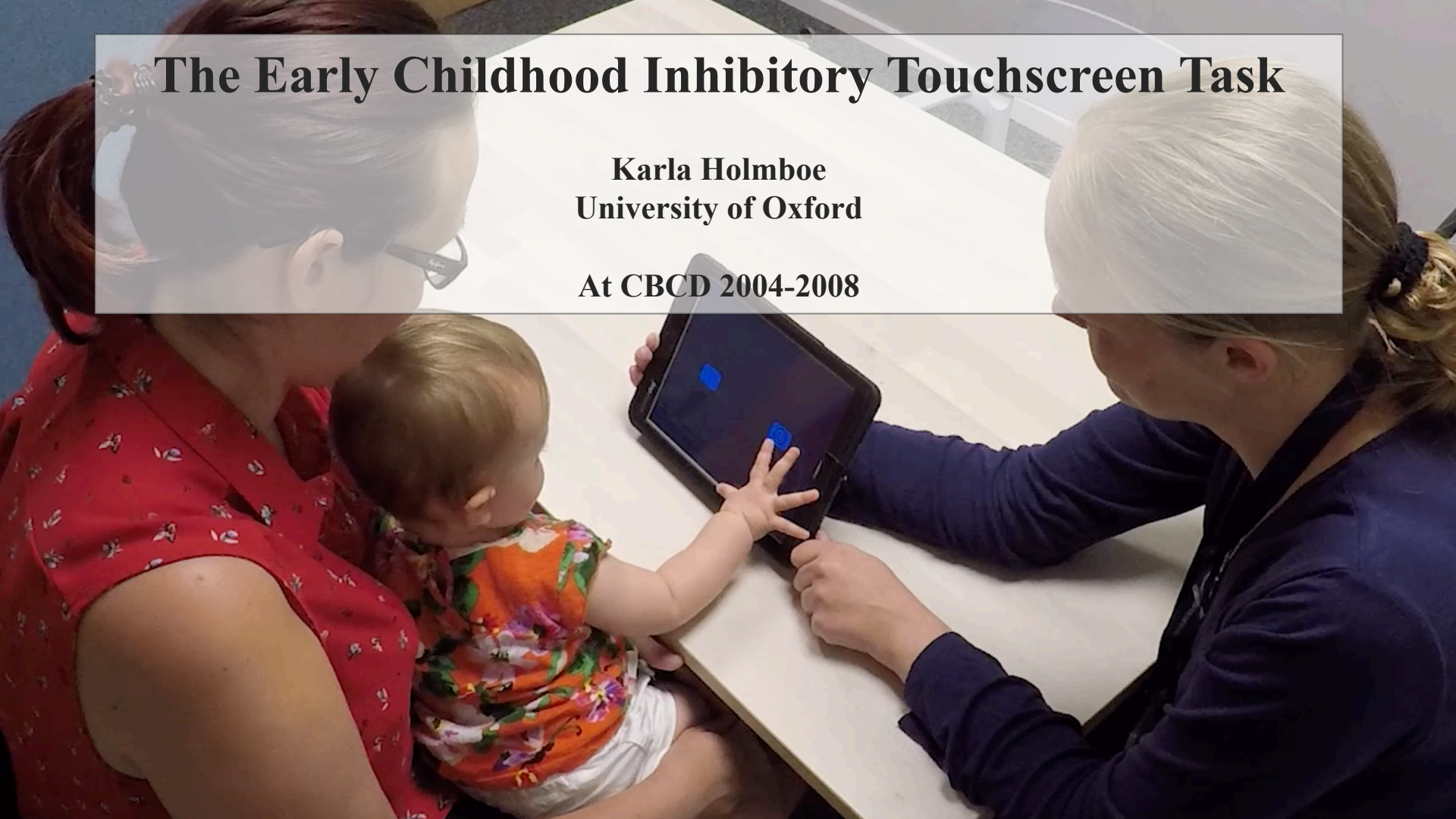
The Early Childhood Inhibitory Touchscreen Task

Karla Holmboe
University of Oxford

At CBCD 2004-2008



2007

2019

The Oxford Early EF Study: 11 new and modified tasks

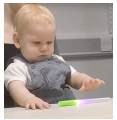
Individual trajectories: Longitudinal study of N = 200 children at 10, 16, 24 & 30 months

Touchscreen IC tasks

Reversal learning (eye-tracking)

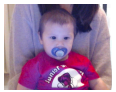
Manual response inhibition/switching

Prohibition tasks



Focused attention (free play, heart rate)

FA / distractibility (eye-tracking)

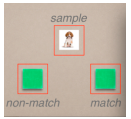


Inhibitory control | Working memory

Focused attention | Everyday EF

Object WM ('Magic Box', manual)

Spatial WM ('Mr Mole', eye-tracking)



Delayed Match Retrieval (Kaldy et al. 2016)

The Early EF Questionnaire (developed by Dr. A. Hendry)

Temperament, behaviour problems, ADHD symptoms, etc.

Neuroimaging: EEG (FA/distractibility), fNIRS (inhibitory control); Genetics

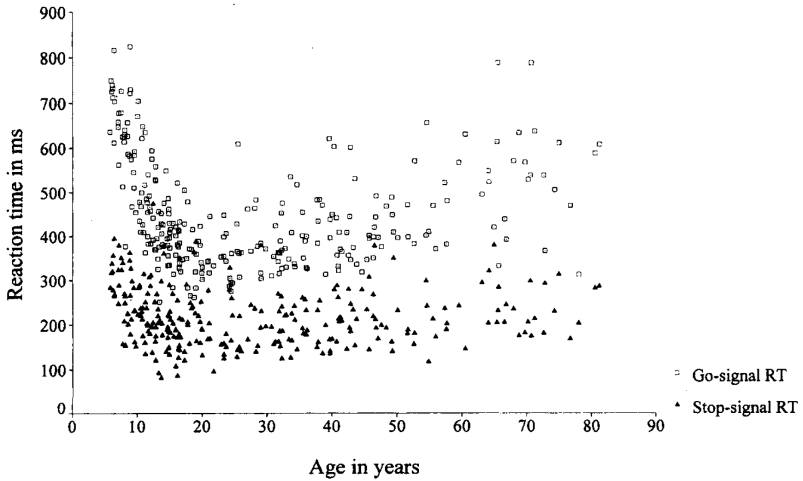
Response inhibition

Life-span development of response inhibition

Ability to stop a highly practiced (i.e., prepotent) response.

Two classic tasks: Go/NoGo task & Stop-signal task.

Rapid improvement in Go/NoGo performance across early



Williams et al., 1999

Response inhibition in toddlers

Go/NoGo and Stop-signal tasks are not suitable for very young children.

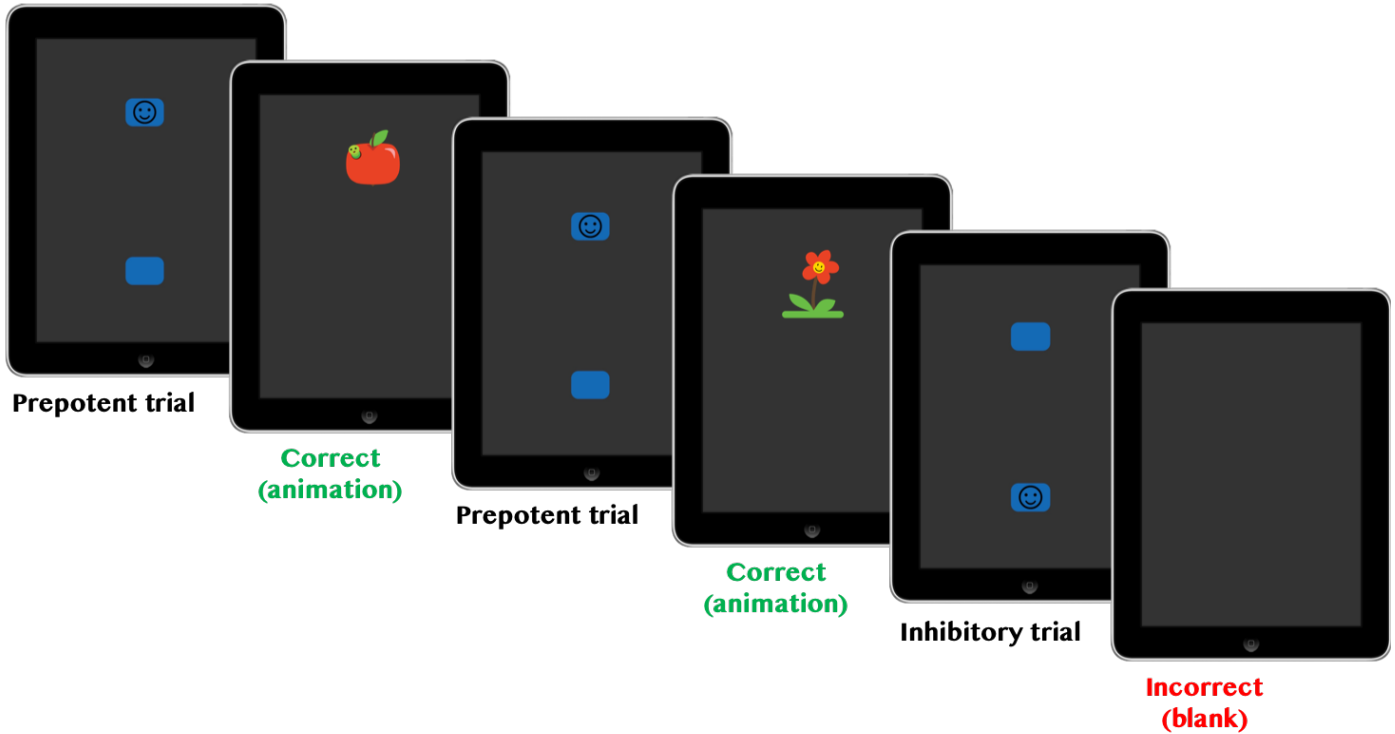
Children under 3 years of age struggle with task comprehension and working memory demands (e.g., "if-then" rules).

The Early Childhood Inhibitory Touchscreen Task (ECITT)

Designed to measure ability to inhibit a prepotent response in children as young as 2 years of age (but now using the task from 10 months of age).

Task involves playing an iPad game where the participant has to press one of two buttons depending on which one has a ‘happy face’ (smiley) on it.

The Early Childhood Inhibitory Touchscreen Task (ECITT)



Holmboe, Larkman, de Klerk, Simpson, Christodoulou, & Dvergsdal (under revision). Preprint: https://psyarxiv.com/k7g4a/

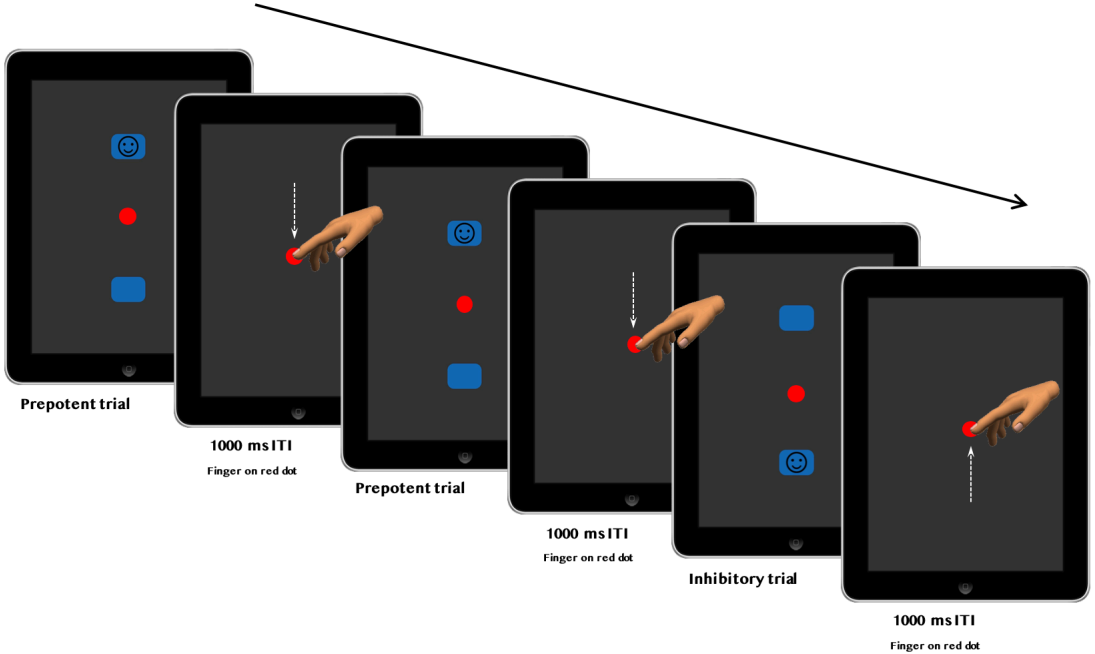
ECITT-A: Version for older children & adults

Faster trial presentation.

No animations.

Bring finger back to red dot in centre between trials.

Encouraged to respond as fast as possible without making mistakes.



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The Early Childhood Inhibitory Touchscreen Task (ECITT)

Four studies

Study 0 (Pilot)
Toddlers

- Lab-based setting
- Toddlers aged 20-28 months (M = 25 months)
- N = 13

Study 1
Toddlers

- Lab-based setting
- 24-month-olds (N = 41) and 30-month-olds (N = 41)

Study 2
Life-span

- Lab-based setting / school / community
- Child (M = 7.2 years, N = 26); Young adult (M = 23 years, N = 17); [illegible] (M = 70 [illegible] 19)
- Validation with Stop-signal task

PLUS: New data from 16-month-olds (N = 64) in the Oxford Early EF Study

Study 3
Public engagement

- Setting: public engagement events
- Opportunity sample
- N = 140 (largest groups: 4-7 years: N = 54; and 8-11 years: N = 53).

Holmboe, Larkman, de Klerk, Simpson, Christodoulou, & Dvergsdal (under revision). Preprint: https://psyarxiv.com/k7g4a/

The Early Childhood Inhibitory Touchscreen Task (ECITT)

Predictions

Condition effect

- If ECITT measures response inhibition, participants should:
  - Make more errors on inhibitory trials
  - Have slower reaction times on (correct) inhibitory trials

Developmental progression

- Compared to 2½-year-olds, 2-year-olds should:
  - Make more errors on inhibitory trials
  - Be slower on (correct) inhibitory trials

Validation

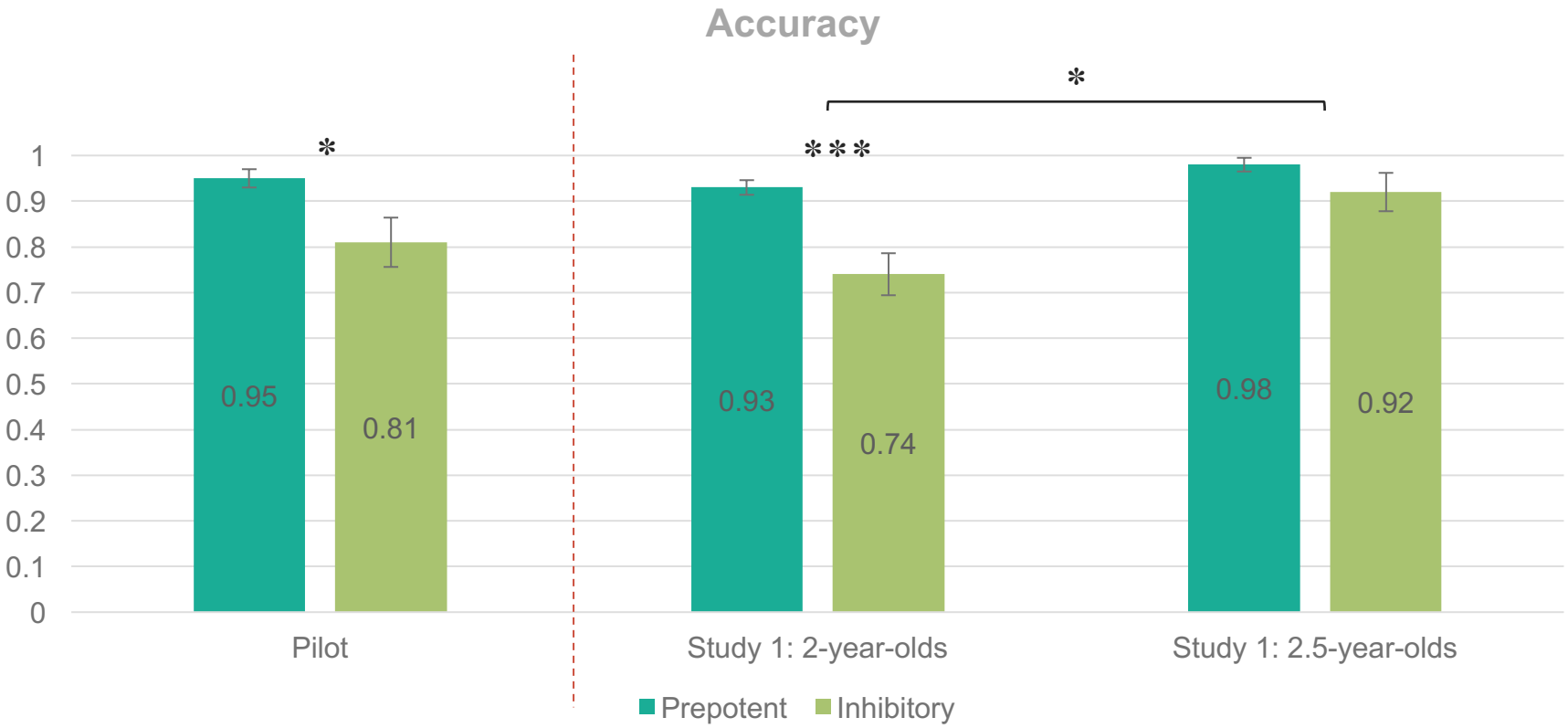
- Similar 'u-shaped' life-span development of inhibitory control as for the Stop-signal task (Williams et al., 1999).
- Performance on ECITT-A should correlate with performance on the Stop-signal task (Study 3).

Setting

- Effects should be present even in a more naturalistic / noisy setting (Study 4, public engagement events).

Holmboe, Larkman, de Klerk, Simpson, Christodoulou, & Dvergsdal (under revision). Preprint: https://psyarxiv.com/k7g4a/

Pilot Study & Study 1



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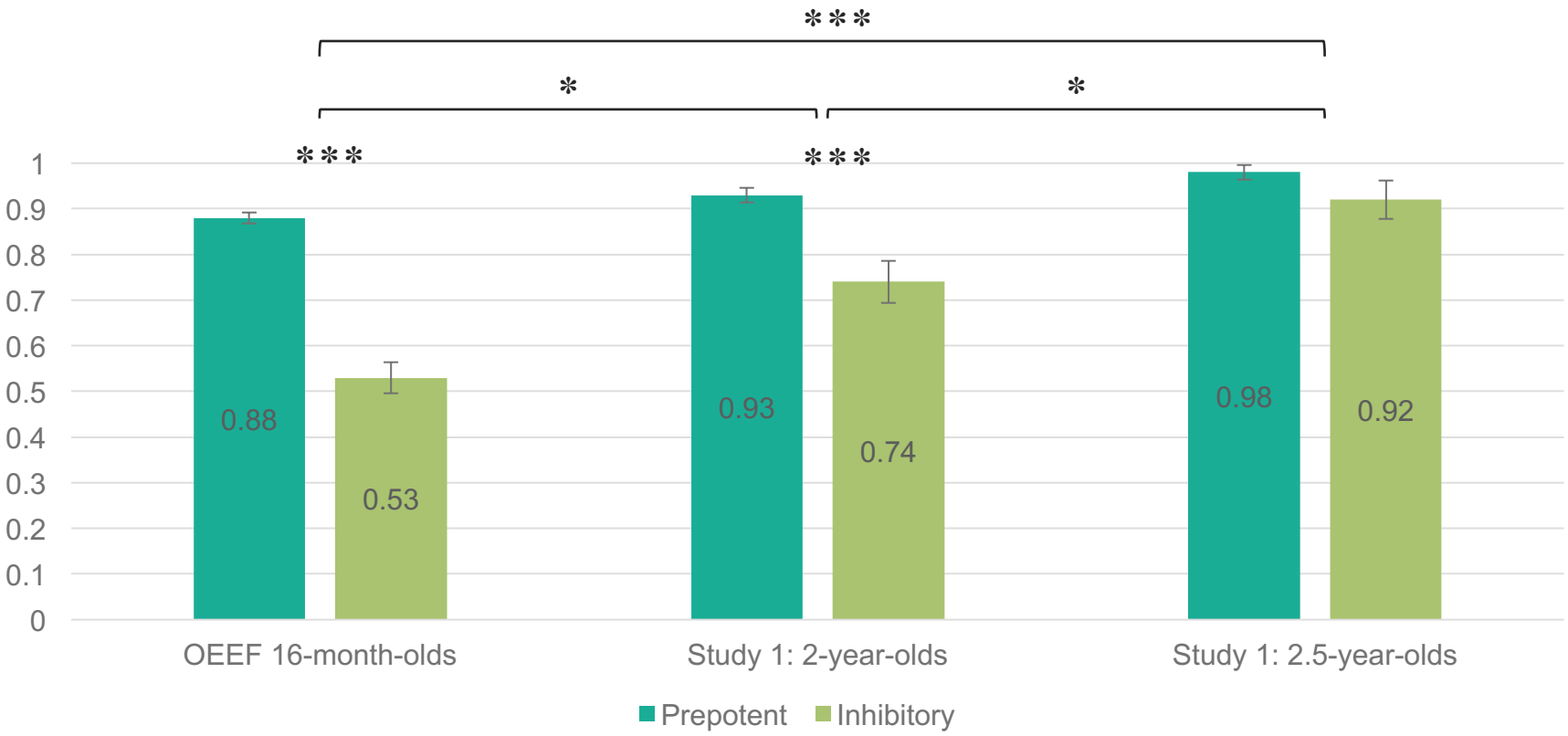
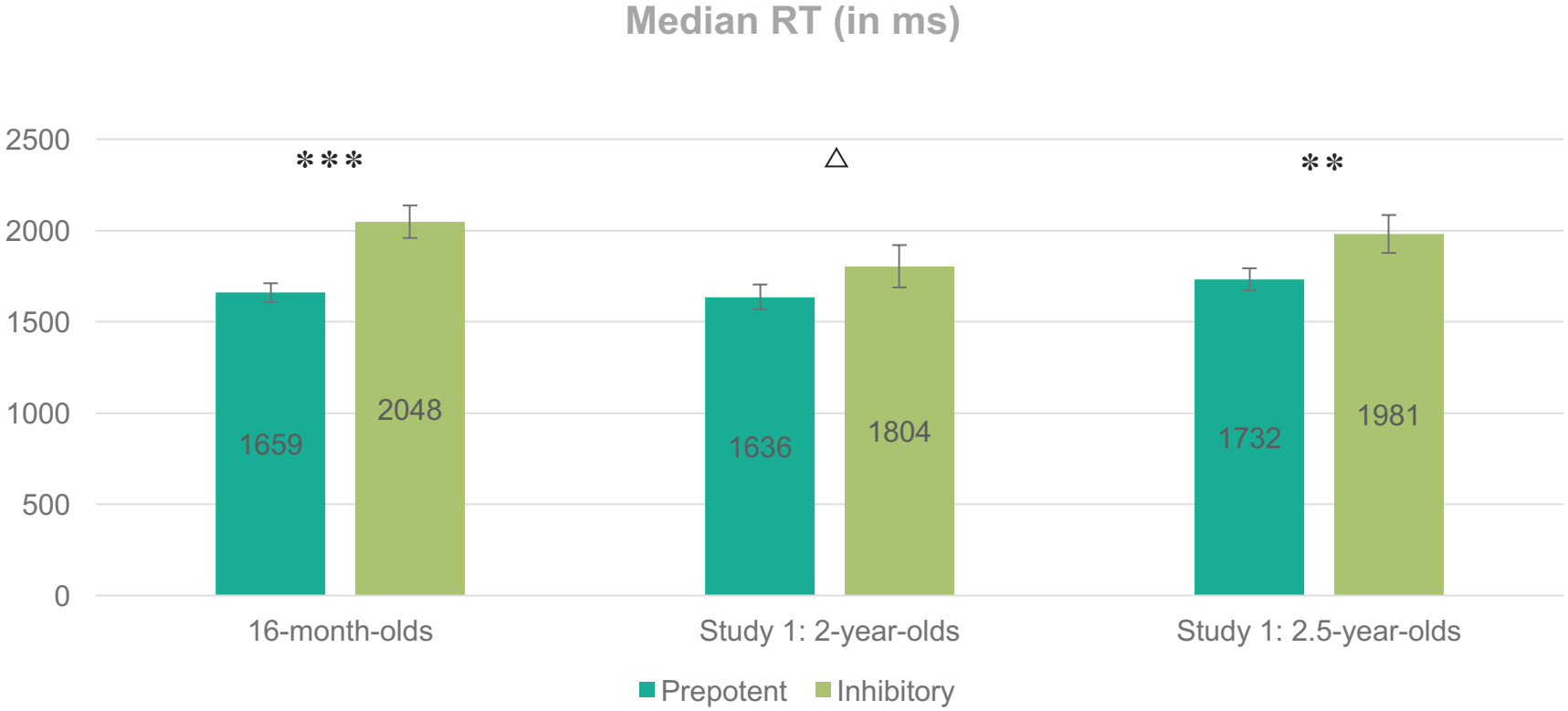
16, 24 and 30 months

Accuracy

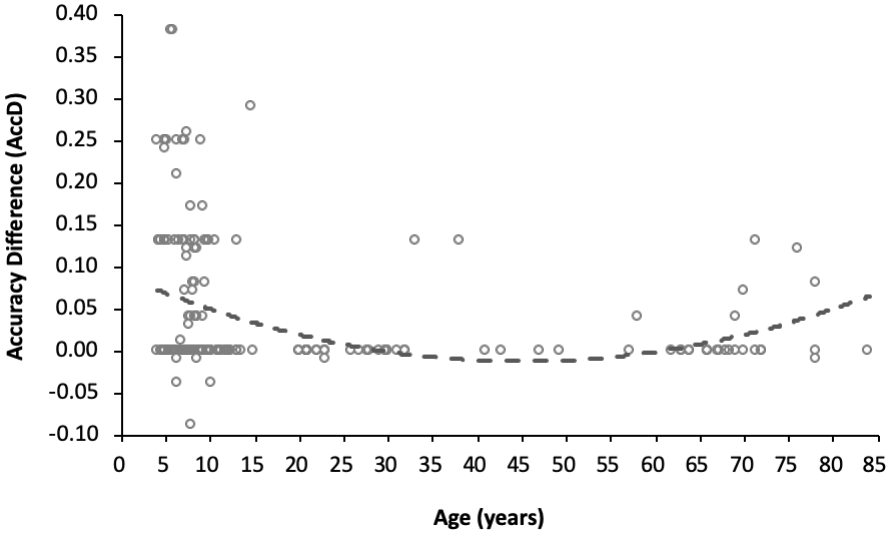


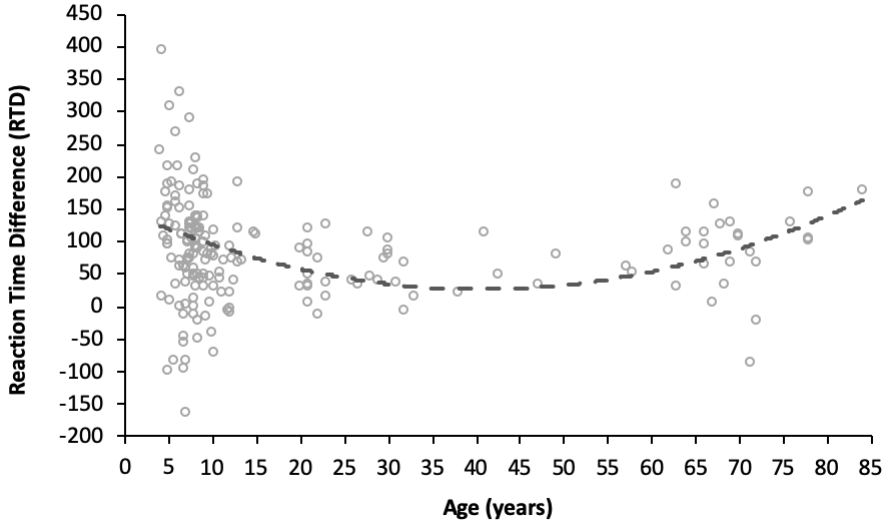
16, 24 and 30 months



Study 3 & 4 (life-span & public engagement)

N = 193





Quadratic/'u-shaped' function of age (similar to Stop-signal task) accounted for 7.5%-9.3% of the variance in inhibitory performance on the ECITT-A.

There was a significant positive correlation between ECITT-A (AccD) and Stop-signal performance, r = .272, p = .036 (controlling for Age and Simple RT).

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Conclusions

- The Early Childhood Inhibitory Touchscreen Task (ECITT) is a new response inhibition task. It is very simple: all participants have to do is to press the “happy face”.
- It can be used from 16 months of age, and, despite minor modifications to make the task fun for toddlers, is structurally similar across age.
- As predicted, participants ranging widely in age, from toddlers to elderly, make more errors and are slower to respond on inhibitory trials than on prepotent trials.
- We see a clear developmental progression in response inhibition between 16 and 30 months, demonstrating the potential of the task to measure individual differences in inhibitory control at an age that is notoriously difficult to assess.
- I hope the ECITT will provide a useful tool for investigating longitudinal trajectories in early inhibitory control development in relation to later outcomes (e.g., complex EF skills, school performance, social development).