## PART I - THE LITERATURE SECTION

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| 2       | Meta-analytic sample of 855 children and adults with TBI derived from 21 studies | Wechsler Intelligence Scales | FSIQ, PIQ, VIQ | • Mild TBI: no significant intelligence impairment  
• Severe TBI: chronic impairment in FSIQ, PIQ & VIQ ($d_{-0.71 - -1.07}$)  
• PTA duration strongly predicts the magnitude of intelligence impairment ($r_{-0.52 - -0.80}$) |
| 3       | Meta-analytic sample of 3,890 children and adults with TBI derived from 81 studies | Wechsler Intelligence Scales | FSIQ, PIQ, VIQ | • Mild TBI: chronic impairment in FSIQ ($d = -0.37$) & VIQ ($d = -0.30$)  
• Moderate TBI: chronic impairment in FSIQ ($d = -0.19$) & VIQ ($d = -0.30$)  
• Severe TBI: chronic impairment in FSIQ, PIQ & VIQ ($d_{-0.66 - -0.83}$)  
• GCS score, LOC duration & PTA duration strongly predict the magnitude of intelligence impairment ($r_{0.22 - 0.69; -0.44 - -0.82}$; and $0.36$ to $-0.76$, respectively)  
• Adults have poorer long-term intelligence outcome of mild TBI than children (PIQ & VIQ)  
• Children have poorer long-term intelligence outcome of severe TBI than adults (FSIQ & VIQ) |

*Note.* FSIQ = full-scale intelligence quotient; GCS = Glasgow Coma Scale score; LOC = loss of consciousness duration; PIQ = performance intelligence quotient; PTA = post-traumatic amnesia; TBI = traumatic brain injury; VIQ = verbal intelligence quotient.
## TABLE SUMMARY OF MAIN FINDINGS

### PART II - THE NEUROCOGNITIVE SECTION

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| 4 | 113 TBI 53 TC | Attention Network Test Ex-Gaussian Analysis | MRT & Accuracy Tau | • No effects of TBI on alerting, orienting or executive attention  
• Decreased processing speed after TBI (MRT: \(d = 0.45\))  
• Increased lapses of attention after TBI (tau: \(d = 0.52\));  
• Lapses of attention account for slower processing speed  
• Lapses of attention mediate the negative relation between FSIQ and parent rated attention problems after pediatric TBI  
• Lapses of attention increased after mild RF+ TBI \((d = 0.49)\) and MS TBI \((d = 0.77)\) |
| 5 | 112 TBI 52 TC | Probabilistic Learning Test | Accuracy | • No effects of TBI on learning from inconsistent feedback  
• Decreased generalization of learning after MS TBI \((d = -0.51)\)  
• Poorer generalization of learning predicted more parent rated externalizing problems after pediatric TBI (together with age and SES, \(R^2 = .15\))  
• Generalization of learning has clinical potential to identify children with clinically significant externalizing behavior problems \((\text{AUC} = .77, \text{sensitivity} = 86\%, \text{specificity} = 72\%)\) |
| 6 | 103 TBI 44 TC | Experimental paradigm for visual integration Diffusion Model | MRT & Accuracy Boundary separation, drift rate & non-decision time | • Decreased visual integration accuracy after TBI \((d = -0.50)\)  
• Effect of TBI traced back to reduced efficiency of visual integration \((\text{drift rate: } d = -0.76)\)  
• Decreased efficiency of visual integration after mild RF+ TBI \((d = -0.73)\) and MS TBI \((d = -0.81)\)  
• Decreased accuracy and efficiency of visual integration partly to fully mediated the impact of TBI on FSIQ |
| 7 | 94 TBI 39 TC | Experimental paradigm for multisensory integration Diffusion Model | MRT & Accuracy Boundary separation, drift rate & non-decision time | • Decreased multisensory integration accuracy after TBI \((d = -0.51)\)  
• Effect of TBI traced back to reduced efficiency of multisensory integration \((d = -0.51)\)  
• Decreased efficiency of multisensory integration after mild RF+ TBI \((d = -0.44)\) and MS TBI \((d = -0.63)\)  
• Decreased accuracy and efficiency of multisensory integration partly mediated the impact of TBI on FSIQ |
| 8 | 76 MTBI 53 TC | Wechsler Intelligence Scale for Children III short form Parent and teacher ratings of behavior problems (CBCL, TRF & SDQ) | FSIQ Behavior Problems composite score | • No significant effects of mild RF- TBI  
• Decreased neurocognitive functioning after mild RF+ TBI \((\text{FSIQ: } d = -0.52)\)  
• Increased behavior problems after mild RF+ TBI \((\text{parent/teacher ratings: } d = 0.72)\)  
• Effects of mild RF+ TBI not accounted for by intracranial pathology or premorbid psychiatry  
• Most prevalent risk factors: abnormal head CT-scan \((29\%)\), impaired consciousness \((25\%)\) & persistent vomiting \((24\%)\)  
• Presence of impaired consciousness had predictive value for decreased neurocognitive outcome \((\text{with lower SES, } R^2 = 30\%)\) and more behavior problems \((\text{with male gender and lower SES, } R^2 = 13\%)\) after mild TBI |
Note. AUC = area under the curve; CT = computed tomography; CBCL = Child Behavior Checklist; FSIQ = full-scale intelligence quotient; mild RF+ TBI = mild TBI with risk factors for complicated TBI; MRT = mean reaction time; MS TBI = moderate/severe TBI; TBI = traumatic brain injury; SDQ = Strengths & Difficulties Questionnaire; SES = socio-economic status; TC= trauma control; TRF = Teacher Report Form.
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| 9       | 37 TBI | Acute CT | Intracranial pathology on CT | • Intracranial pathology after mild RF+ TBI (35%) and MS TBI (65%)  
• Decreased white matter volume after mild RF+ TBI ($d = -0.74$) and MS TBI ($d = -0.80$)  
• No effects of TBI on volumes of subcortical structures  
• No significant effects of mild RF+ TBI on FA  
• Decreased FA ($d = -1.88$), increased MD ($d = 0.84$) and increased RD ($d = 1.32$) after MS TBI  
• MS TBI: affected FA in all assessed white matter tracts  
• SLF, ILF & IFOF were most prominently contributed to the neuropathology of MS TBI  
• GCC, BCC & SCC were most extensively affected by MS TBI  
• Intracranial pathology predicted higher externalizing problems ($r = .35$)  
• White matter volume was not related to aspects of functional outcome  
• Lower FA predicted poorer FSIQ ($r = .29$), working memory ($r = .41$) and more internalizing problems ($r = -.26$)  
• Regional associations between FA and FSIQ, working memory and encoding in verbal memory consistently involved the CC, and fully mediated the impact of TBI on FSIQ, working memory and encoding in verbal memory |
|         | 27 TC  | Post-acute T1-scan | Post-acute DTI |  |
| 10      | 36 TBI | DTI | Characteristic Path Length  
Transitivity  
Modularity  
Assortativity | • Network definitions greatly influence connectome reconstruction in terms of interhemispheric connectivity and sensitivity for TBI  
• The connectivity probability network primarily captures intrahemispheric connectivity  
• The connectivity integrity network has increased sensitivity for interhemispheric connectivity  
• Increased transitivity ($d = 0.70$) and assortativity ($d = 0.70$) in the connectivity probability network after MS TBI  
• Increased characteristic path length in the connectivity probability network after MS TBI, when accounting for FA ($d = 0.79$)  
• Increased characteristic path length in the connectivity integrity network ($d = 0.75$) after MS TBI, also in the backbone of this network as identified using the minimum spanning tree ($d = 0.66$)  
• Increased characteristic path length after pediatric TBI was related to lower FSIQ (connectivity probability network: $r = -.35$) and poorer working memory (connectivity probability network: $r = -.44$; connectivity integrity network: $r = -.42$)  
• Increased characteristic path length in the backbone of the probability network was related to better working memory performance ($r = .39$)  
• Results suggested that the impact of MS TBI on global FA directly translates into increased characteristic path length |
|         | 27 TC  | Probabilistic Tractography |  |
|         |       | Graph Theory |  |
|         |       | Minimum Spanning Tree |  |

Note. AD = axial diffusivity; BCC = body of the corpus callosum; CC = corpus callosum; CT = computed tomography; DTI = diffusion tensor imaging; FA = fractional anisotropy; FSIQ = full-scale intelligence quotient; GCC = genu of the corpus callosum; ILF = inferior longitudinal fasciculus; IFOF = inferior fronto-occipital fasciculus; MD = mean diffusivity; mild RF+ TBI = mild TBI with risk factors for complicated TBI; MS TBI = moderate/severe TBI; RD = radial diffusivity; SLF = superior longitudinal fasciculus; SCC = splenium of the corpus callosum; TBI = traumatic brain injury; TC = trauma control.