

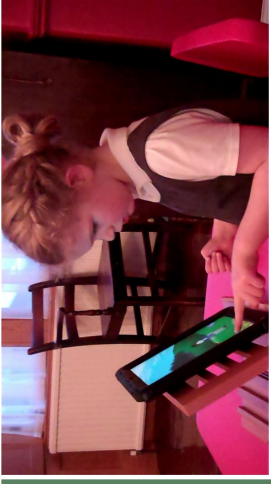
Background

- Children with autism can struggle to attend to social information and to use social cues - this affects their ability to learn, especially from people ¹
- Children with autism often show a strong preference and facility for using technology, including computer games ^{2,3}
- There is a widely-held assumption that early intervention has the greatest potential to benefit children with autism ⁴
- FindMe is a specially-designed iPad app, targeting social skills development and accessible to very young children
- A recent RCT of the app (n=54) produced no group-level effects on real world social and communication skills. However a sub-set of participants may have shown a treatment benefit
- Here we investigate the utility of detailed in-app data collected on game play to elucidate possible intervention effects

Click-East: Using data Collected within a Therapeutic iPad app to Elucidate Results of a Randomised Controlled Trial



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The App, FindMe



Figure 1:
 Top row: images from part 1 of the app, which rehearses the skill of 'prompting people for attention'
 Middle row: images from part 2 of the app, which rehearses the skill of following social cues
 Bottom row: images from the rewards embedded in the app
 The app was created using a participatory design framework and then developed with extensive user testing

The Trial, Click-East

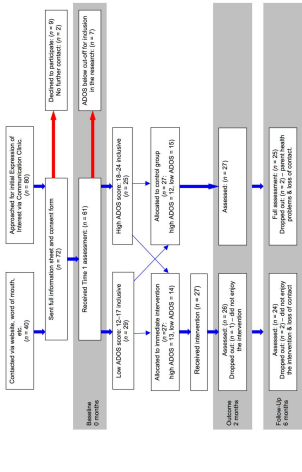


Fig 2: CONSORT diagram showing the RCT process

1. Dawson, G., Meltzoff, A. N., Osterling, J., Blalock, J. and Brown, E. (1998). Children with autism fail to orient to naturally occurring social stimuli. *Journal of Autism and Developmental Disorders*, 28(6), 479-485.
2. Munby, P. and Sigman, M. (1990). A longitudinal study of joint attention and language development in autistic children. *Journal of Autism and Developmental Disorders*, 20(1), 115-128.
3. Shane, H. and Albert, P. (2008). Electronic Screen Media for Persons with Autism Spectrum Disorders. 38(8), 1499-1508
4. Pennington, R. C. (2010). Computer-assisted instruction for teaching academic skills to students with autism spectrum disorders: A review of literature". *Focus on Autism and Other Developmental Disabilities* 25(4), 239-248.
5. Woods, J. J. and A. M. Wetherby (2003). Early identification of and intervention for infants and toddlers with autism and toddlers who are at risk for autism spectrum disorder. *Lang Speech Hear Serv* 34(3), 180-193.

RCT results

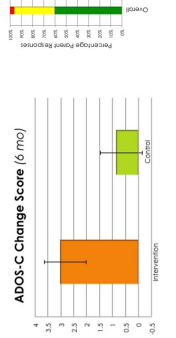


Fig 3: Group mean change scores on primary outcome (t(47) = -.975, p=.335, d = .028)

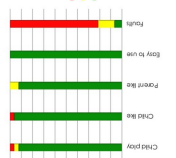


Fig 4: Parent attitudes to the intervention

	Intervention (n=27)	Waitlist (n=27)
Age (months)	49	50
Gender (% males)	75%	82%
Maternal education: % Uni or above	41%	40%
SMID, bottom quartile	15%	18%
SMID, top quartile	3%	5%
Modern VR age equivalent (months)	30	31
ADOS-2, VI age equivalent (months)	27	27
ADOS-2, VI score	7.74	7.26
ADOS-2, VI score	142	123
CBSS social communication sub-scale	24	25

Table 1: Group characteristics at baseline

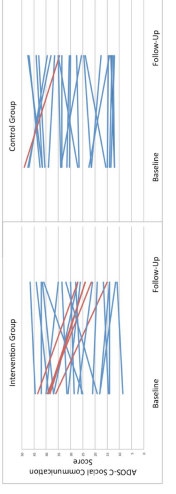


Fig 5: Individual change scores on primary outcome: children demonstrating reliable change are shown in red

- Groups were well matched at baseline (see Table 1 on the left)
- There was no group level intervention effect on primary outcome, a measure of social communication in parent-child play
- No group effects were found on other outcomes including parent-report social communication skills, vocabulary and ADOS
- Parent attitudes to the intervention were positive
- A sub-set of children in the intervention group (n=5) showed reliable change

Conclusions

- Children showing benefits as a result of the intervention appeared to:
 - Have relevant impairments at baseline
 - Show skill in response to the technological intervention
 - But their trajectories of change over time seem to be typical
- Technology-based interventions provide an opportunity for collection of detailed data on intervention 'dose'
- These may help in interpreting group-level findings
- Further investigation of the link between amount of play, response times, app complexity level and touches to distractors and background items may be revealing of learning trajectories in children with ASD

In-App Data

Whole group data (n=41 including waitlist controls)

- Mean date span of intervention = 58 days
- Mean number of days with play = 25 days
- Mean sessions of play per day = 1.6
- Mean play time = 11hrs, or approx 26 mins on play days.
- Percentage reaching highest game level = 74%
- Children showed consistency in response time to trials but three distinct patterns of change in play time (Fig. 6 & 7)

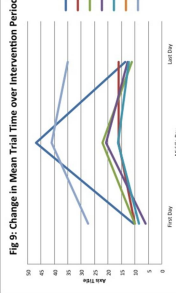
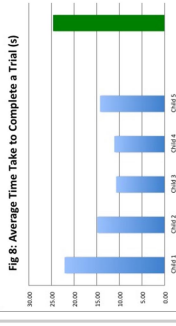
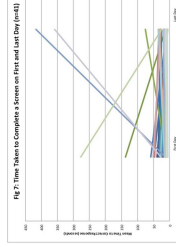
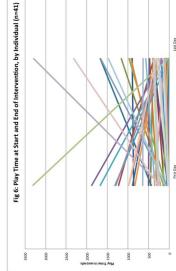


Fig 6: Play Time at Start and End of Intervention, by individual (n=41)

Fig 7: Time Taken to Complete a Screen on First and Last Day (n=41)

Fig 8: Average Time Taken to Complete a Trial (s)

Fig 9: Change in Mean Trial Time over Intervention Period

Conflict of Interest:

Authors HP, SFW and HM declare that they may receive royalties in the future if the FindMe app paid downloads exceed a certain threshold.

FindMe is also available in a free, reduced-content version via iTunes

FindMe(Autism) By Interface3



With thanks to all our participating families and experts and our funder, the Nuffield Foundation



Interface3
 Smart MultiTouch Solutions

