	Processing speed Working memory Verbal learning/memory Switching attention
Levin et al., 2000	NR	<u>Parent education</u> <b>mmTBI:</b> 14.4 ± 2.4 y <b>sTBI:</b> 14.0 ± 3.4 y	<b>mmTBI:</b> 36% High velocity 64% Low velocity  <b>sTBI:</b> 72% High velocity 28% Low velocity	<b>mmTBI:</b> 71% Diffuse injury I 25% Diffuse Injury II 4% Evacuated mass  <b>sTBI:</b> 20% Diffuse injury I 48% Diffuse injury II 16% Diffuse injury III 16% Evacuated mass	3D T <sub>1</sub> Slice thickness (T1) = 5 mm Slice thickness (T2) = 1.5 mm	Outcome/Recovery Adaptive Behavior
Mayer et al., 2015	NR	<u>Parent education</u> <b>TBI:</b> 13.18 ± 2.59 y <b>HC:</b> 15.62 ± 3.71 y	60% Sports/Play 27% Fall 13% MVA	None	3T Siemens 3D T <sub>1</sub> MPRAGE Voxel size = 1×1×1 mm	Attention Memory Processing speed Working memory Executive function Premorbid intelligence Behavioral regulation Emotional function
Wilde et al., 2012c	<b>TBI:</b> 10% African American 30% Caucasian 60% Hispanic  <b>OI:</b> 38% African American 33% Caucasian 28% Hispanic	<u>SCI (z-score):</u> <b>TBI:</b> -0.16 ± 0.91 <b>OI:</b> 0.11 ± 0.82	<b>TBI:</b> 40% MVA passenger 25% RVA 20% Fall 5% MVA pedestrian 5% Uncategorized	NR	1.5T Philips Intera 3D T <sub>1</sub> TR/TE = 15/4.6 ms FOV = 256×256 mm Slice thickness/gap = 1/0 mm Voxel size = 1×1×1 mm	Behavioral regulation Emotional control
Wu et al., 2018	NR	NR	<b>SRC:</b> 30% Football 20% Running 10% Volleyball 10% Baseball 10% Wrestling 10% Other	NR	Philips 3D T <sub>1</sub> FFE TR/TE = 6.9/3.1 ms FOV = 256×256 mm Voxel size = 1×1×1 mm Flip angle = 8°	None

Wu et al., 2010	<b>TBI:</b> 4% African American 35% Caucasian 57% Hispanic 4% Native American  <b>OI:</b> 28% African American 4% Asian 40% Caucasian 24% Hispanic 4% Multiracial	<u>SCI (z-score)</u> <b>TBI:</b> $0.05 \pm 0.91$ <b>OI:</b> $0.27 \pm 0.89$  <u>Maternal education</u> <b>TBI:</b> $12.5 \pm 3.4$ y <b>OI:</b> $14.0 \pm 2.7$ y	<b>TBI:</b> 70% MVA passenger 13% RVA 9% MVA pedestrian 9% Fall	NR	1.5T Philips Intera 3D T <sub>1</sub> TR/TE = 15/4.6 ms FOV = 256×256 mm Slice thickness/gap = 1/0 mm Voxel size = 1×1×1 mm	Processing speed
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BFT = blunt force trauma; DAI = diffuse axonal injury; EDH = epidural hematoma; FFE = fast field echo; FOV = field of view; HC = healthy controls; ICH = intracranial hemorrhage; ICP = intracranial pressure; IVH = intraventricular hemorrhage; mmTBI = mild/moderate traumatic brain injury; MP-RAGE = magnetization prepared-rapid gradient echo; MVA = motor vehicle accident; NR = not reported; OI = orthopedically injured controls; RVA = recreational vehicle accident; SAH = subarachnoid hemorrhage; SCI = sociocomposite index (Yeates et al., 1997); SDH = subdural hemorrhage; SF = skull fracture; SRC = sports-related concussion; sTBI = severe traumatic brain injury; T = tesla; T<sub>1</sub> = T<sub>1</sub>-weighted contrast; T1 = time 1; T2 = time 2; TBI = traumatic brain injury; TE = echo time; TR = repetition time

**Supplementary Table S2.** Additional summary information for data extracted from diffusion-weighted magnetic resonance imaging studies.

<b>Study</b>	<b>Race/Ethnicity</b>	<b>Socioeconomic Status</b>	<b>Mechanism of Injury</b>	<b>Primary Injuries</b>	<b>Acquisition Parameters</b>	<b>Functional Domains</b>
Dennis et al., 2018a	NR	NR	21% MVA passenger 25% MVA pedestrian 36% RVA 7% Assault 4% Fall from height 4% BFT 4% Unknown	36% Depressed SF 32% Non-depressed SF 28% SAH 39% SDH 18% IVH 28% EDH 50% ICH 18% DAI 25% Contusion 14% Increased ICP	3T Siemens Trio DWI TR/TE = 9500/87 ms FOV = 256×256 mm Voxel size = 2×2×2 mm 64 diffusion directions b-values = 0/1000 s/mm <sup>2</sup>	Processing speed Working memory Verbal learning/memory Switching attention
Dennis et al., 2017c	NR	NR	14% MVA passenger 24% MVA pedestrian 57% RVA 5% Assault 5% BFT	30% Depressed SF 35% Non-depressed SF 30% SAH 30% SDH 15% IVH 45% EDH 50% ICH 5% DAI 40% Contusion 15% Increased ICP	3T Siemens Trio DWI TR/TE = 9500/87 ms FOV = 256×256 mm Voxel size = 2×2×2 mm 64 diffusion directions b-values = 0/1000 s/mm <sup>2</sup>	Processing speed Working memory Verbal memory Switching attention
Ewing-Cobbs et al., 2016	<b>TBI:</b> 25% African American 31% Caucasian 31% Hispanic 13% Other  <b>OI:</b> 28% African American 28% Caucasian 39% Hispanic 5% Other	<b>Maternal education</b> <b>TBI:</b> 31% < High School 31% High School grad 19% Some college 19% ≥ College grad  <b>OI:</b> 17% < High School 33% High school grad 28% Some college 22% ≥ College grad	56% MVA passenger 19% MVA pedestrian 13% Fall 6% Sports/play 6% Other	<b>Total sample (N = 44):</b> (Unilateral/Bilateral/Midline) 14%/30%/0% Contusion 0%/9%/0% ICH 2%/16%/2% DAI 7%/11%/0% Edema 14%/18%/0% SAH/IVH 12%/5%/9% SDH 12%/7%/0% EDH	3T Philips DTI EPI TR/TE = 6100/84 ms FOV = 240×240 mm Slice thickness = 3 mm Voxel size = 0.94×0.94×3 mm 21 diffusion directions b-values = 0/1000 s/mm <sup>2</sup>	None
Genc et al., 2017	NR	<u>AUSIE06</u> <b>TBI:</b> 64.85 ± 22.85 <b>HC:</b> 78.49 ± 11.32	82% Fall/BFT 18% MVA	38% Frontal lesion 24% Extrafrontal lesion 6% Subcortical lesion	3T Siemens TIM Trio DTI EPI TR/TE = 9300/104 ms FOV = 256×256 mm Slice thickness = 2 mm Voxel size = 2×2×2 mm 60 diffusion directions b-values = 0/2000 s/mm <sup>2</sup>	Intellectual ability Working memory Processing speed

Mayer et al., 2015	NR	<u>Parent education</u> <b>TBI:</b> $13.18 \pm 2.59$ y <b>HC:</b> $15.62 \pm 3.71$ y	60% Sports/Play 27% Fall 13% MVA	None	3T Siemens DWI SE Voxel size = $2 \times 2 \times 2$ mm 30 diffusion directions b-values = 0/800 s/mm $^2$	Attention Memory Processing speed Working memory Executive function Premorbid intelligence Behavioral regulation Emotional function
Mayer et al., 2012	NR	<u>Parent education</u> <b>TBI:</b> $13.18 \pm 2.59$ y <b>HC:</b> $15.62 \pm 3.71$ y	60% Sports/Play 27% Fall 13% MVA	None	3T Siemens DWI SE Voxel size = $2 \times 2 \times 2$ mm 30 diffusion directions b-values = 0/800 s/mm $^2$	Attention Memory Processing speed Working memory Executive function Premorbid intelligence Behavioral regulation Emotional function
Van Beek et al., 2015	NR	NR	45% Fall 20% MVA passenger 20% MVA pedestrian 5% Unknown	NR	3T Philips Achieva DTI EPI TR/TE = 11043/55 ms FOV = $220 \times 220$ mm Slice thickness = 2.2 mm Voxel size = $1.96 \times 1.96 \times 2.2$ mm 45 diffusion directions b-values = 0/800 s/mm $^2$	Intellectual function Pre-morbid math ability Numerical processing Enumeration Arithmetic Working memory Motor Speed
Verhelst et al., 2019	NR	NR	75% MVA 19% Sports/Play 6% Other	81% Frontal 88% Temporal 63% Parietal 50% Occipital 56% Corpus Callosum 44% Subcortical 31% Cerebellar 13% Midbrain 19% Brainstem	3T Siemens MAGNETOM Trio DWI EPI TR/TE = 10800/83 ms FOV = $240 \times 240$ mm Voxel size = $2.5 \times 2.5 \times 2.5$ mm 64 diffusion directions b-values = 0/1200 s/mm $^2$	Selective attention Processing speed Working memory Nonverbal learning Planning Problem solving Response inhibition Executive function
Wilde et al., 2012a	<b>TBI:</b> 10% African American 30% Caucasian 60% Hispanic  <b>OI:</b> 38% African American 33% Caucasian 28% Hispanic	<u>SCI (z-score)</u> <b>TBI:</b> $-0.16 \pm 0.91$ <b>OI:</b> $0.11 \pm 0.82$	60% MVA passenger 20% Fall 10% RVA 5% MVA pedestrian 5% Other	95% Frontal 60% Temporal 55% Parietal 30% Corpus Callosum 20% Basal Ganglia 15% Cerebellar	1.5T Philips Intera OR Achieva DTI EPI TR/TE = 6318/51 ms FOV = $256 \times 256$ mm 15 diffusion directions b-values = 0/860 s/mm $^2$	None

Wu et al., 2018	NR	<u>SCI</u> (collected, but NR)	30% Football 20% Running 10% Volleyball 10% Baseball 10% Wrestling 10% Other	NR	Philips DTI EPI TR/TE = 63180/51 ms FOV = 240×240 mm Slice Thickness/gap = 2/0 mm Voxel size = 2×2×2 mm 30 diffusion directions b-values = 0/1000 s/mm <sup>2</sup>	None
Wu et al., 2010	<b>TBI:</b> 4% African American 35% Caucasian 57% Hispanic 4% Native American  <b>OI:</b> 28% African American 4% Asian 40% Caucasian 24% Hispanic 4% Other	<u>SCI (z-score)</u> <b>TBI:</b> 0.05 ± 0.91 <b>OI:</b> 0.27 ± 0.89  <u>Maternal education</u> <b>TBI:</b> 12.5 ± 3.4 y <b>OI:</b> 14.0 ± 2.7 y	70% MVA passenger 13% RVA 9% MVA pedestrian 9% Fall	NR	1.5T Philips Intera DTI EPI TR/TE = 10150.5/90 ms FOV = 256×256 mm Slice thickness/gap = 2.7/0 mm Voxel size = 2.69×2.69×2.7 mm 15 diffusion directions b-values = 0/860 s/mm <sup>2</sup>	Processing speed
Yuan et al., 2017	<b>TBI:</b> 71% White 29% Non-white  <b>HC:</b> 91% White 9% Non-white	NR	NR	NR	3T Philips Achieva DTI EPI TR/TE = 9000/84 ms FOV = 256×256 mm Slice thickness = 2 mm Voxel size = 2×2×2 mm 61 diffusion directions b-values = 0/1000 s/mm <sup>2</sup>	Attention Executive function

AUSIE06 = Australian Socioeconomic Index 2006 (McMillan et al., 2009); BFT = blunt force trauma; DAI = diffuse axonal injury; DTI = diffusion tensor imaging; DWI = diffusion weighted imaging; EDH = epidural hematoma; EPI = echo planar imaging; FOV = field of view; HC = healthy controls; ICH = intracranial hemorrhage; ICP = intracranial pressure; IVH = intraventricular hemorrhage; MVA = motor vehicle accident; NR = not reported; OI = orthopedically injured controls; RVA = recreational vehicle accident; SAH = subarachnoid hemorrhage; SCI = sociocomposite index (Yeates et al., 1997); SDH = subdural hematoma; SE = single-shot echo; SF = skull fracture; T = tesla; TBI = traumatic brain injury; TE = echo time; TR = repetition time

**Supplementary Table S3.** Additional summary information for data extracted from magnetic resonance spectroscopy imaging studies.

<b>Study</b>	<b>Race/Ethnicity</b>	<b>Socioeconomic Status</b>	<b>Mechanism of Injury</b>	<b>Primary Injuries</b>	<b>Acquisition Parameters</b>	<b>Functional Domains</b>
Babikian et al., 2018	NR	<u>Parent education</u> <b>TBI-Slow:</b> $13.0 \pm 3.7$ y <b>TBI-Normal:</b> $14.4 \pm 3.7$ y <b>HC:</b> $15.1 \pm 3.6$ y	NR	NR	3T Siemens Trio 3D $^1\text{H}$ EPSI TR/TE = 1710/70 ms Slab thickness = 135 mm Spatial sampling = $100 \times 50 \times 18$ FOV = $280 \times 280 \times 180$ mm	Processing speed Working memory Verbal memory Switching attention
Dennis et al., 2018a	NR	NR	21% MVA passenger 25% MVA pedestrian 36% RVA 7% Assault 4% Fall from height 4% BFT 4% Unknown	36% Depressed SF 32% Non-depressed SF 28% SAH 39% SDH 18% IVH 28% EDH 50% ICH 18% DAI 25% Contusion 14% Increased ICP	3T Siemens Trio 3D $^1\text{H}$ EPSI TR/TE = 1710/70 ms Slab thickness = 135 mm Spatial sampling = $50 \times 50 \times 18$ FOV = $280 \times 280 \times 180$ mm 1000 spectral points	Processing speed Working memory Verbal memory Switching attention
Holshouser et al., 2019	NR	NR	<b>mmTBI:</b> 19% MVA passenger 19% MVA pedestrian 6% RVA 34% Fall 19% Sports/Play 3% Assault  <b>sTBI:</b> 31% MVA passenger 47% MVA pedestrian 13% RVA 9% Fall	NR	3T Siemens TIM Trio 3D $^1\text{H}$ PRESS TR/TE = 1700/144 ms Slab thickness = 10 mm Spatial sampling = $16 \times 16 \times 8$ FOV = $160 \times 160 \times 80$ mm 1024 spectral points	Intellectual ability Attention Memory Neurological outcome
Yeo et al., 2006	NR	NR	NR	42% Hemorrhage	1.5T GE Signa 3D $^1\text{H}$ PRESS TR/TE = 1500/62 ms Slab thickness = 15 mm	Attention Processing speed Working memory Verbal Fluency Verbal Memory Nonverbal Memory Executive Function Motor Skill

$^1\text{H}$  = hydrogen; BFT = blunt force trauma; DAI = diffuse axonal injury; EDH = epidural hematoma; EPSI = echo planar spectroscopic imaging; FOV = field of view; HC = healthy controls; ICH = intracranial hemorrhage; ICP = intracranial pressure; IVH = intraventricular hemorrhage; mmTBI = mild/moderate traumatic brain injury; MVA = motor vehicle accident; NR = not reported; PRESS = point resolved spectroscopy sequence ; RVA = recreational vehicle accident; SAH = subarachnoid hemorrhage; SDH = subdural hematoma; SF = skull fracture; sTBI = severe traumatic brain injury; T = tesla; TBI-Normal = traumatic brain injury with normal interhemispheric transfer time; TBI-Slow = traumatic brain injury with slow interhemispheric transfer time; TE = echo time; TR = repetition time

**Supplementary Table S4.** Additional summary information for data extracted from functional magnetic resonance imaging studies.

<b>Study</b>	<b>Race/Ethnicity</b>	<b>Socioeconomic Status</b>	<b>Mechanism of Injury</b>	<b>Primary Injuries</b>	<b>Acquisition Parameters</b>	<b>Functional Domains</b>
Cazalis et al., 2011	NR	NR	NR	100% DAI	3T Siemens Allegra EPI BOLD TR/TE = 2000/30 ms FOV = 200×200 mm Voxel size = 3.125×3.125×3 mm  3D T <sub>2</sub> * Flash TR/TE = 57/20 ms FOV = 256×256 mm Voxel size = 1×0.5×2 mm Flip angle = 20°	Spatial Working Memory (fMRI paradigm)
Mutch et al., 2016	NR	NR	50% Football 33% Hockey 17% Cycling 17% Soccer	None	3T Siemens Verio T <sub>2</sub> * GRE TR/TE = 2000/30 ms FOV = 240×240 mm Slice thickness/gap = 5/2 mm Voxel size = 3.75×3.75×6 mm Flip angle = 85°	NR

BOLD = blood oxygen level dependent; DAI = diffuse axonal injury; EPI = echo planar imaging; fMRI = functional magnetic resonance imaging; FOV = field of view; GRE = gradient-recalled echo; NR = not reported; T = tesla; T<sub>2</sub>\* = T<sub>2</sub>-weighted gradient recalled echo; TE = echo time; TR = repetition time

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