Manual dexterity learning in children diagnosed as Benign Congenital Hypotonia

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Introduction:

Benign Congenital Hypotonia (BCH) is a diagnosis by exclusion (no other neurological or musculo-skeletal deficit) at infancy[1]. The leading symptom is an inability of the child to maintain posture against gravity. There's some debate whether the condition is indeed benign and it is *not known whether fine manual dexterity and skill acquisition are intact later in life.*

Methods:

Participants:

14 children diagnosed in infancy as BCH, and 14 healthy controls, 7-8 year olds, were studied. Gender, school years & hand dominance were matched across groups.

Task & training-testing schedule:

A novel motor learning paradigm based on the Functional Dexterity Test (FDT)[2]. The participants completed at least 18 blocks (repetitions) of peg manipulations using a version of the FDT set-up during the training session and 6 blocks on each re-test.

Each participant was tested in 3 consecutive sessions: A training session and 2 post-training sessions a) at 24-48 hours and b) at 6 weeks post-training.

Performance evaluation:

Dependent variables: speed (time, in sec., to invert all 16 pegs) & accuracy (number of errors according to categories (drop, touch, supination; 2nd hand assistance; body assistance)).

Results:

1. **Both groups showed large, performance gains in terms of speed, with significant decrease in error rate.**
2. **Both groups showed similar learning rates (equal slopes for improvement in speed & accuracy).**
3. **In general, the BCH group was significantly slower and was more error prone.**
4. **On average BCH showed more "forgetting" during the retention intervals.**

1 Carbony et al, ***J. Ped Neurol***, 26:383-6, 2002

2 Elion et al, Proc. 2nd ***ISPRM,*** eds: Ring & Soroker, 661-664, 2003

FIG 1: Learning & retention in BCH & controls (performance speed)

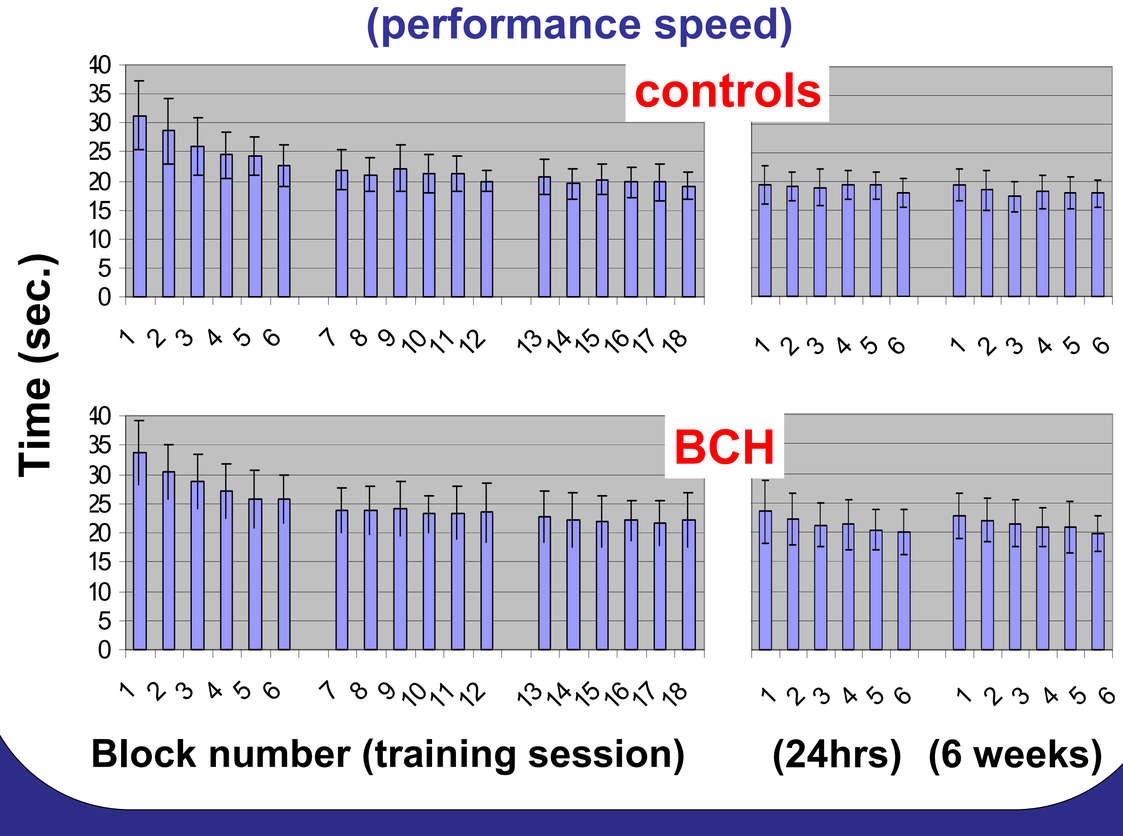


FIG 2: Both groups improved in accuracy (error rates)

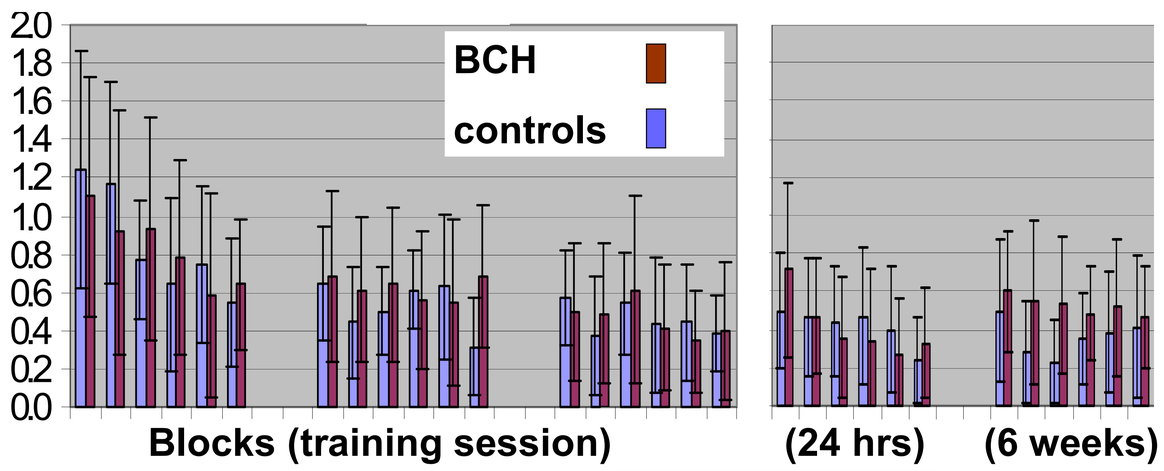


FIG 3: But BCH had more (x2) drop errors

(training session)

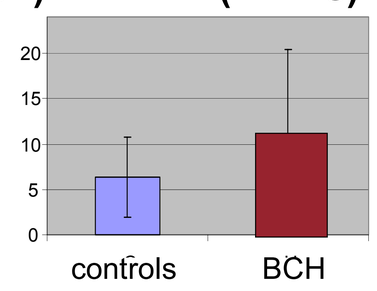
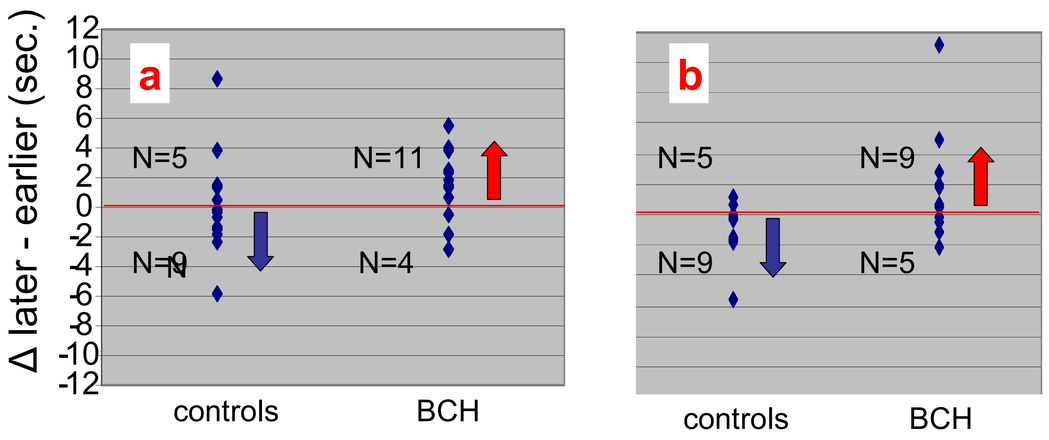


FIG 4: More BCH children show some loss in performance (speed) post-training



Over-night (a) and across 6 weeks (b) more BCH children vs. controls showed loss of speed gains

Conclusion: BCH children may have some motor learning deficits at 7-8 yrs.