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Evidence for the benefits of inclusion in education and the keys to success



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background

Our research on the issues

• In 1987 we conducted a survey with 90 families of teenagers in Hampshire - almost the total group of those living at home.

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- The aim was to find out what life was like for teenagers with Down syndrome and their families – all aspects, language, academic progress, practical skills, leisure activities, health, behaviour, family needs. Published as a book but a depressing read - reflects lack of education and opportunities rather than having Down syndrome
- In 1999 we decided to repeat the survey to see if next generation were benefiting from changes in social attitudes and educational expectations

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dse 🕘 dse 📃 Evidence for the benefits of inclusion Main findings of the study Inclusion study - Portsmouth UK Buckley, Bird, Sacks & Archer No progress from 1988-2000 for special class outcomes - this Compared achievements of all teenagers with Down was a surprise, we expected progress syndrome in 1987 and in 2000 in one county · Significant and specific educational benefits for inclusion • In 1987 – all in special education classrooms (SLD) Teenagers fully included in mainstream classes • In 1999 – about one-third full inclusion from 5 yrs - gains of more than 2 years in spoken language skills and 3 Compared special class (SLD & MLD) and full inclusion years in reading and writing outcomes with carefully matched groups - gains in maths, general knowledge and in social One area of Hampshire county included children in independence mainstream schools from 1988, earlier than the rest of - no differences in personal independence or social contacts the county and adapted the teaching to address their out of school - tend to have better behaviour No difference between the groups in ability or social Copyright © 2012 Down Syndrome Education Interna















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Our experience of inclusion

- In Portsmouth we began including children in their local mainstream schools in 1988 – with full support of the LA and parents. We still provide the inclusion support service to children and young people in local schools.
- 2 main drivers in 1988 still the same
- Psychological: development is social, all children are profoundly influenced by learning opportunities and learning from other children – cognitive, language, academic and social learning
- Social: Identity is socially acquired Who am I? How do others see me? Where do I belong? Changing attitudes, stopping the rejection and exclusion of our children

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How are children included?

• Full inclusion in the local mainstream school

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- Full inclusion in an age appropriate class
- In class support from teaching assistant (TA)
 15 to 30 hours per week according to need
- Accessing the same curriculum differentiated for each learner
- Adapted teaching methods to the profile visual learner, language delayed, sensory impairments, motor needs
- Move up each year with class
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dse 🕘 dse 📃 What have we learned since 1988? Inclusion support in Portsmouth • Provided by 'specialists' • We have learned by working with schools locally • At least one monitoring visit each term and across the UK - provide a lot of training · Support for access to curriculum, ATTITUDES are THE KEY TO SUCCESS – that is social development and behaviour, believing in inclusion and 'seeing child first', not and for focused interventions the disability · Training for staff - teachers and assistants, parents, • Commitment from the top, Head and Governors publications, information · Planning at whole school, class and individual Regular liaison with parents and school team - equal levels access to service by parents and professionals A similar model is used in other successful Local Good communication – a team approach **Authorities** Willingness to learn and to problem solve Copyright © 2012 Down Syndrome Education International Copyright © 2012 Down Syndrome Education International

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Attitudes and rights

- We learned very early how very different schools and teachers can be
- We also learned about the need to address attitudes and beliefs about Down syndrome
- We had some of our most able students rejected even though their work was within the range in the class
- We had some of our most disabled students welcomed and fully included
- This is still happening despite disability discrimination law
- It is a professional duty for a teacher to meet a child's needs

 with necessary support and training not an option

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 "Everyone has had a good day and wants to come back tomorrow" – One Head's definition of a successful school Convibit © 2012 Down Swidowe Education International.



dse :: ` Key points • 'It has been a huge professional development for me – to understand these children can cope well in mainstream school • That must be the same for all the staff who have worked with the children and will impact on all their teaching • For recognising individual needs and how to deal with these • Very positive'

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Flexibility needed

- No 'we always/only do it this way!'
- A range of teaching methods team teaching, small groups, peer tutoring, working with teaching assistants
- Flexible and planned use of resources people, space, materials, information
- Training for staff at all levels
- Time management for planning, meetings
- Remembering this is for ALL children

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Parent involvement

- Partnership with parents based on mutual respect is essential to success and to maximising learning and social opportunities
- Parents are usually experts on their child's disability or needs and have played a major part in early education programmes as teacher if they have Down syndrome.
- They can continue to support teaching aims and help their child consolidate and generalise learning out of school

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dse 📳 Supported by key recommendations from Fox, Farrell, Davis

Four key factors schools need to look at (2 year study, 18 English schools)

- The centrality of the class teacher in the management of the inclusion of the child
- A complementary rather than compensatory relationship between the support assistant and class teacher
- The capacity of the class curriculum to include and involve the pupil with Down syndrome
- The quality of communication between the teacher and pupil, teacher and teaching assistant, teacher and advisory teacher, teacher and parents/carers

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Differentiation, age 8

Class project about water. Key questions and answers; a

word web. Vocabulary and sentences

- explain: rain, cloud, river, lake, pond,
- reservoir, people and water use, transport, contaminated water

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dse :: Challenges for parents Too many families find that getting their child included is still a battle – despite their child's right to a place in a mainstream school within their community Some face negative attitudes in schools Some face negative attitudes in Education Authorities Many feel that it is a constant struggle – each year they find themselves needing to advocate for their child, they see poor teaching practice and unwillingness to learn about their child's needs, to value their child Many are on the end of the 'bad news book' only hearing the negatives

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Key points

- 'Our experience has been phenomenal in terms of our level of understanding of learning what learning is about
- We've had to rethink our preconceptions about what it is to be academic
- and what people need to have to achieve
- It has broadened our whole awareness of education'

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Recent research See the work of Gert de Graaf in the Netherlands – he has reviewed the literature and conducted his own in depth research Review chapter at <<u>http://www.downsyndroom.nl/reviewinclusive</u>> De Graaf, G., van Hove, G & Haveman M (2013) More academics in regular schools? The effect of regular versus special school placement on academic skills in

versus special school placement on academic skills in Dutch primary school students with Down syndrome. J Intell Disab Research 57, 21-38

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De Graaf et al. findings - benefits of inclusion

- Children in regular education had better academic outcomes in reading, writing and maths with the strongest effect for reading
- Even after accounting for the effects of IQ, age, nonacademic skills and parental education – which did effect outcomes
- Parental time spent on academics at home also mattered.
- One factor is that more teaching time given to academics especially reading in regular school placements

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De Graaf et al. findings – benefits of inclusion

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- Papers presented by Gert and his team at World Down Syndrome Congress, South Africa 2012
- Additional analyses more years in regular education the greater the benefit for reading controlling for T1 reading scores and over an above IQ (N=115, 2006-2010).
- Children with IQs above 50 with mainly special school history were compared with children with IQs 35-50 included in regular school. (410 children in study in 4 IQ groups). The children with **lower IQs but in regular** classrooms were ahead on reading, writing, math, selfhelp, language and computer skills

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Why these findings?	F
 The social world – typical language, typical social behaviour, typical learning models all around Higher expectations 	•
 Better quality teaching as well as more teaching time given to academics 	•
 More individual planning – small steps and intensity matter – see our RLI data 	•
 Classroom support – often one-to-one. This enables student to stay on task and complete work successfully Access to a wider curriculum 	
Support of peer group	•

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References –DSE UK Inclusion studies

- 1. Buckley, S., Bird, G., Sacks, B., & Archer, T. (2002). A comparison of mainstream and special education for teenagers with Down syndrome: Implications for parents and teachers. *Down Syndrome Research and Practice*. 9 (3) pp 54-67 (with full data tables).
 2. Buckley, S., Bird, G. & Sacks, B. (2006) Evidence that we can the backers. *Down Syndrome Comparent Syndrome*.
- 2. Buckley, S., Bird, G. & Sacks. B. (2006) Evidence that we can change the profile from a study of inclusive education. *Down Syndrome Research and Practice*. 9 (3) pp. 51-53.
- 3. Buckley, S., Bird, G., Sacks, B., & Archer, T. (2002). The achievements of teenagers with Down syndrome. *Down Syndrome News and Update*, 2(3), 90-96.
- Buckley, S. J. & Sacks, B. (1987). The adolescent with Down syndrome: Life for the teenager and for the family. Portsmouth, England: University of Portsmouth.
- Articles 1-3 are available in full on http://www.down-syndrome.org/

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References - 'all other inclusion studies agree'

- All other studies of inclusion for children with Down syndrome – mainly rather smaller than ours – agree that the children show academic gains and language gains
- S. Turner, A. Alborz & V. Gayle (2007) Predictors of academic attainments of young people with Down's syndrome. Journal of Intellectual Disability Research 52(5):380-392,
- S Fox, P Farrell P Davis (2004) Factors associated with the effective inclusion of primary-aged pupils with Down's syndrome British Journal of Special Education 31 (4) 184-190
- De Graaf, G., van Hove, G & Haveman M (2013) More academics in regular schools? The effect of regular versus special school placement on academic skills in Dutch primary school students with Down syndrome. *J Intell Disab Research 57, 21-38*

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The evidence for a specific phenotype or profile
See Deborah J. Fidler (Colorado State University) and colleagues for a recent reviews of the evidence
The Emerging Down Syndrome Behavioural Phenotype in Early Childhood. Infants and Young Children (2005) 18, 2, 86-103
Education and children with Down syndrome: neuroscience, development and education. Mental Retardation and Developmental Disabilities Research Reviews (2007) 13, 262-271.
The Down syndrome behavioural phenotype: implications or practice and research in occupational therapy. Occupational Therapy in Health Care (2011) 25, 7-25

- And free access articles preschool, primary and teenage profile papers
- Down Syndrome Research and Practice 9 (3) special section on the specific profile free at
- <u>http://www.down-syndrome.org/research-practice/</u>

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Individual differences in response to reading intervention for children with Down syndrome

Sue Buckley

Kelly Burgoyne, Fiona Duff, Paula Clarke,, Maggie Snowling & Charles Hulme



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The University of York

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From research to practice

- How do teachers and parents make use of research studies?
- What do they need to know?

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- Does group data tell us anything about individuals?
- If an RCT has demonstrated effectiveness of an intervention, does that mean all individuals in the population studied will benefit?
- Do these questions challenge the way we present and publish data?



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-		
Phase 1 Pre-test Gro	oup 1 20 weeks intervention/Group 2 waiting contro	ol Post-test 1
Sept 2009		May 2010
Phase 2	Group 1 and 2 20 weeks intervention	Post-test 2
June 2010		Jan 2011
Phase 3 G	roup 1 and 2 20 weeks unsupported intervention	Post-test 3
Feb 2011		July 2011
Phase 4 Pul	blication of training materials and dissemination ac	tivities
Aug 2011		March 2013



		ds <mark>e</mark> [0
Se	ession Structure		
	Reading Strand (20 mins)		
	Reading easy level book	2-3 mins	
	Reading new instructional level book	5 mins	
	Sight word learning	2-3 mins	1
	Letters, sounds, phonology	5 mins	1
	Introduce new instructional level book	5 mins	1
	Language Strand (20 mins)		
	Vocabulary: Introduce new words	5 mins	1
	Vocabulary: Reinforce meaning of new words	5 mins	
	Expressive language: Use new words in connected speech	5 mins	
	Expressive language: Use new words in written language	5 mins	
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Autum	Pre-test n 09: 6;10 (5;02 -	- 10;00)
Average Raw Score	Range Raw Score	Average Age- Equivalent
28.70 (12.78)	8 - 71	2;10
35.43 (13.53)	11-67	3;01
6.54 (11.30)	0 – 52	-
14.28 (8.69)	0-30	4;10
	Autum Average Raw Score 28.70 (12.78) 35.43 (13.53) 6.54 (11.30) 14.28 (8.69)	Pre-test Autumn 09: 6;10 (5;02 - Average Raw Range Raw Score 28.70 (12.78) 35.43 (13.53) 11 - 67 6.54 (11.30) 0 - 52 14.28 (8.69) 0 - 30















pred	lictor		e mane	p. 08. 0		0	
Table 2 A	ge, language ski	lls, attendance and	behaviour of 8	children who r	nade very little	e or no progress o	on word
Case	Group	Age at start (months)	Receptive Vocabulary Raw Score (at	Expressive Vocabulary Raw Score (at	Block Design Raw Score (at start)	Attendance (% of max. possible)	Behaviour Rating (1=Good,
1	1	117	start) 41	start) 28	12	57%	5=Poor) 1.0
2	1	80	41	16	19	54%	1.3
3	2	68	18	13	5	44%	1.7
4	2	70	13	9	0	84%	4.3
5	2	70	12	10	0	56%	3.4
6	2	83	32	21	11	61%	2.4
7	2	62	26	18	4	48%	1.3
8	2	85	32	27	12	77%	1.3
Mean		82	35	29	13	65%	1.6













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This mix of focused research interests and direct involvement in education has given us a unique opportunity to set up interventions and then follow children in longitudinal studies, as well as ask more experimental research questions.
We give high priority to sharing information directly with parents and practitioners through publishing, website and training activities.
For more information on the work of the charity see http://www.dseinternational.org/ and note linked US site http://www.dseusa.org/en-us/



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Keep in touch with our work We have a large information site at Down Syndrome Online at http://www.down-syndrome.org/ This has much information for teachers in the Down Syndrome Issues and Information Education series (DSII) There is also a wealth of papers by world leading experts in the Down Syndrome Research and Practice section Teaching materials, books and videos can be found at our online store at http://store.dseusa.org/ Sign up for regular news and blogs at link on bottom of home page or at http://www.dseusa.org/en-us/email/ and http://www.dseusa.org/en-us/email/

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Effects of Down syndrome on development

- · Most children will have delayed development
- There is a very wide range of individual differences from mild delays to more severe levels of disability
- For most children, severity of disability cannot be predicted at birth or in early years
- Not all aspects of development are equally delayed
- Research in the past 15 years has highlighted a profile of strengths and weaknesses
- We can use this information to be more effective in helping children reach their full potential – development is not fixed at birth

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dse The specific developmental profile associated with Down syndrome

- · Good social interactive skills
- · Good empathy and positive personalities
- Sensitive to failure and negative emotional cues
- May use social skills to distract/avoid difficult tasks
- Good behaviour relative to mental ability and communication skills
- · Good practical self-help/daily living skills over time
- Delayed early motor development affects early learning through play and handwriting progress

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dse The specific developmental profile associated with Down syndrome

- Significant risk of vision and hearing impairments
- Specific speech and language delays relative to non-verbal mental abilities

Cognitive strengths and weaknesses

- Specific verbal short-term and working memory difficulties
- Strengths in visual short-term memory and processing Academic learning
- Strengths in reading can be at age level (10%+)
- Number more difficult often 2 years or more behind reading

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The importance of the weaker areas – speech, language and working memory

- Language underpins cognitive and social development for all children
- Words for knowledge vocabulary size
- Language for remembering, thinking, reasoning
- Language for self-control and planning
- · Language for dealing with emotions and worries
- Language for communicating with others
- Language for friendships
- Any child with language delay will have cognitive (mental) delays (including executive function difficulties)
- Working memory deficits will affect all learning

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dse :: Learning to talk Talking is for communicating – getting the message across, engaging with others Starts with looking, smiling, pointing – non-verbal skills for commenting, requesting, answering Then words – vocabulary learning – working out meanings and saying the words Then sentences – grammar learning – stringing words together for more complex meanings Talking requires clear speech skills – takes time for all children













• See and Learn Number and Memory in development

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Why this learning profile? Hearing loss plays a part Auditory processing may play a part Slow vocabulary learning may delay grammar Difficulties with verbal short-term memory play a part We know nothing of early speech discrimination in children with Down syndrome

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- Speech difficulties will delay language development
- We know very little about causes of speech-motor issues - Not just a motor issue
- Planning component
- Verbal short-term memory component

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Working memory is important for all children

- 'Working memory is the mental workplace in which information can be temporarily stored and manipulated during complex everyday activities.'
- listening to another speaker
- decoding an unfamiliar word whilst holding the meaning of the previously decoded text in mind
- · writing while formulating the next part of the text
- engaging in mental arithmetic
- Predicts academic progress better than IQ (Alloway)
- See excellent book S. Gathercole & T. P. Alloway. Working memory and learning: practical guide for teachers. Sage 2008 and article for teachers at <u>http://www.york.ac.uk/res/wml/PATOSS.pdf</u>

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Verbal short term memory & language

- The phonological component supports verbal short-term memory (VSTM)
- Verbal short term memory span improves with age and can be measured with digit and word span tasks
- Verbal memory span is influenced by increases in speech perception and production rates, and by reading ability
- The phonological loop influences the learning of vocabulary and syntax – and the storage and processing of sentences
- It seems to influence spoken language output may play a role in holding the phonological structure of speech prior to output (Gathercole et al 2005)

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 However, recent Italian research has indicated visual STM impaired if material require simultaneous rather than sequential processing (dual tasks) and also central executive impairments (Lanfranchi et al.)

Why this profile?

- A number of research studies by Chris Jarrold and team at Bristol University, UK have shown that the deficits cannot be explained by hearing loss or speech difficulties
- They suggest a phonological loop deficit which will affect word learning as well as memory.
- They have shown children with Down syndrome have specific difficulty learning the accurate phonological or sound pattern of words
- There is some evidence that training can improve working memory function including computer training – Cogmed (Bennett, Holmes, Buckley 2013)
- Early speech perception and production difficulties could be causal as system has to tune to native language

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Effects of poor verbal short term memory function

- In other children with poor verbal STM
- Speech characterised by short utterance length
- Immature syntax/grammar
- · Limited range of vocabulary
- Speech clarity issues
- Storage and processing of sentences
- · Poorer reading and poorer maths
- See Gathercole et al (2005) Developmental consequences of poor phonological memory in childhood. *Journal of Child Psychology and Psychiatry* 46 (6) 598-611 and also in 47 (1) 4-15 on memory in developmental disorders
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Executive functions now being studied • Working Memory – Hold information in mind for purpose of completing (ticking with an activity Shift –

- purpose of completing/sticking with an activity. **Shift** Move freely from one situation to another, solve problems flexibly. **Inhibition** – Control impulses and behaviour at correct time/context. **Emotional Control** – Modulates emotional responses appropriately to situation. **Plan/Organise** – Anticipates future events/consequences.
- Lanfranchi et al (2010) adolescents with Down syndrome showed impairments relative to their MA on planning, inhibition, shift and working memory. Lee, Fidler et al. (2011) also report EF impairments and continue to study EF. Working memory and shift improved with WM training (Bennett et al 2013) – very preliminary finding.
- Important role of language in executive functions

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Implications for intervention and education

Use social/emotional strengths

- build on emotional responsiveness encourage social communication, looking, smiling, gesture
- early social communication underpins cognitive and language development
- · talk to and play naturally with children
- build on social understanding encourage 'good' behaviour
- Always encourage AGE appropriate behaviour do not 'baby' or 'spoil' child (or adult), have clear expectations and boundaries

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Implications for intervention and education

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- Target speech and language difficulties from infancy and through school years
- Remember that children are visual learners
- Use reading to teach talking from early (2 to 3 years) and through school years
- Learning from listening will be specially difficult but learning from looking easier so always use visual supports - signs, pictures, reading, the computer
- Enable understanding to be demonstrated without the need to say it - choosing, pointing, selecting

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Implications for intervention and education	Implications for intervention and education
 Progress with grammar is linked to total vocabulary size for children with Down syndrome – therefore teaching vocabulary is an important goal from early Speech skills start in first year – therefore intervention should start then – games to develop discrimination and encourage production of speech sounds Non verbal communication skills predict talking (joint attention and pointing) therefore intervention should start in first year Gesture use can close the comprehension/production gap but we need more research on the proper use of signing 	 Compensate for 'weaknesses' Hearing, vision – regular checks, good health care – speak clearly, use signs, limit background noise. Involve sensory impairment team Address working memory difficulties with sound and word discrimination games from infancy, improving spoken language development and playing memory games Encourage motor development at all times Active practice Encourage active movement through play Sporting skills are good for fitness as well as social skills

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dse 📳 In summary · Children with Down syndrome are visual learners They find learning from listening particularly difficult • This effects learning to talk and it effects processing spoken language and instruction If we plan interventions to - to focus on teaching spoken language - support all learning visually - especially with print - to improve and compensate for working memory Can we make a difference? Our data for teenagers taught in this way from preschool years suggests we can

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http://www.down-syndrome.org/research-practice/

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Relevant research evidence is growing

Whole journal issues devoted to Down syndrome - important review

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- Mental Retardation and Developmental Disabilities Research
- Journal of Intellectual Disability Research 51 (12) 2007
- Important recent review papers and chapters on cognition (Silverman), language (Fidler et al., Roberts et al, Abbeduto et al., education (Fidler & Nadel), reading (Groen et al., Buckley, Snowling et al.), social development (larocci et al, Cebula & Wishart)
- Gathercole & Alloway articles and books on working memory for teachers.
- Clarke, B. & Faragher, R. (2013) Educating learners with Down syndrome. Routledge Education. (Includes good reviews of cognition and motivation literature and practical chapters on behaviour, reading and maths).

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References – speech, language and memory

- J.E. Roberts, R.S. Chapman, & S.F. Warren (Eds.), Communication and language intervention series: Speech and language development and intervention in Down syndrome and fragile X syndrome (pp. 233-254). Baltimore: Paul H. Brookes Publishing Co. Very good review and practical for professionals
- Abbeduto, L, Warren, S.F. & Conners, F.A. (2007) Language development in Down syndrome: from the prelinguistic period to the acquisition of literacy. Mental Retardation and Developmental Disabilities Research Reviews 13: 247-261
- Gathercole et al (2005) Developmental consequences of poor phonological memory in childhood. *Journal of Child Psychology and Psychiatry* 46 (6) 598-611 – also same journal (2006) 47 (1) on memory in developmental disabilities
- LanFranchi S et al. Executive function in adolescents with Down syndrome. J Intell Dis Research 54, 308-319

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dse 🔲 References - cognition and education Lee, NR, Fidler DJ et al. (2011) Caregiver report of executive functioning in a population based sample of young children with Down syndrome. *Am J Intell Dev Disabil.* 116, 200-304. Bennett S, Holmes J and Buckley S (2013). Computerized memory training leads to sustained improvement in visuospatial short term memory skills in children with Down syndrome. *American Journal on teacher and eard Deventional Computerized Interview* 118(2), 112-102. Intellectual and Developmental Disabilities, 118(3), 179-192. Importance of full inclusion in changing the profile Buckley SJ, Bird G, Sacks B, Archer T. A comparison of mainstream and special education for teenagers with Down syndrome: Implications for parents and teachers. *Down Syndrome Research and Practice*. 2006;9(3);54-67.

De Graaf, G., van Hove, G & Haveman M (2013) More academics in pequilar schools? The effect of regular versus special school placement on academic skills in Dutch primary school students with Down syndrome. J Intell Disab Research 57, 21-38

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Baseline Scores – Kaufman AWMA								
	СА	MA V	MA NV	Verbal STM	Verbal WM	Visual STM	Visual WM	
Group 1	113.60	63.80	68.90	13.10	7.50	11.60	6.90	
Group 2	113.64	65.64	66.00	13.09	8.82	13.64	8.73	
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AWMA Scores (pre and post training)							
		Ver	bal	Vis	ual		
	Time	STM	WM	STM	WM		
Group 1	1	13.10	7.50	11.60	6.80		
Group 1	2	13.40	8.40	14.50*	10.10*		
Group 1	3	15.10	8.80	15.20	11.20		
Group 2	1	13.09	8.82	13.64	8.73		
Group 2	2	12.91	7.45	12.27	8.91		
Group 2	3	15.45	8.64	15.73*	10.36		

BRIEF-P – Executive Functioning Measure

Measures EF in 5 key areas.

•Working Memory – Hold information in mind for purpose of completing/sticking with an activity.

•Shift - Move freely from one situation to another, solve problems flexibly.

•Inhibition – Controls impulses and behaviour at correct time/context.

•Emotional Control – Modulates emotional responses appropriately to situation.

•Plan/Organise – Anticipates future events/consequences.

High scores indicate difficulties in that area – average score for typical child is 50.

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	Time	Inhibition	Shift	Emotional Control	Working Memory	Plan/ Organise			
Group 1	1	71.10	70.50	61.30	80.10	68.80			
Group 1	2	65.20	60.60*	57.80	71.70*	61.10			
Group 2	1	67.73	61.18	61.27	76.36	65.00			
Group 2	2	62.90	56.63	57.09	72.18*	62.09			
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Evaluating therapies

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- Substantial challenges involved in developing assessments that are reliable and sensitive enough to demonstrate treatment effects
- Substantial challenges in getting young people with Down syndrome to 'do their best' in assessments
- Quality at sites strict adherence to protocol and attention to detail Placebo effects???? Due to attention or knowing
- you are in trial and expected outcomes? Outcome measures must relate to real world quality of life improvements but these may need more than drug opportunities for new learning

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- Bennett S, Holmes J and Buckley S (2013). Computerized memory training leads to sustained improvement in visuospatial short term memory skills in children with Down syndrome. American Journal on Intellectual and Developmental Disabilities, 118(3), 179-192. <u>http://dx.doi.org/10.1352/1944-7558-118.3.179</u>

References

Alloway, T.P. Working memory, but not IQ, predicts subsequent learning in children with learning difficulties. European Journal of Psychological Assessment. 2009.: Vol 25(2): 92-98.

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- announes, compean Journal of Psychological Assessment, 2005. Vol 2(2), 52-96. Alloway, TP. Automated Working Memory Assessment, 2007, Oxford: Harcourt. Broadley I, MacDonald J, Buckley SJ. Are children with Down syndrome able to maintain learned from a short-term memory training program?. Down Syndrome Research and Pr 1994;2(3):116-122. http://www.down-syndrome.org/reports/4/1/
- Chapman R, Seung, H. Digit span in individuals with Down syndrome and in typically developing children: Temporal aspects. Journal of Speech, Language and Hearing Research, 2000; 43 (3): 609-620.
- 620. Combiain, A. (1994). Working memory in Down's syndrome. Training the rehearsal strategy. *Down's Syndrome*. Research and Practice, 2, 123-126. http://www.down.syndrome.org/reports/42. Conners FA. Rosenquist CJ. Arnet L, Moore MS. Hume LE. Improving memory span in children with Down syndrome. Journal of Intellectual Disability Research 2005;52(3):24-255. Gatheroole, SE. and Baddeley, A.D. Evaluation of the role of phonological STM in the development of vocabulary in children. A longitudinal study. Journal of Memory and Language. 1989; 28, 200-213. .
- Giola GA, Isquith PK, Guy SC, Kenworthy L. Behavior Rating Inventory of Executive Function 2000; Odessa, FL: Psychological Assessment Resources. .

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References

- Hick RF, Botting N, Conti-Ramsden G. Short-term memory and vocabulary development in children with Down syndrome and children with specific language impairment. Developmental Medicine & Child Neurology 2005; 47: 532-538.
 Holmes J, Gathercole SE, Place M, Dunning DL, Hilton KA, Elliott JG. Working memory deficits can be overcome: Impact of training and medication on working memory in children with ADHD Applied Cognitive Psychology 2009; Doi 10:1002/apr.1589.
 Laws G, MacDonald J, Buckley SJ, Broadley J. Long-term maintenance of memory skills taught to children with Down syndrome. Down Syndrome Research and Practice: 1995;3(3):103-109. http://www.down-syndrome.org/reports/SE/
 McNab F, Yarone A, Farde L, Jucaite A, Bystritsky P, Forssberg H, Klingberg T. Changes in cortical dopamine D1 receptor binding associated with cognitive training. Science 2009; 323, 800.

- dopamine D1 receptor binding associated with cognitive training. Science 2009; 323, 800. Klingherg T, Freml E, Olesen BJ, Johnson M, Gustafsson P, Dealhström K, et al. Computerized Training of Working Memory in Children With ADHD--A Randomized, Controlled Trial. Journal of the American Academy of Child & Adolescent Psychiatry 2005;44(2):177-186. Thorell LB, Lindqvist S, Bergman Nutley S, Bohlin G, Klingberg T. Training and transfer effects of executive functions in preschool children. Developmental Science 2009 Jan;12(1):106-113. Westerberg H, Klingberg T. Changes in cortical activity after training of working memory a single subject analysis. Physiology & Behavior 2007, 92, 186-192. .

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What is known about ASDs?
 ASD occurs in 1% of the general population and in up to 40% of people with intellectual disability
 There are many more males – around 4 males to 1 female
 Its causes are not known - have a strong genetic component(s) – probably many disorders
 Diagnosis is based on clinical judgement
• The 3 separate 'symptom' clusters common in general population – may have different genetic

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underpinnings (Skuse 2007)

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Study of prevalence – DiGuiseppi et al.

- Give a weighted prevalence of 18.2% for children with ASD and within that group 6.4% were diagnosed as autistic.
- If assume they identified all the children with ASD in the total population then prevalence is 7.4% they conclude that this may be the more accurate prevalence figure and is identical to that found in a UK population based study.
- If the 11 children with ASD and mental ages at or below 18 months removed the estimated weighted prevalence of ASD was 13% and none had a diagnosis of Autism. And ASD prevalence was 9.3% for children with mild cognitive impairment, 19.9% for those with moderate cognitive impairment and 13.1% for those with severe cognitive impairment.

downsed 🔲 Screening tools - 50% false positives Specificity: The screening tools did find 88% of the children later diagnosed with ASD – they were screen positive (12% were missed and rated as screen negative). Sensitivity: The screening tools produced about 50% false positives - that is children who looked to be 'at risk' and have ASD but who turned out not to have the condition. A false positive screen result was significantly more likely if the child had a hearing problem or a persistent vision problem. Children born prematurely were nearly four times more likely to have a false positive screen. There was no association between a history of heart disease, ear infections or seizures and false positive screen. down syndrome education international

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Confound with severe cognitive impairment

- Autism was diagnosis in 28% of the children with severe cognitive impairment and in no children with mild or moderate impairment. PDD-NOS (ASD) was diagnosed twice as often in children with moderate or severe impairment than in those with mild cognitive impairment.
- Experienced clinicians and they report that they were confident that those diagnosed with autism did have 'true' autism co-occurring with Down syndrome. They report that they were less confident about the rest of the children diagnosed as ASD (PDD-NOS in USA).

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Is it autism? They say that 'these children usually presented with significant problems in communication and repetitive behavior; whereas their social style demonstrated less reciprocity than expected for their overall developmental level, core social relatedness was not impaired. The question remains whether these children truly had an ASD, or whether cognitive, temperament, attention, and motor factors combined to influence reciprocity and communicative development'. DiGuiseppi et al. p 188. Is it executive function deficits? (i.e. in planning, shifting attention, perseveration, cognitive inflexibility) which affect social and communicative functioning - many items on screening tools tap aspects of executive function. P. 189

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ls it autism?		Longitudinal stu
 They suggest that 'children with inflexible behavioral styles or difficulty coordinating multiple behaviors may screen positive for autism and that further evaluation by an experienced clinician is necessary to disentangle executive dysfunction from poor social relatedness. They recommend that 'clinicians should supplement screening questionnaires with direct observation, attending to social orienting, communicative intention, emotion contagion and other aspects of core social relatedness that differentiate autism from global developmental delay'. p 189. 		 20 young children olds) - compreh clinicians using a reassessed two y findings support described. At T1 two children was considered ADOS-G scores she engaged in 9 children met p were not diagnored
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	 Is it autism? They suggest that 'children with inflexible behavioral styles or difficulty coordinating multiple behaviors may screen positive for autism and that further evaluation by an experienced clinician is necessary to disentangle executive dysfunction from poor social relatedness. They recommend that 'clinicians should supplement screening questionnaires with direct observation, attending to social orienting, communicative intention, emotion contagion and other aspects of core social relatedness that differentiate autism from global developmental delay'. p 189. 	 Is it autism? They suggest that 'children with inflexible behavioral styles or difficulty coordinating multiple behaviors may screen positive for autism and that further evaluation by an experienced clinician is necessary to disentangle executive dysfunction from poor social relatedness. They recommend that 'clinicians should supplement screening questionnaires with direct observation, attending to social orienting, communicative intention, emotion contagion and other aspects of core social relatedness that differentiate autism from global developmental delay'. p 189.

Characteristic Constraints of the study o

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Longitudinal study – Colorado, Hepburn 2007

- While all 9 demonstrated limited play, repetitive motor behaviours (particularly hand flapping) and were nonverbal, none demonstrated a core difficulty in social relating. Emotion contagion and sharing of affect with an adult during play was noted in all 9 children, as were attempts to imitate and to follow an adult's bid for joint attention. See p 6.
- At T2, 2 years later, the same 3 children were at risk of autism based on the assessments. The clinicians again felt the third child should not receive a diagnosis of ASD for the reasons given earlier. The other two children were still considered to be autistic. None of the other children qualified for an ASD diagnosis.
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- Impairments in stereotyped behaviours/repetitive interests more pronounced in DS autism group but seen in 85.2% of all the children with Down syndrome. More repetitive hand movements in DS only than DS autism group!
- Sensory issues no group differences
- DS autism = lowest cognition & authors ask is it autism?

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Aims of DSEI longitudinal study

- Track changes in the behaviours diagnostic for autism
- Track range of onset of these behaviours and changes with time – to increase our ability to correctly diagnose and support from as early as possible
- 40 children recruited 18 to 42 months in 2008
- Bayley III assessments
- M Chat parent completed screening tool
- Carey Toddler Temperament Scale
- Detailed sign and spoken language records
- Early Support Developmental Journals for babies and children with Down syndrome

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The M Chat – a screening tool

- Designed as an early detection tool
 For TD children 16-30 months
 23 item questionnaire completed by parents
 Six 'critical' questions
 Fail or 'at risk' if you fail:
 2 of the 6 critical questions
 Any 3 items
- M Chat also used in Denver Down syndrome population study by DiGuiseppi et al (2010) Full details and references to M Chat at

http://www2.gsu.edu/~psydlr/Diana L. Robins, Ph.D..html down syndrome education international www.downsed.org

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M Chat results – over 3 years	
• 'Fail' on the critical items (2 or mo	re of 6 items failed)
• 2008: 5	
• 2009: 2	
• 2011: 2	
• 'Fail' on total fail score (3 or more	of 23 items failed)
• 2008: 7 (10)	
• 2009: 3 (4)	
• 2011: 1 (2)	
(n) = number who fail if we leave in wa	Iking and deafness
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M Chat results – ove	M Chat results – over 3 years			
• Total 'fails' each year				
• 2008 : 12 (32.4%)	(15 = 40.5%)			
• 2009 : 5 (13.5%)	(6 = 16.2%)			
• 2011:3 (9%)	(4 = 12%)			
Age issue				
2008: 21 to 42 months - 6	of the 12 below 30 months CA 4 of these 22/23 months			
2009: 33 to 64 months - 1	of the 5 below 42 months			
2011: 60 to 69 months - n	one in younger half of sample			
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Number of children failing	Number of children failing questions by year			
Social initiation/engagement	2008	2009	2011	
Point to request	7 (6)	2 (1)	1 (1)	
*Point to show	6 (5)	3 (2)	2 (2)	
Attract attention to activity	6 (6)	2 (1)	2 (1)	
*Bring objects to show	4 (4)	4 (3)	2 (1)	
*If you point at toy across				
room does child look	5 (5)	0 (0)	2 (2)	
*Does child imitate you (face)	1 (1)	2 (1)	1 (1)	
* indicates the 6 critical items				
(N) Indicates no of 'fail' children with overall 'fail' score				
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		discov	downsed ering potential + transforming lives		
Number of children faili	Number of children failing questions by year				
Other play/behaviours	2008	2009	2011		
Make unusual finger mvmts	8 (6)	2 (1)	1 (0)		
Stare/wander to no purpose	7 (4)	9 (4)	4 (1)		
Does your child pretend	4 (4)	0 (5)	1 (1)		
Not play without fiddling	5 (4)	1 (1)	2 (1)		
Oversensitive to noise	6 (4)	8 (2)	21 (2)		
*Does child respond to name	2 (1)	0	2 (2)		
*Interest in other children	0	0 (0)	0		
* indicates the 6 critical items					
(N) Indicates no of 'fail' children with overall 'fail' score					
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		P " Ives		
Number of children failing questions by year				
Social referencing	2008 2009 2011			
Does your child look at you				
when faced with something	4 (2) 2 (1) 1 (1)			
unfamiliar				
Items which may mislead				
Does your child walk (no)	16 (9) 4 (2) 0			
Have you thought child deaf	8 (2) 7 (2) 7 (2)			
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Child	downsed discovering potential - transforming lives Children 'at risk' in 2011				
Sam3 ch	 Sample now aged 60 to 82 mths (5 to 6:10 years) 3 children – no of items 'failed' each year 				
		2008	2009	2011	
	1 81 mths	4 (1)	3 (1)	6 (1)	
	2 78 mths	5 (2)	3 (2)	7 (3)	
	3 73 mths	6 (3)	4 (2)	6 (4)	
 (n) = number of 'critical' items failed All still fail each year if we ignore 'sensitivity to noise' Not least able and no hearing aids, grommets – one with report of glue at one point 					
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Implications

- The majority of children 'at risk' do not lack core social interactive skills at Time 2 in 2009 (age 2:9-4:6) – they 'fail' on other items
- Diagnosing ASD before 5 years of age unreliable
- Even at time 3 in 2011 this is not typical 'core' autism and we need to consider what this means for interventions
- Our further analysis of the data on many aspects of these children's development and health issues may enable us to clarify what is happening developmentally – especially on the cognitive and communication fronts - for these children and we want to see how the behaviours change over time

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Challenges in ASD diagnosis in Down syndrome

The overlap with levels of intellectual impairment or disability

- Some individuals have not reached the developmental level to show behaviours being assessed as 'missing'
- Generalised damage to brain or 'social brain' (Skuse 2007)
- When ASD symptoms seen in genetic syndromes each has a syndrome specific pattern of these 'autistic traits' – showing similarities and differences and further detail on these are needed (Moss & Howlin 2009)
- No evidence that applying 'autism' therapies works or that they are appropriate (Moss & Howlin 2009)

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Repetitive behaviours - current work

Leekham et al 2007 Typically developing 2 year olds

- suggested 4 sub-scales: unusual sensory interests, repetitive motor movements, rigidity/adherence to routine and preoccupations with restricted patterns of interest.
- These sub-scales closely resembled repetitive behaviour subtypes within the ICD-10 criteria for autism. Repetitive behaviours of every type were frequently reported.
- repetitive behaviours represent a continuum of functioning that extends to the typically developing child population.

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Repetitive behaviours and Dov	wn syndrome
Evans and Gray 2000 – no difference betw syndrome children, mean MA of 5 years of compulsive behaviours. (Age 3 to 21 year behaviours reduced with increasing ment Glenn & Cunningham 2007 – children with higher levels of routine and compulsive li all MAs.	ween TD and Down on repetitive, rs) most tal age. th Down syndrome ike behaviours at
For younger MA and CA children- RCBs p associated with adaptive behaviours	positively
For children with MAs over 5 years and a associated with behaviour problems	ll adults –
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downsed 📳 Positive function of repetitive behaviours Routines universal and likely to have adaptive function • enhance socialisation and simplify complex situations (e.g. in children's repeated play patterns and games) help to reduce and master anxiety, such as bedtime routines which have familiar sequence of actions help to develop a sense of security and control over the environment • routines increase child's feelings of competence, reduce anxiety and free up cognitive capacity all of which foster likelihood child will explore and learn new ideas. 'just right' behaviours - lining up toys, or same plate understanding order and dev. capacity for classification See Glenn and Cunningham 2007 down syndrome education international www.downsed.org

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Repetitive behaviours – current work

- Moss et al. 2009 prevalence of repetitive behaviours in genetic syndromes – useful questionnaire measure.
- Turner, M. (1999) useful review of repetitive behaviour in autism – need to understand the different behaviours within this global term.
- Looks at theories
- reduce arousal,
- operant behaviour,
- impaired mentalising,
- weak central coherence,
- executive function deficit

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Repetitive behaviours – Turner review			
Lowest during periods of social interaction			
 Stereotyped behaviour reduces and adaptive l increase with high levels of structure and incre interpersonal demands 	behaviours eased		
Executive function suggestions			
• Inability to generate novel behaviour may lead of a restricted set of behaviours	d to display		
 Impaired capacity to inhibit behaviour – 'locke line of behaviour 	ed into' one		
Teach appropriate play activities, use activity sch picture prompts, behaviour modification	edules with		
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Sensory Profiles

See Rogers, Hepburn, Wehner 2003

- 7 subscales Short sensory profile (Dunn) = tactile, taste/smell, movement, visual/auditory sensitivities, under responsive/seeks sensation, auditory filtering, low energy/weak
- Sensory reactivity of group with developmental disabilities same as MA matched TD children
- Children with autism or fragile X higher scores Chen et al. 2009 – repetitive behaviours and sensory processing, used Short Sensory Profile in autism. Significant correlations between the two – needs to be explored further.

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Conclusions

ASD and Down syndrome can co-exist but social impairment less – not typical

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- Currently over-diagnosed need refined criteria
 Family history may help genetics
- Tanniy history may help genetics
- Repetitive behaviours, sensory issues not ASD
- Confounded with severe cognitive impairments and brain damage
- Detailed longitudinal studies needed to trace needs and outcomes
- Careful evaluations of interventions needed no
 evidence typical autism approaches will work

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Conclusions	Interventions at present
 Another group – more repetitive behaviours and sensory issues than typical in DS or last longer?? Caution – these are common in DS 	Autism intervention literature – see reviews, Howlin, Magiati & Chapman, 2009 and Kasari, Freeman et al 2005 Evidence of effectiveness for
 May be developmentally appropriate and actually aid progress – up to 6-8 year mental age Reduce with cognitive and play progress – but child with 	 Behavioural approaches, highly structured teaching Teaching joint attention and play skills – see Kasari et al 2010 and Aldred et al 2004
 DS may get 'stuck' – all stages longer drawn out Longitudinal studies needed for both repetitive and sensory behaviours 	 Down syndrome – no studies yet but we would recommend teaching communication - requesting, pointing, teaching signs and words
 See recent Moss and Warner studies in reference list – confirm not typical autism 	 teaching problem solving and play skills Play partners – to scaffold play and learning
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References – autism and Down syndrome

Review article

Buckley, S Autism and Down syndrome (2005) Down Syndrome News and Update 4 (4) 114-120 . Online at

http://www.down-syndrome.org/updates/341/updates-341.pdf Colorado studies

- DiGuiseppi, C, Hepburn, S, Davis, J, Fidler, D et al (2010) Screening for ASD in children with Down syndrome : Population prevalence and screening test characteristics. Journal of Developmental & Behavioral Pediatrics, 31(3)181-191
- Hepburn, S., Philofsky, A., Fidler, D & Rogers, S (2007) Autism symptoms in toddlers with Down syndrome: a descriptive study. J of Applied Research in Intellectual Disabilities 21 (1) 48-57.
- Lowenthal, R, Paula, C.S. Schwartzman, J.S et al. (2007) Presence of Pervasive Developmental Disorder in Down syndrome. Journal of Autism and Developmental Disorders 37, 1394-1395.
 down syndrome education international www.downsed.org



References – Down syndrome

- Capone, G., Goyal, P, et al. (2006) Neurobehavioural disorders in children, adolescents and young adults with Down syndrome. Am J Medical Genetics 142C: 158-172.
- Glenn, S & Cunningham, C. (2007) Typical or pathological? Routinised and compulsive-like behaviours in children and young people with Down syndrome. Intellectual and Developmental Disabilities 45, 246-256.
- Evans, D,W & Gray, F.L. (2000) Compulsive-like behavior in individuals with Down syndrome: its relation to mental age, adaptive and maladaptive behavior. Child Development, 71, 288-300.
- Reddy, V., Williams, E. & Vaughan, A (2001) Sharing laughter: the humour of preschool children with Down syndrome. Down Syndrome Research and Practice, 7, 125-128.
- Moss, J. Howlin, P. (2009) Autism spectrum disorders in genetic syndromes: implications for diagnosis, intervention and understanding the wider ASD population. J of Intell Disability Research. 53 (1) 852-873.
 down syndrome education international www.downsed.org



d	potential + transforming lives
References - interventions	Re
 Howlin, P., Magiati, I. & Charman, T. (2009) Systematic re intensive behavioural interventions for children with aut Dev Dis. 114, 23-41 	view of early • , ism. Am J Int
 Kasari, C., Freeman, S. et al (2005) Early Intervention for in autism. Clin Neuropsychiatry, 2, 382-388. 	core deficits
 Eikeseth, S (2008) Outcome of comprehensive psycho- e interventions for young children with autism. Research in Disabilities, 30, 158-178. 	educational n Dev <u>htt</u>
 Kasari, C, Gulsrud, A et al (2010) Randomised controlled mediated joint engagement intervention for toddlers wi Autism Dev Disord. 40,1045-1056. 	caregiver <u>htt</u> ith autism. J Cur
 Aldred, C., Green, J. & Adams, C. (2004) A new social con intervention for children with autism: pilot randomised of treatment study suggesting effectiveness. J Child Psycho 1420-1430. 	nmunication controlled ol Psych 45,

down syndrome education international

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downsed 📳 ferences and resources Autism and Developmental Delays in Young Children: The Responsive Teaching Curriculum for Parents and Professionals. Mahoney & MacDonald, 2007). http://w w.responsiveteaching.ord Medlen, J. (2008) Creating support for families of children with a codiagnosis: a survey. Down Syndrome Research and Practice 13 in press and online at ://www.down-syndrome.org/reviews/2071/ ://www.disabilitysolutions.org/ rent questions in autism research – is it one disorder? Skuse, D. H. (2007) Rethinking the nature of genetic vulnerability to autistic spectrum disorders. Trends in Genetics. 23 (98) Happe, F, Ronald, A, Plomin, R (2006) Time to give up on a single explanation for autism. Nature Neuroscience, 9, 1210 – 1220. down syndrome education international www.downsed.org

discovering potential - transforming bes References and resources Warner, G., Moss, J., Smith, P. & Howlin, P. (2014) Autism Characteristics and Behavioural Disturbances in ~ 500 Children with Down's Syndrome in England and Wales. *Autism Research*, 7, pages 433–441. Moss, J., Richards, C., Nelson, L.& Oliver, C. (2013) Prevalence of autism spectrum disorder symptomatology and related behavioural characteristics in individuals with Down syndrome. *Autism*, 17, 390-404. Useful practical book Margaret Froehlke, R.N. & Robin Zaborek (Eds) (2013) *When Down Syndrome and Autism Intersect*. Woodbine House.

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