# Language and schooling outcomes after moderate-to-severe traumatic brain injury sustained before the age of 18 months

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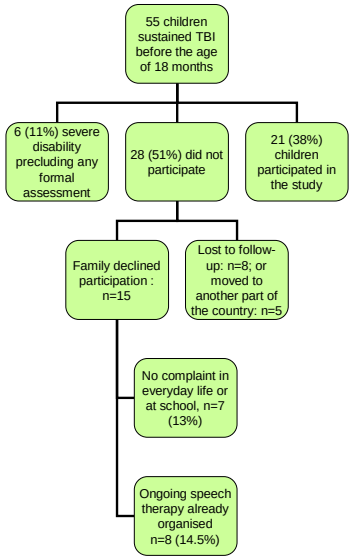
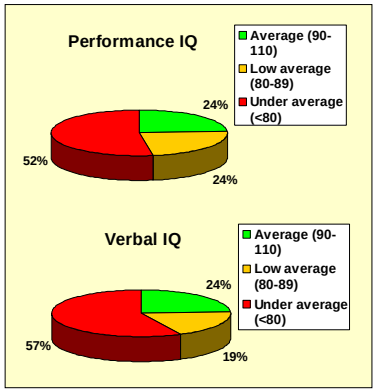
**Background and aims:** Childhood traumatic brain injury (TBI) is a significant rehabilitation challenge. Severity of injury and young age at injury consistently predict poor outcome.
**The aim of this study** was to assess oral language and schooling of children with moderate to severe TBI sustained before 18 months of age, once they have reached school age.




## Methods

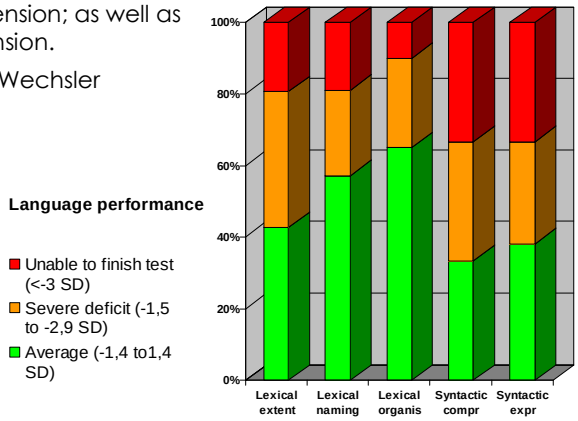
**Inclusion criteria:** children hospitalised in a single rehabilitation department following moderate-to-severe accidental or inflicted TBI, sustained before the age of 18 months, between 2000 and 2007.
**Exclusion criteria:** neurological or genetic disease diagnosed before onset or family history of dysphasia.
Between 2000 and 2007, 604 children (aged 0 – 15 years) were hospitalised in the department following TBI. Among them, **55 children met the inclusion criteria**.
**Procedure:** In 2011 – 2012, parents were invited to participate in the study.
**Oral language assessment** of the child was performed, including standardised tests of **lexical** naming, organisation and comprehension; as well as **syntactic** expression and comprehension.
**Neuropsychological assessment** was performed using age appropriate Wechsler intelligence scales.
**Information on type of schooling** and adaptations was collected.

## Results

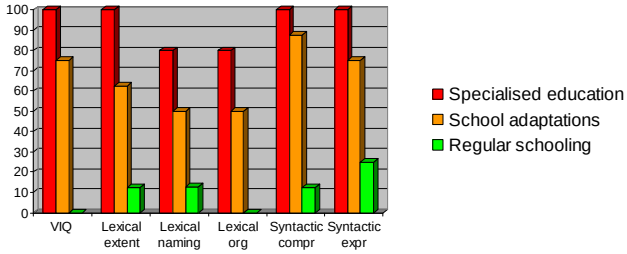
21 out of 55 children (38.2%) participated in the study [13 males, 8 accidental TBI, 13 non accidental TBI, mean age 7.55 years (SD=1.9), mean age at injury: 0.7 year (SD=0.5), mean time since injury: 6.8 years (SD=1.8)]. **(See flowchart)**

**Results of the neuropychological assessment (see figures)**
4 children (19%) had dissociated IQ scores.
Only 24% had average Verbal and Performance IQ (however no score exceeded 96). More than half of the group was in the deficient range.

**Results of the language assessment (see figure)**
On average, **lexical extent, syntactic comprehension and expression** were impaired, with 38%, 57.1% and 62% performing in the clinical range (≤ -1.5 SD) respectively.
As a group, children performed **within the low average range for lexical naming and organisation** (with 43% and 33% in the clinical range respectively).

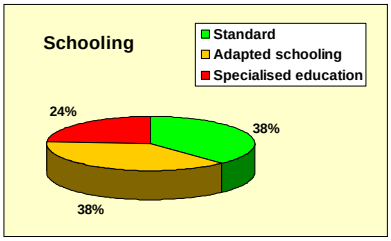



**% of children in the impaired range (<-1,5 SD) according to schooling modalities**




## Schooling (see figures)

- Five children **(24%)** were in **specialised education** (all had severe cognitive and language deficits).
- Sixteen children **(76%)** attended **standard education**, however **6 children had a personal school aid** and **8 stayed back** one year at least.
- Among children attending standard education (n=16), those who followed a **strictly normal curriculum (n=8; 50%)** displayed higher cognitive and language abilities (mean VIQ=90; none <79; most language tests in the normal range) than those who had stayed back one year and/or had a personal school aid (75 % with IQ ≤79; more severe language deficits).




**Conclusion:** Although the study sample is small and biased, our findings indicate that early TBI causes significant cognitive and language impairments at school age, impacting on schooling. The highest rates of impairments in oral language were found for syntactic aspects of language, especially comprehension. This has implications in terms of screening, long-term follow-up and early intervention.