

Centre for
Applied Autism
Research (CAAR)



UNIVERSITY OF
BATH

Professor Mark Brosnan



Autism summer school: go.bath.ac.uk/ubass

Autism employment school: go.bath.ac.uk/bessa

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Digital Autism: Participatory design and the autistic community



Inclusion or intervention

Being digital

Social media

Robots

Digital Social Stories

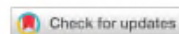
Finding the right digital technology

Evidence-based decisions

The current illusion of educational inclusion

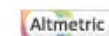
[Liz Pellicano, Sven Bölte, Aubyn Stahmer,](#)

First Published March 30, 2018 | Editorial |



<https://doi.org/10.1177/1362361318766166>

[Article information](#) ▾



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A growing number of countries and organizations have in the last decade declared their support for the “inclusion” of all individuals in education, responding in part to the recommendations of the autistic advocacy and neurodiversity movements, and the United Nations convention on the rights of persons with disabilities.¹ Article 24 of the UN convention supports the right of every student, including those on the autism spectrum, to access inclusive, quality, free education in their community with the necessary support to help enable them to reach their potential. Inclusion in this regard should not be confused with integration, which concentrates on the capacities of an individual to adapt to a given mainstream. Instead, inclusion demands that we change the existing educational environment in order to respond to the diverse needs of all learners.

2018 PEW survey of US 743 teens (aged 13-17)

- 95% have a smartphone



Digital Immigrants



- Adopters of the web technologies
- Prefer to talk in person
- Logical learners
- Focusing on one task at a time
- Prefer to have interaction with one or few people rather than many
- Get info from traditional news sites

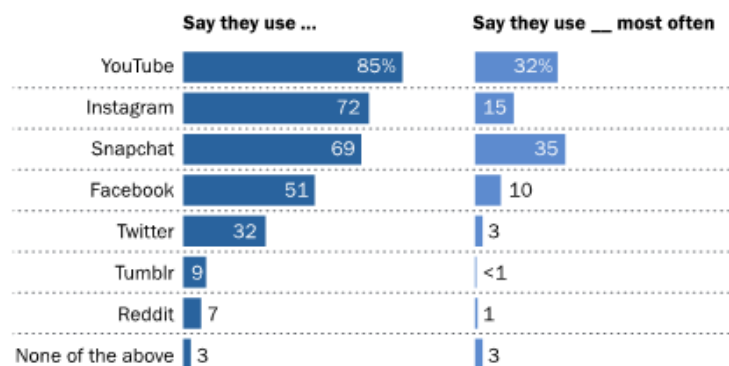
Digital Natives



- Born during or after the digital age
- Always on, attached to a phone or other device
- Intuitive learners
- Multitask and rapidly task-switch
- Extremely social
- Multimedia oriented

YouTube, Instagram and Snapchat are the most popular online platforms among teens

% of U.S. teens who ...



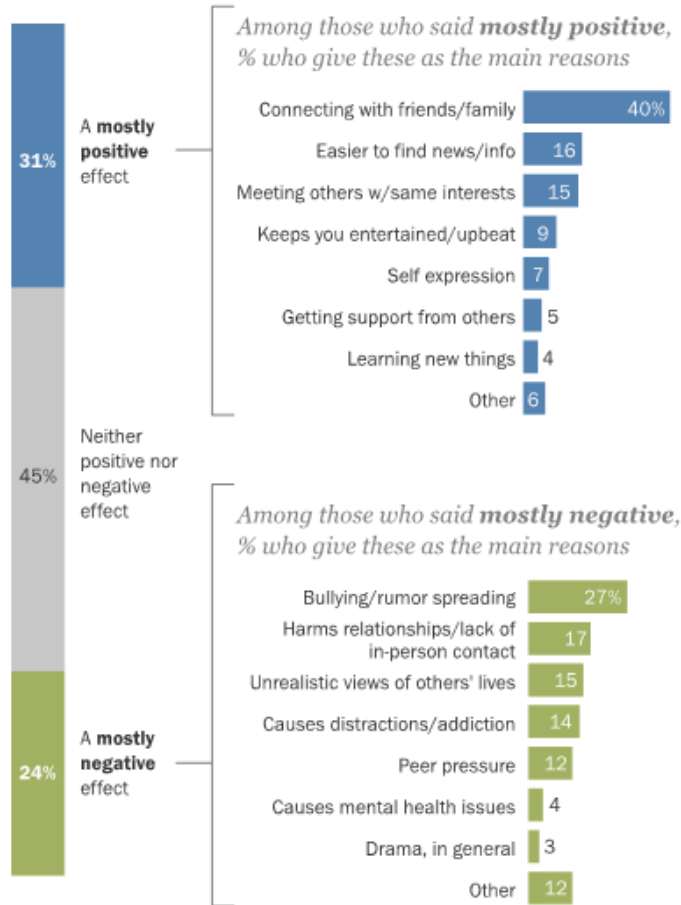
45% of teens say they're online almost constantly

% of U.S. teens who say they use the internet, either on a computer or a cellphone ...



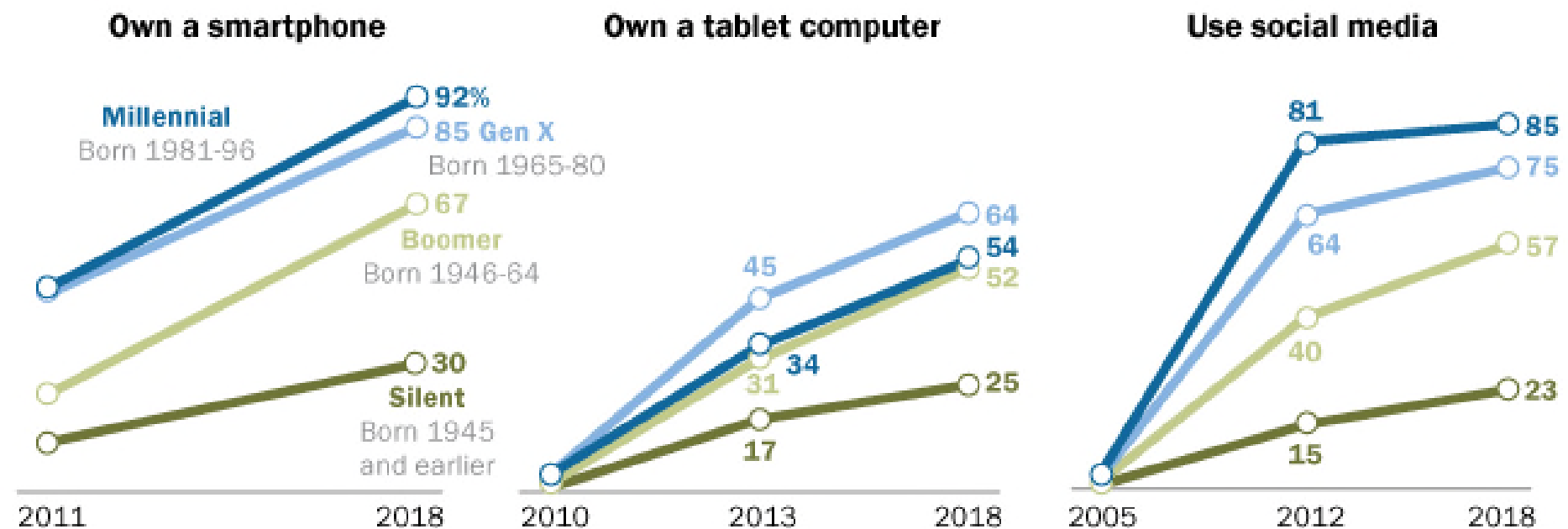
Teens have mixed views on social media's effect on people their age; many say it helps them connect with others, some express concerns about bullying

% of U.S. teens who say social media has had ___ on people their own age



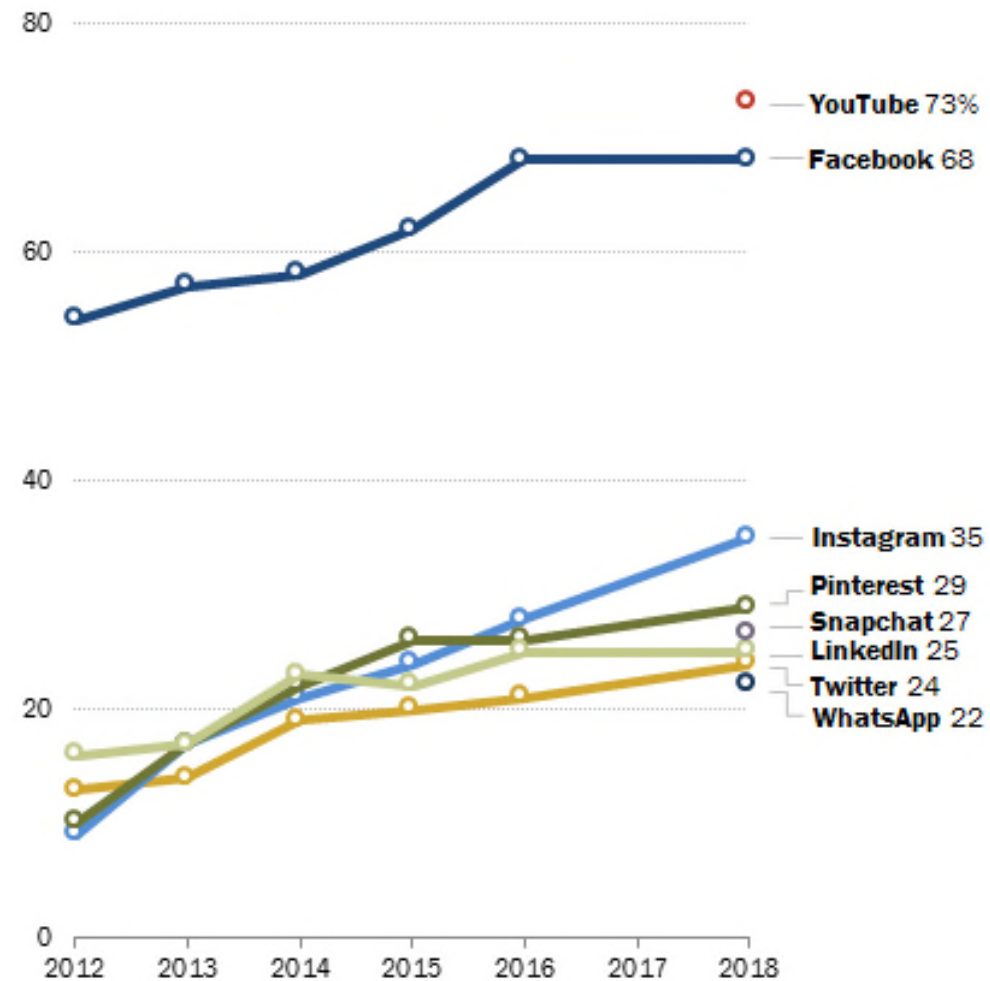
Millennials lead on some technology adoption measures, but Boomers and Gen Xers are also heavy adopters

% of U.S. adults in each generation who say they ...

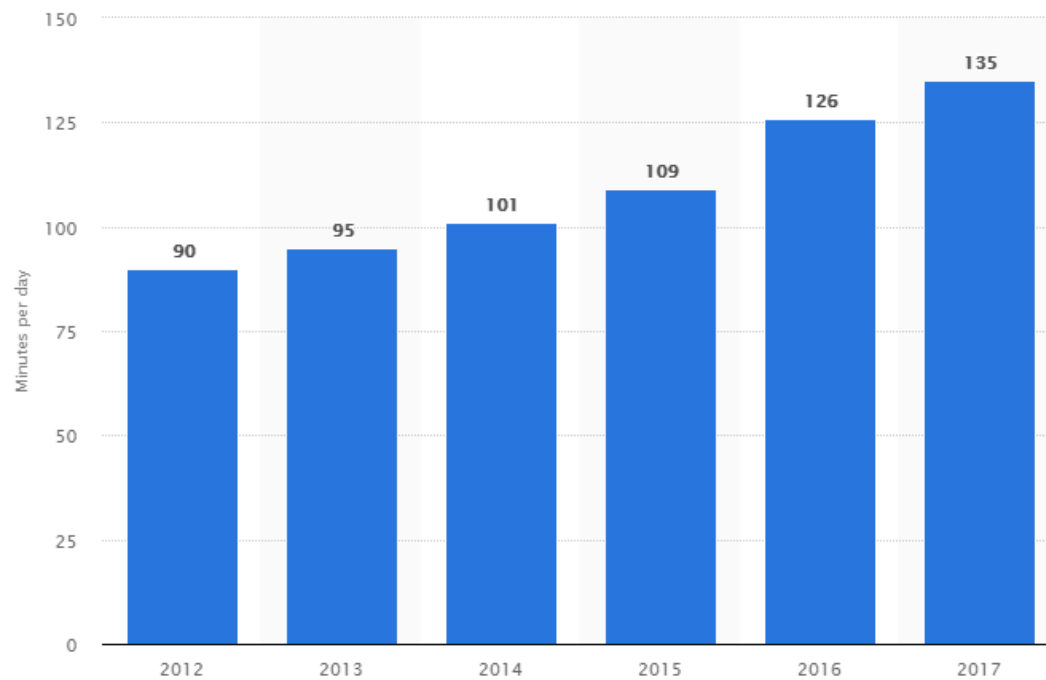


Majority of Americans now use Facebook, YouTube

% of U.S. adults who say they use the following social media sites online or on their cellphone



Minutes per day on social media globally



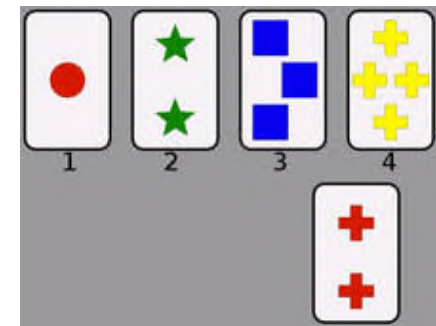
Digital autism: Inclusion and intervention





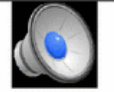
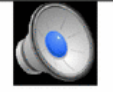
- Within autism research and practice, autism is often characterised as a relative weakness in social processing (with other humans) and relative strengths in non-social processing (with the physical world: e.g. Baron-Cohen et al., 2001; 2005; Klin et al., 2000; 2009).
- Intervention for autism can build upon these relative strengths to address these relative weaknesses.
- Autistic people may benefit from using digital technology.



Digital Autism?

- Sally-Anne Task (Swettenham et al., 1996)
- Wisconsin Card Sorting Test (Ozonoff, 1995)
- Emotion recognition (Brosnan et al., 2015)



					
Human dynamic	Animated dynamic	Human static	Animated static	Human auditory	Animated auditory

Using technology - guidance for parents



Why use technology?

When using technology, children on the autism spectrum:

- can learn new skills
- are often more motivated
- often show better concentration
- often initiate more contact with those around them, eg talking to their peers or showing teachers and parents what they have done
- can be an expert, make choices and direct their own learning and play
- might find ways to regulate their well-being – watching the same YouTube clip over and over might seem pointless, but it might be helping your child to manage their anxiety or just relax.

Using technology - guidance for parents



The limitations of technology

- Technology is not great for developing generalised skills.
- An autistic child might be good at spelling in an app but not with pen and paper.
- Children using technology can direct their own learning, but they might not always direct it where you would like.
- Repetitive playing of the same game will give you some peace and quiet and provide valuable downtime for your child, but it probably isn't contributing to their learning.

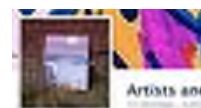
For this reason, technology should always be used as just one in a range of approaches to contribute to your child's well-being, learning and development.

Mazurek (2013) 108 autistic adults (18+) from the USA

	Mean (<i>SD</i>)	Range
Social network hours per day	3.19 (3.32)	0–15
Social network days per week	5.0 (2.37)	0–7
Social network friends	219.62 (244.8)	0–1100
Percentage of social network friends met in person	56.7 (36.8)	0–100%

Category	Percentage of social media users (%)	Sample responses
Social Connection	64.9	<i>"To keep in touch with friends"</i>
		<i>"To connect with people"</i>
		<i>"To interact with others without the rejection and brush offs"</i>
Entertainment/Information	22.1	<i>"Play games"</i>
		<i>"Find music"</i>
Other	5.2	<i>"Don't know"</i>
Business	3.9	<i>"My part-time job involves marketing with social media"</i>
Family	3.9	<i>"To keep in touch with family"</i>

Facebook groups/ communities

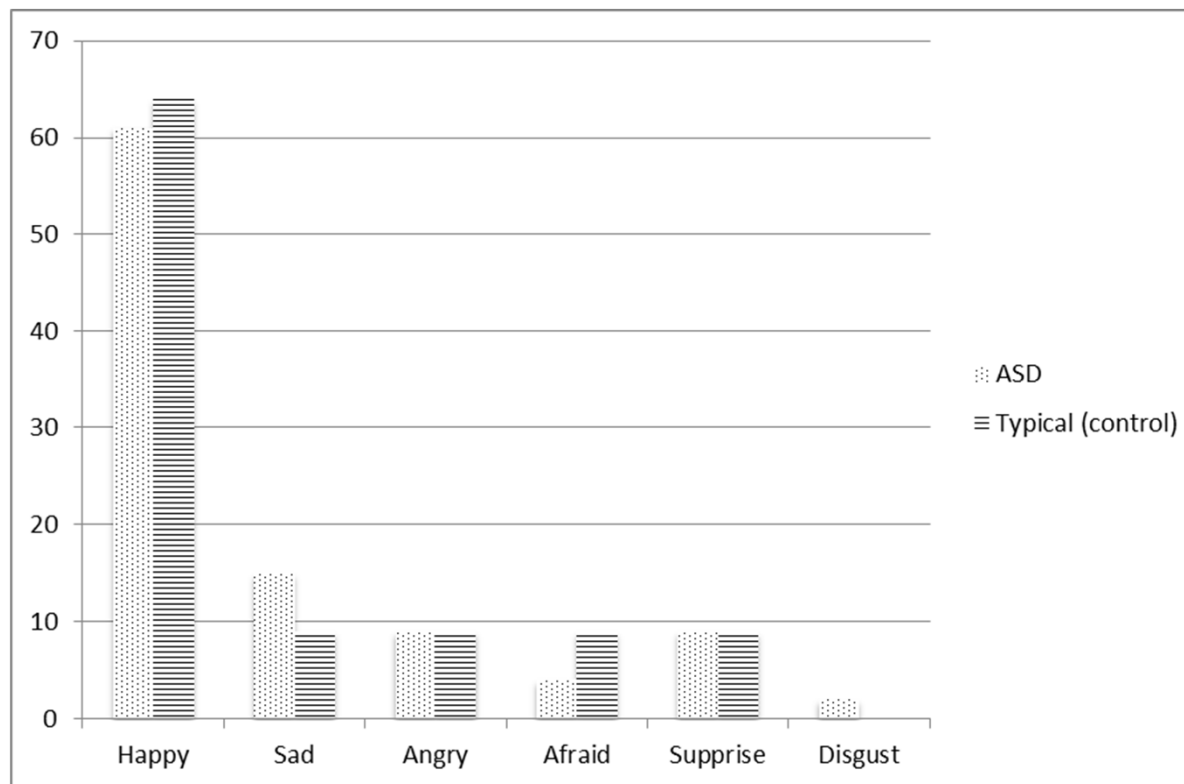


Autism Facebook study (Brosnan and Gavin, 2015)

- Autistic group, 45 active members, 108 posts, 48% contained emotion words
- Cancer group, 41 active members, 102 posts, 49% contained emotion words



Proportions of emotions expressed

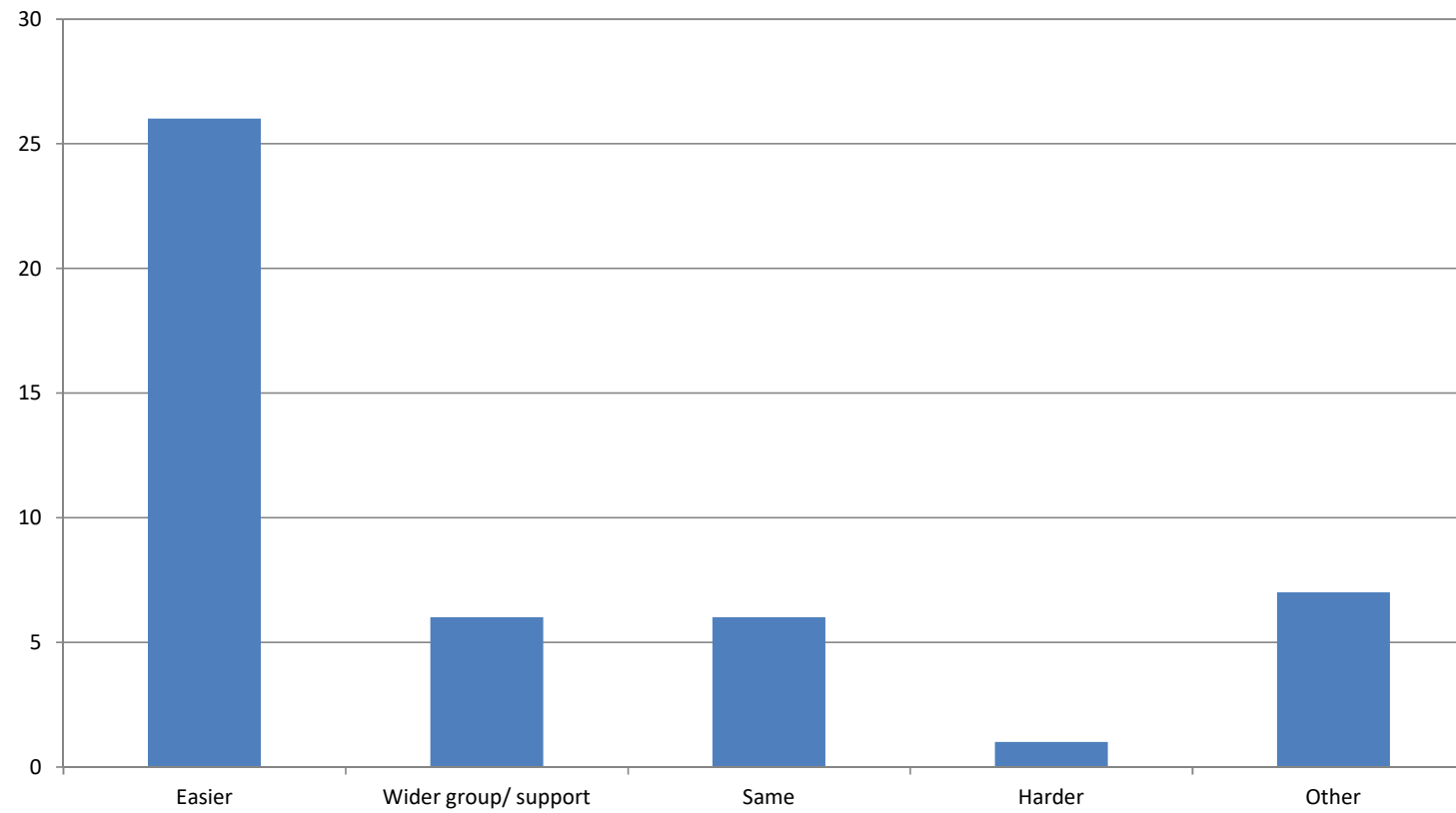


Question:

- How has your autism changed since having the freedom to talk to people online instead of face to face?
- 46 respondents, self identifying as having ASD.



Internet compared to face-to-face



Easier

- Although I've learned to talk to people face-to-face, it's still ten times easier and more comfortable to talk on-line.
- I normally can talk to people on facebook but don't face to face most of the time...

Social cues

- When talking online I feel so much more ease and a lot less pressure to understand social cues.
- It is easier to talk behind a screen, because I don't have to read any gestures, just smileys. :-)

Timing

- On-line is better for the same reason why I don't use a telephone. I need time to think through my replies before typing or talking. On-line gives me the freedom to do that.
- I like the online stuff because I have the freedom to take the time I need to respond, I can read better than I listen, so I misunderstand less...

But, generalising...

- ...It's much easier for me to talk online, email, text. Problem is, I get too comfortable with it and it makes it harder for me to people face to face.
- ...it's better to talk online...but the internet does not help in learning how to deal with people face to face – and for me at least doesn't make me feel less lonely.
- Yes it's easier to socialize online, though I still have a lot of trouble in everyday life, I keep very much to myself offline...

Ward et al. (2018)

- 106 autistic adults
- 51% reported using Facebook, 19% used Twitter
- Facebook users reported greater happiness than nonusers.
- No differences were found between Twitter users and nonusers.

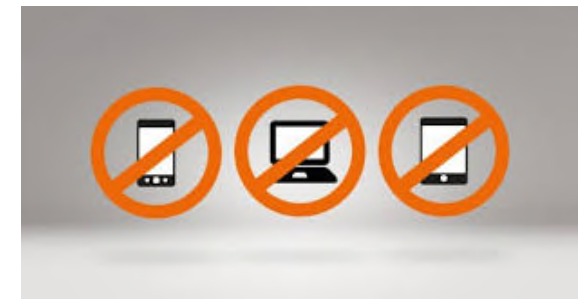


Autistic culture online (Davidson, 2008)

- Of those autistics on the internet who discuss its use, we all agree that its an amazing tool
- We've already got our own country. It's a cybercountry called the Internet, and it's perfect
- The Internet provides at least some of those on the spectrum with a means to develop and maintain social relationships
- The Internet has begun to challenge stereotypes surrounding the competence of people with autism to communicate effectively
- The use of the Internet by individuals with autism and related conditions is part of a movement of self-advocacy

Digital Risks

- Compulsive use
- Cyberbullying
- Gaming addiction
- Hacking
- May be no different in autism (Shane-Simpson et al., 2016)





- The positive thing about computers is that serendipity has meant that they are potentially the greatest ever asset for autistic people.
- They open up a new world of potential: friends, opportunity and employment.
- It is perhaps the non-autistic world who has concrete thinking and needs to accept change in terms of redefining friends and socialising to include social media.
- The internet will not disappear so everyone must work together to make it infinitely positive and beneficial for autistic people. This is their great opportunity for choice and a more level playing field!

Robots

- The goal of Socially Assistive Robots is to create close and effective interaction with a human user for the purpose of giving assistance and achieving measurable progress in convalescence, rehabilitation, learning, etc. (Feil-Seifer & Mataric, 2005)
- 'there is the possibility to create a new paradigm for the treatment of ASD' (Cho & Ahn, 2016; also Feil-Seifer & Mataric, 2007; 2008; Scassellati et al., 2012)

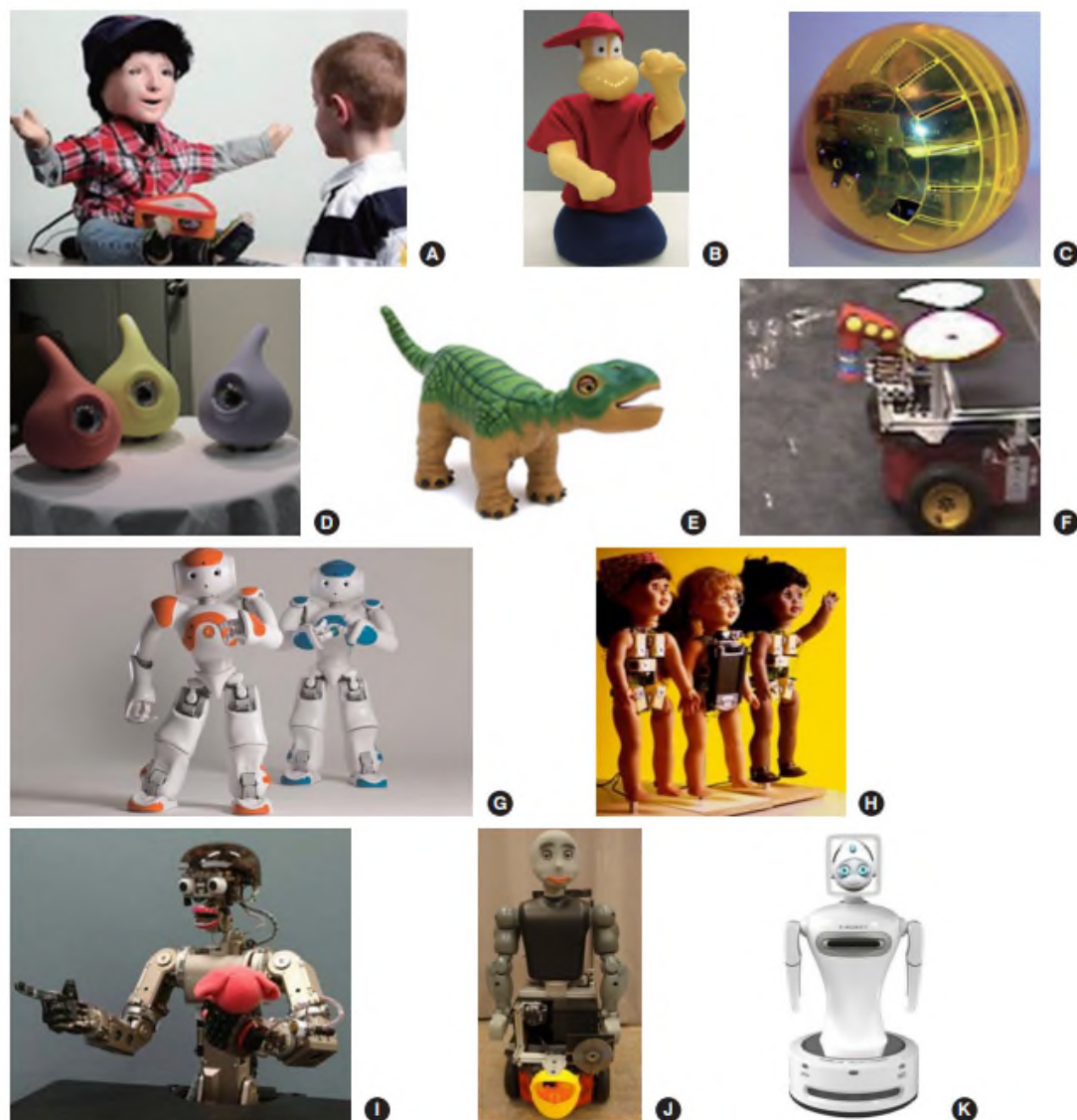
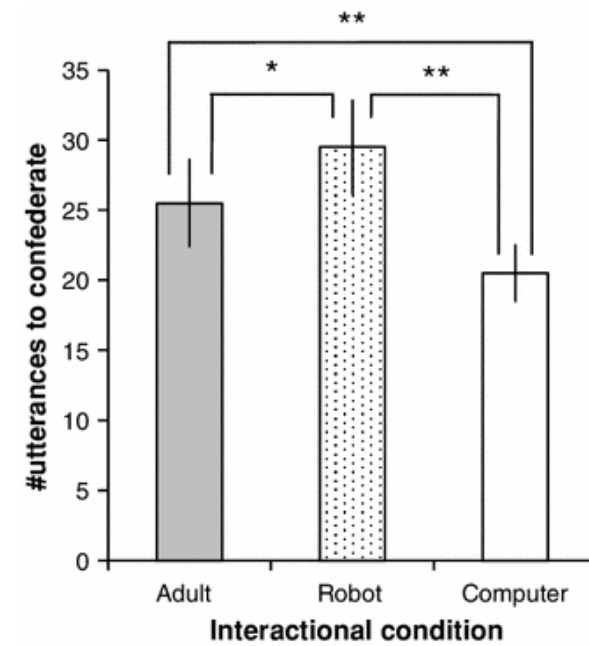
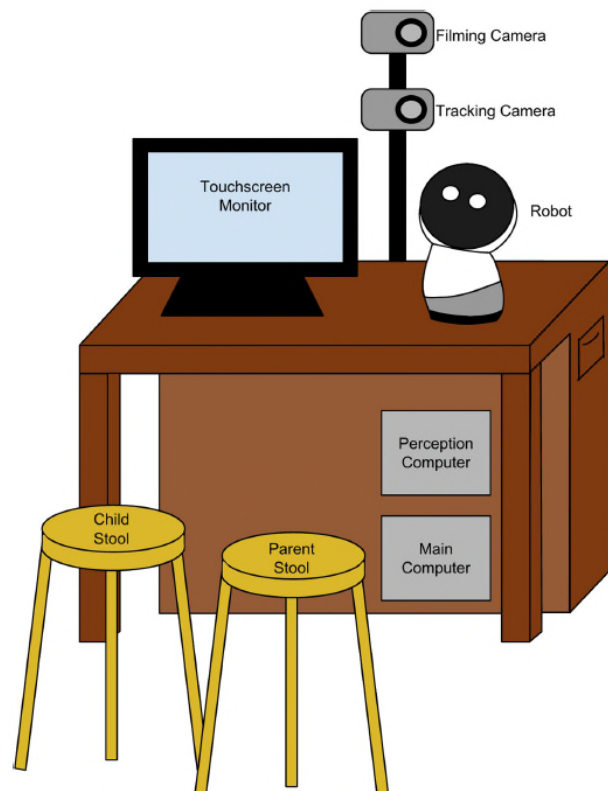


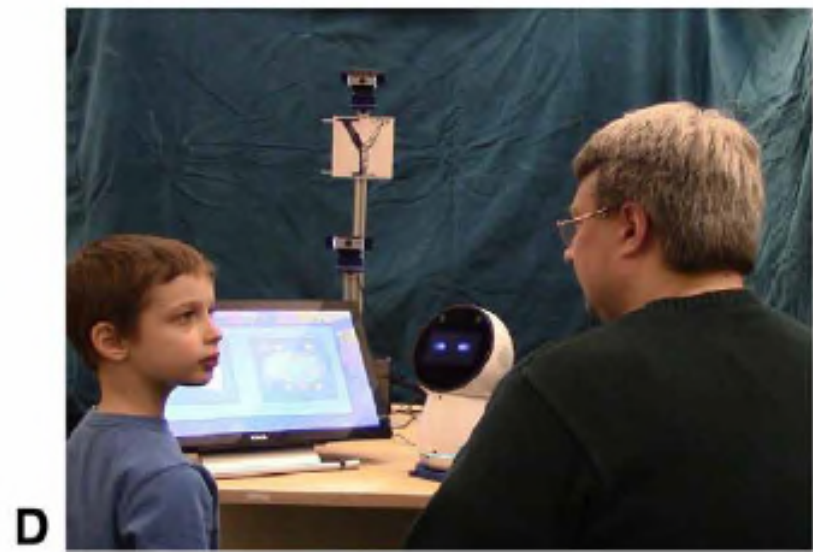
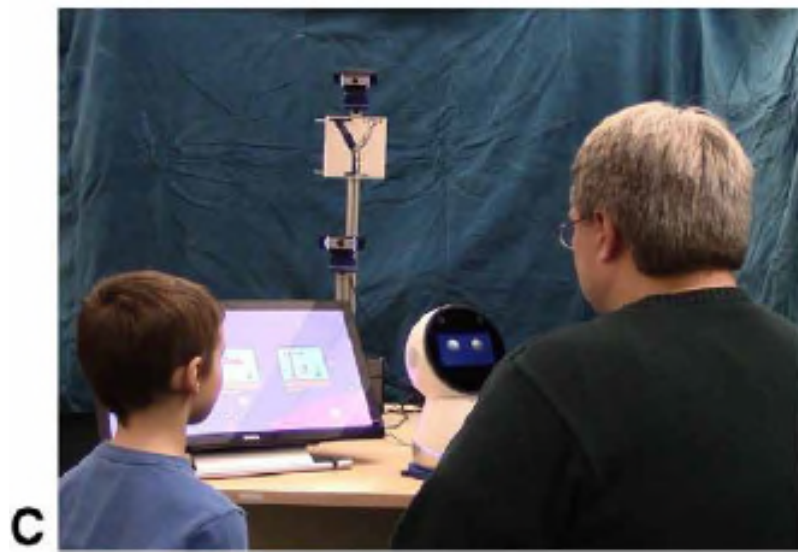
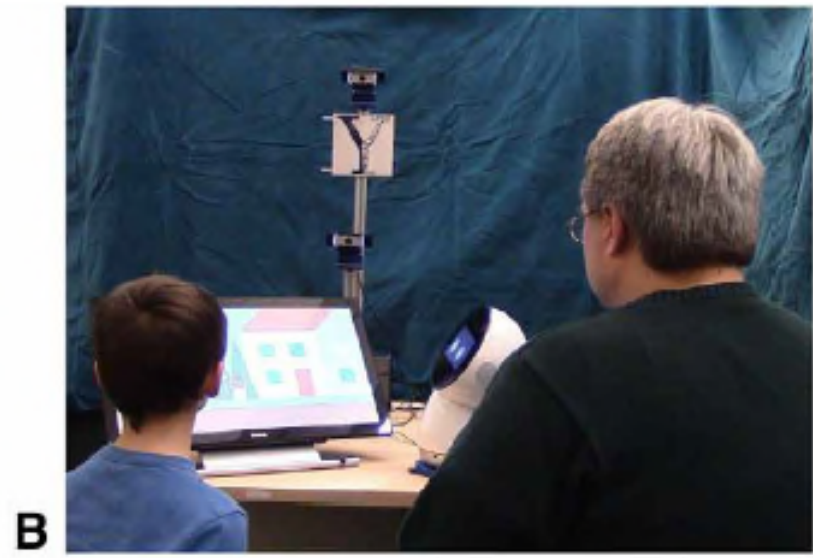
Fig. 2. Robots used in autism therapy. (A) Kaspar (courtesy of the Adaptive Systems Research Group, University of Hertfordshire, UK), (B) Tito (courtesy of F. Michaud), (C) Roball (courtesy of F. Michaud), (D) Muu (courtesy of M. Okada, Toyohashi University of Technology, Japan), (E) Pleo (courtesy of Innvo Labs Corporation), (F) Bubble blower (courtesy of D. Feil-Seifer), (G) Nao (courtesy of Aldebaran), (H) Robota (courtesy of A. Billard), (I) Infanoid (courtesy of H. Kozima), (J) Bandit (courtesy of M. Mataric, USC, USA), and (K) RoboJang (courtesy of Robocare Co., Ltd.).

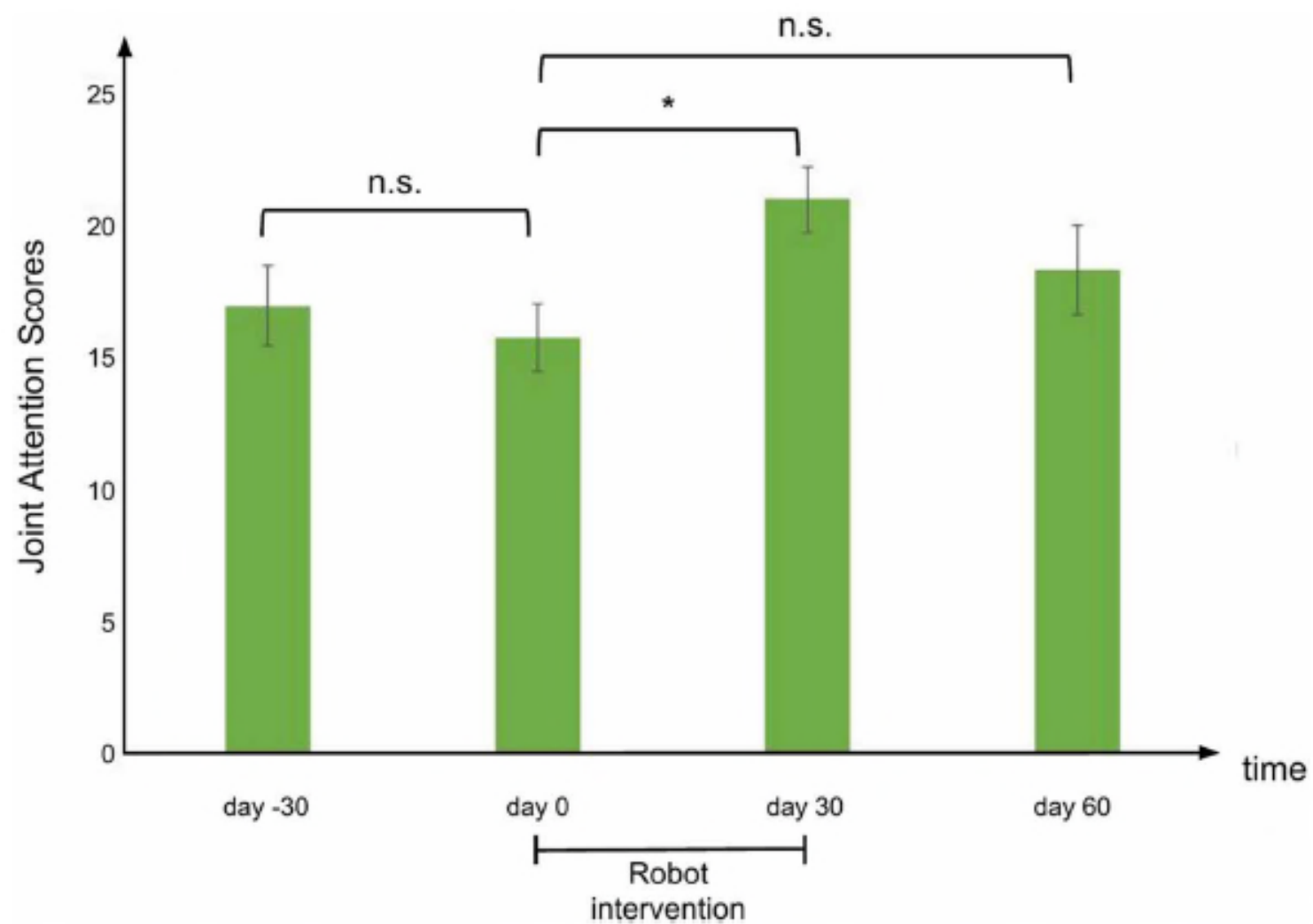
Kim et al. (2012)



Scassellati et al. (2018) – at home







Kumazaki et al. (2018) found that autistic people preferred and disclosed more to 'visually simple' robots compared to highly human-like robots or actual humans.



Inclusion or intervention?

Robotics

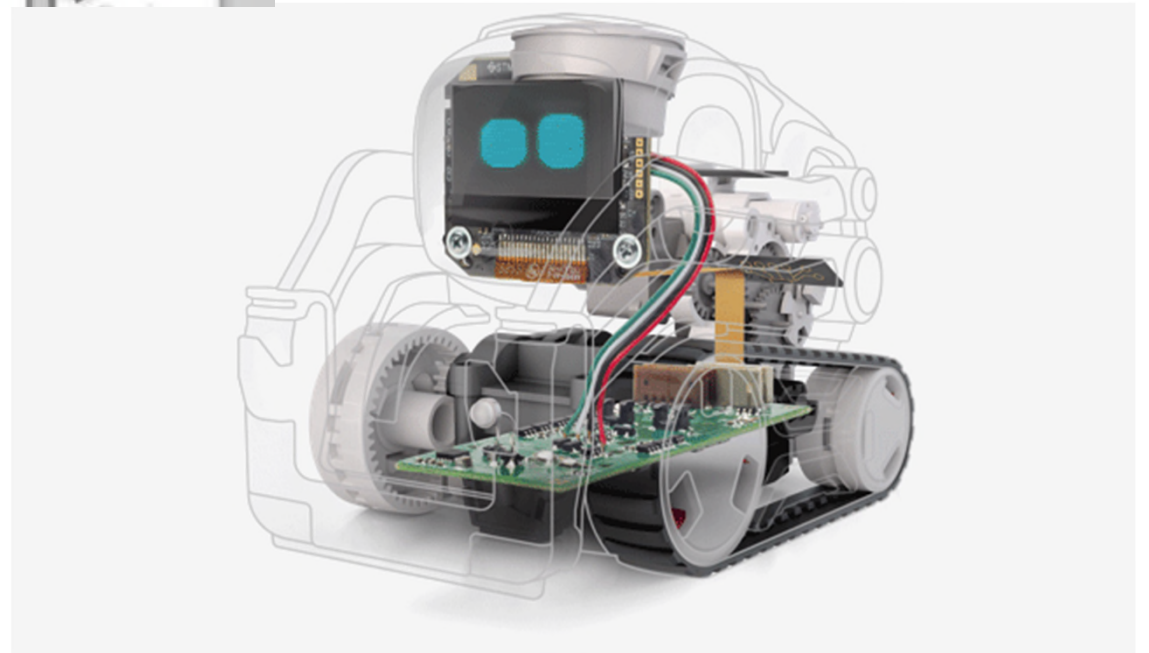
The questionable ethics of treating autistic children with robots

New robot therapies are based on the assumption that autistic behaviour is robotic. Critics argue that this is a fundamental misunderstanding of the condition.



Drawn: Andrea Lucarelli

Damion Milton in Wired (2018):
"Why machines? Are machines the best things to teach social interaction to people?" he says.
"I'm not so sure." He suggests that instead of robots being designed to fix how people with autism behave, perhaps such research can be used to help everyone else understand better what it's like to be autistic, building empathy in both directions.



anki®

Making the future together: Shaping autism research through meaningful participation (Fletcher-Watson et al., 2018)

- By participatory research, we mean incorporating the views of autistic people and their allies about what research gets done, how it is done and how it is implemented

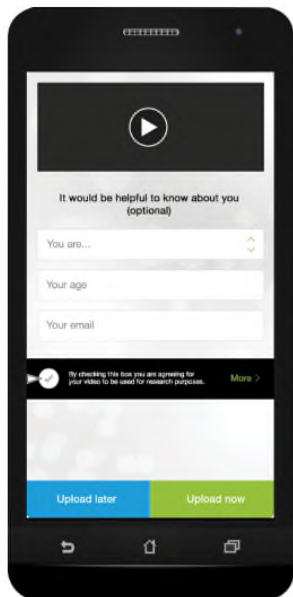


Participatory Design (PD)

- PD involves the people who will use a technology in the process of designing, developing and evaluating the technology (Brosnan et al., 2016).
- PD has the potential to enable digital empowerment and social inclusion of those involved and can be an effective forum for developing interdisciplinary research and engaging with wider communities, such as the autistic community (Brosnan et al., 2016).
- Digital Bubbles: <http://digitalbubbles.org.uk/>

www.ascme-it.org.uk

If there was one new technology to help people with autism, what would it be?



The **ASCme.IT** app allows people with Autism Spectrum Conditions – as well as families, teachers, professionals, and anyone who supports someone with autism – to share their ideas on what kind of new technology could help people with autism. Through the app you can upload a one minute video explaining your idea. It's simple, **easy to use**, and the ideas will be shared with researchers so that new developments in digital technologies for autism can be matched to support the needs of users.

If you've ever had a moment where you wished there was a useful technology out there to help you, or someone else, with something related to autism, this is the chance to get your idea heard!

Have a look at the videos other people have made to see examples and inspire your own ideas. If you don't want to share your video on the website, that's fine – your ideas will still be shared with researchers and developers who are looking to put some of them into action.

Download the app now or, if you'd prefer not to use the app, click [here](#) to send your idea to us directly.

Project partners

UNIVERSITY OF
Southampton

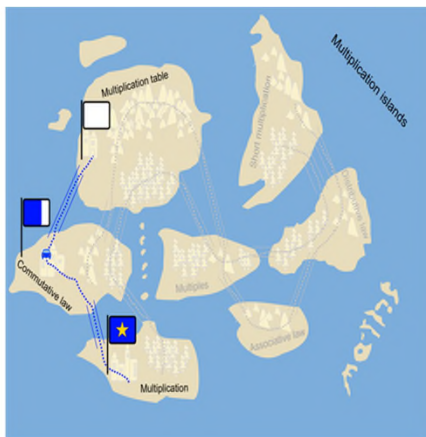
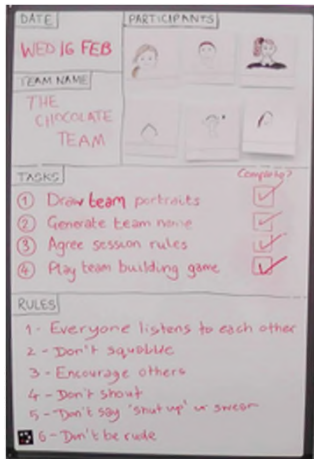
US
University of Sussex



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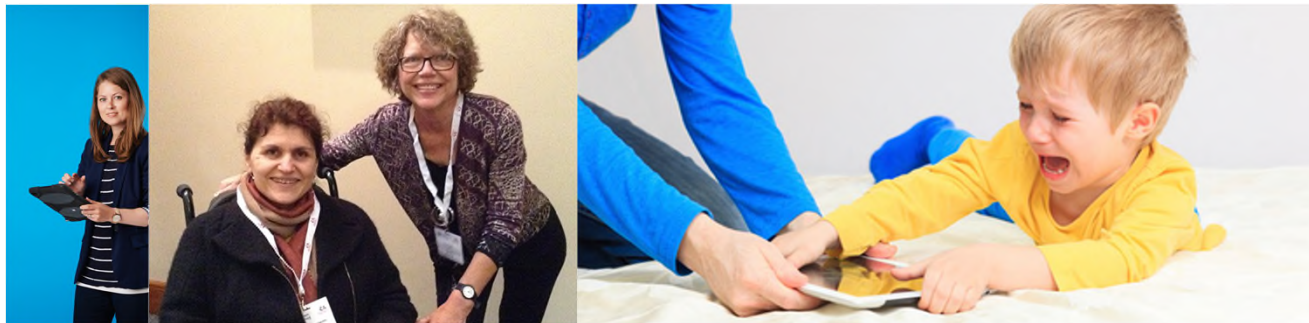


Developing IDEAS: Supporting children with autism within a participatory design team (Benton et al., 2012; 2013)




Digital Social Stories

- IDEAS adapted to develop an iPad programme to address challenging behaviour in autism.
- Participatory design with children with autism and their parents and teachers.



The Leverhulme Trust


Social Stories...







When I'm Frustrated

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by: Sasha Hallagan






Sometimes I get really frustrated and mad.



I want to throw things, hit people, yell, and cry.


If I act that way I can get in trouble and people won't want to be my friend.



When I am frustrated, I need to take a deep breath. I can ask for a break, take a walk, get a drink of water, or put my head down.



I tell people around me, "I am frustrated right now." I use my words. Soon I will feel better.





Sometimes my friends are playing a game without me.



I want to play too but I shouldn't just go and start playing.

I can walk over and ask, "Can I play too?" I need to wait for them to answer.

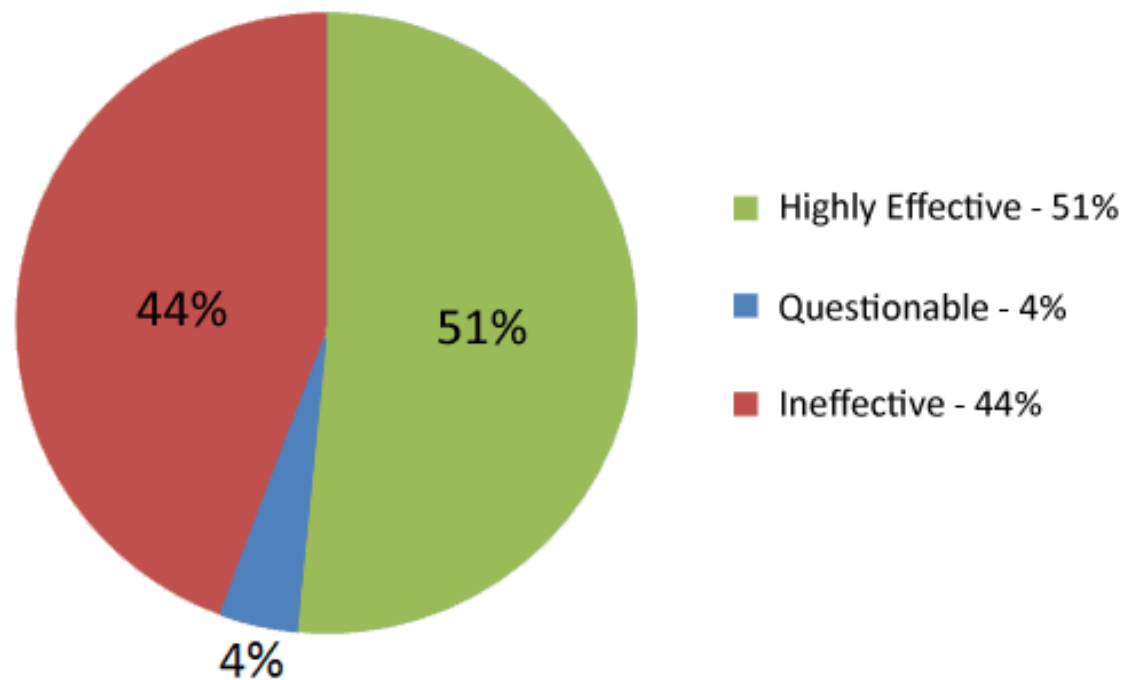
If they say yes - I say "thanks" and start playing. If they say no - I say "no problem, maybe next time."

My friends are happy when I ask if I can play. We can have fun!

Effective at achieving their goal?

**Effectiveness of Social Stories from
Kokina and Kern's 2010 Meta-Analysis**

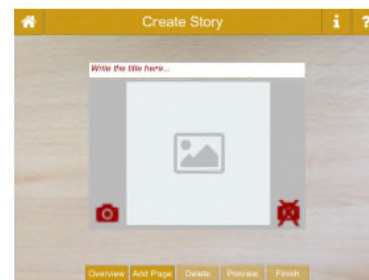
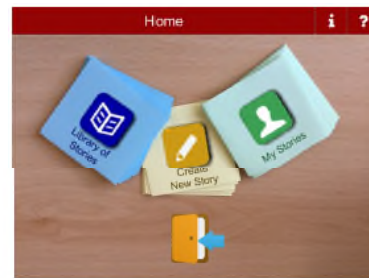


132 parents and teachers (Smith et al., under review)

- Social stories are widely used and acceptable
- Research has focussed upon reducing challenging behaviours

Goal of Social Stories	Research studies	Practitioners	Parents
Increase appropriate behaviours	36 %	89.0 %	61.8 %
Reduce inappropriate behaviours	50 %	79.6 %	55.9 %
Teach academic/functional skills	5 %	29.1 %	29.4 %
Assist in transitions, novel situations, reduce anxiety	9 %	89.3 %	85.3 %

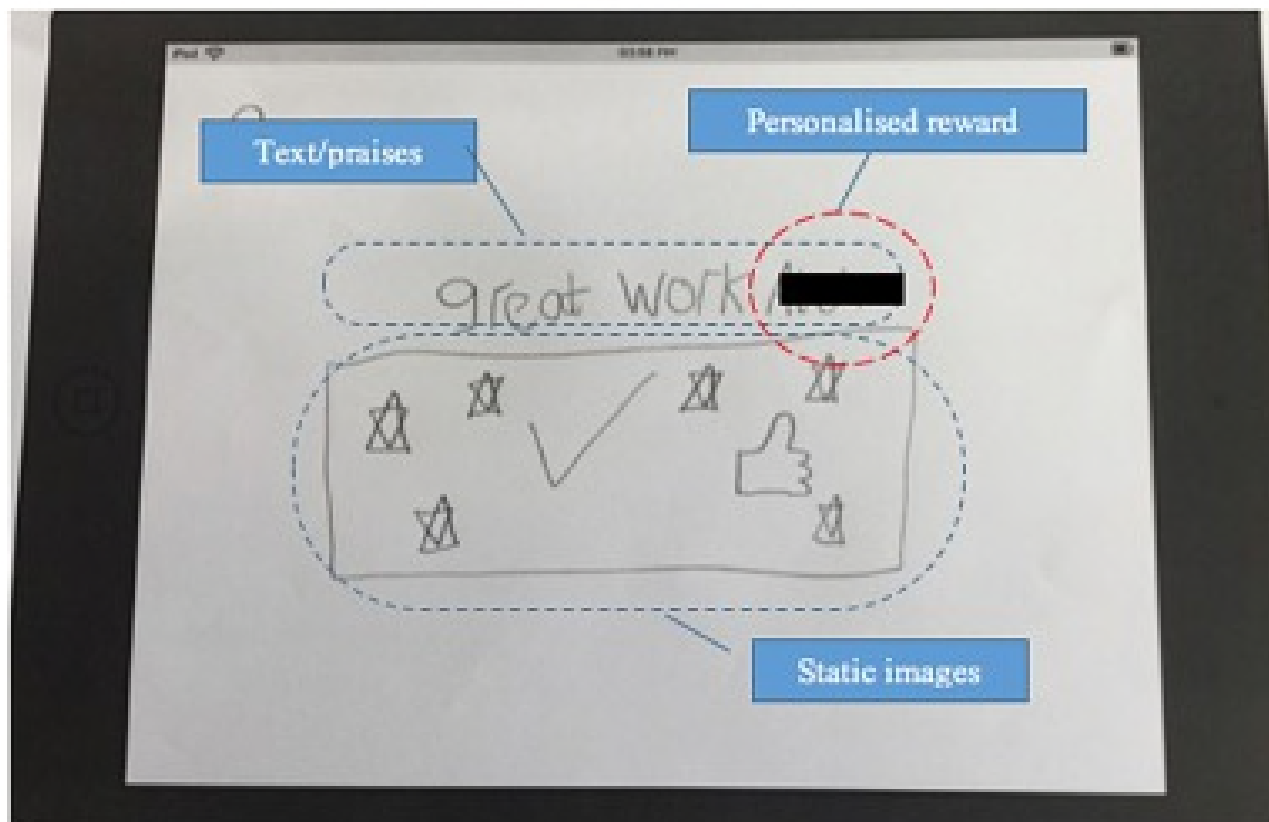
Digital social stories



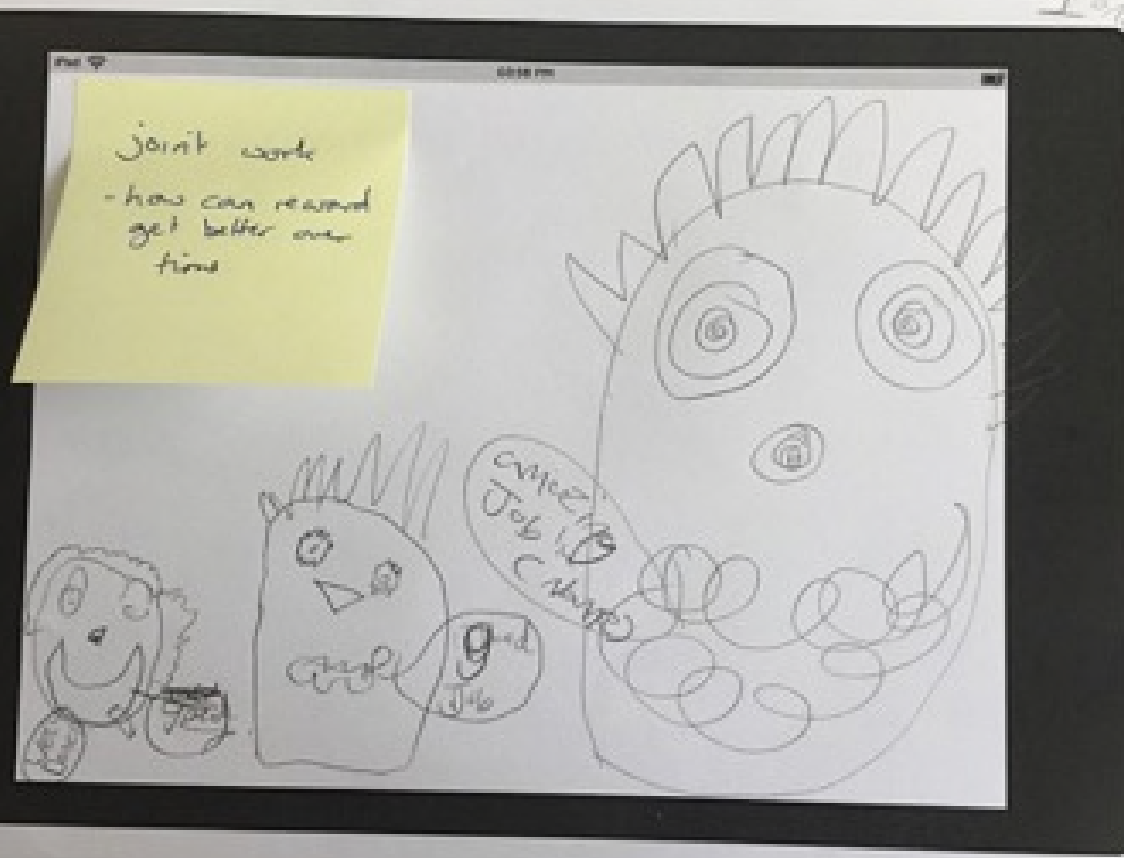
<http://go.bath.ac.uk/social-stories>

Constantin et al. (2017)

Part.	Age	Gender	Diagnosis	Communication Level Speaking (S)/Listening (L)
G1_1	12	F	ASD, ID	P8/P6
G1_2	13	M	ASD, ID	P3/P4
G1_3	11	M	ASD, ID	P8/P6
G1_4	12	F	ASD, ID	P3/P4
G2_1	13	M	ASD	2C*
G2_2	12	M	ASD	2C*
G2_3	13	F	ASD	2B*
G2_4	13	M	ASD	2C*
G3_1	12	M	ID	2B*
G3_2	13	M	ID	1A*
G3_3	13	F	ID	2C*
G3_4	12	M	ID	2C*



10%



Joint work

- how can reward
get better over
time

Worksheet 2

Level 5 (top)

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Level 4

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Level 3

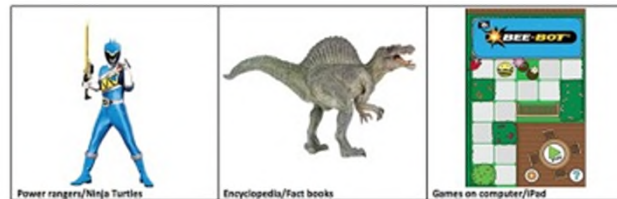
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Level 2

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Level 1

add your favourite sound
here



Certificate



Sound (e.g. roar, applauds)



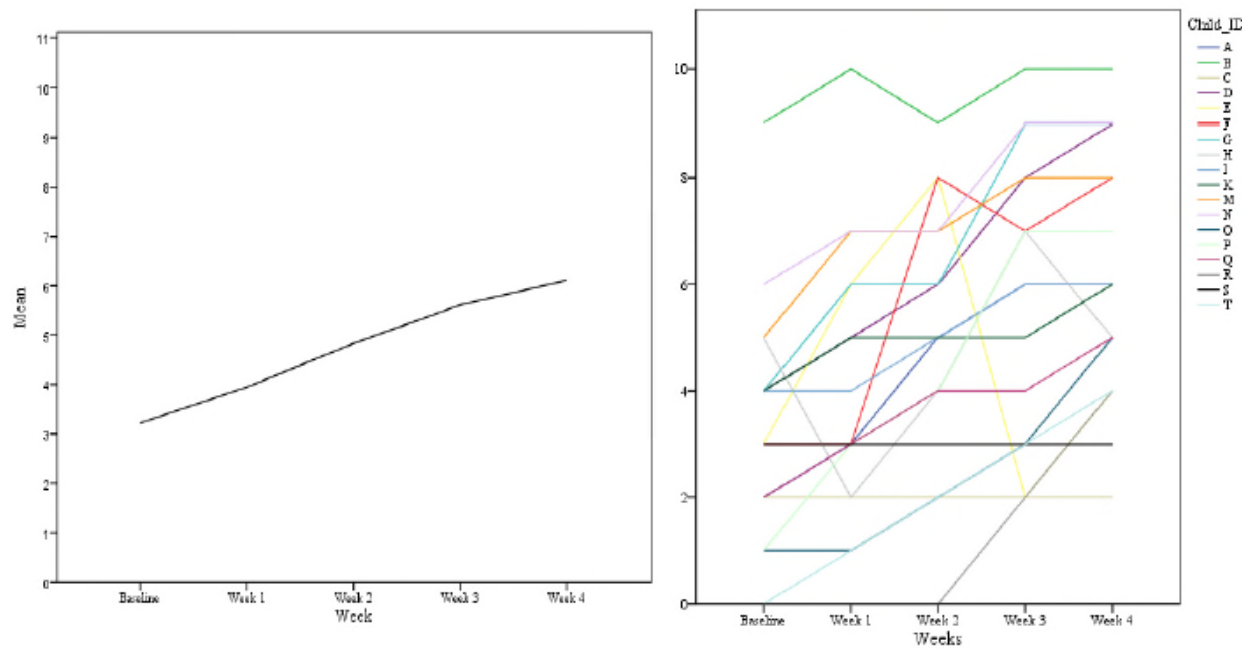
Animation (e.g. spin, fly, jump)



Fireworks



20 autistic children in naturalistic setting
(school) Toms et al., (in prep)



10 autistic children attending camp (Smith et al., in prep)
(8 male; 2 female), aged 7-11.

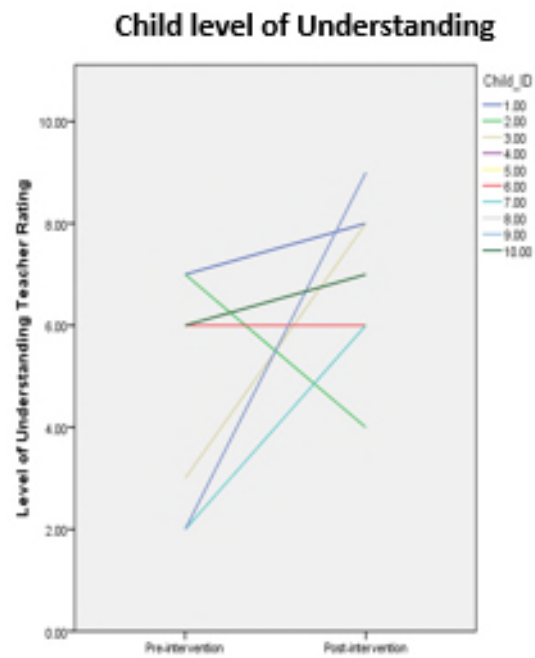


Figure 1: Teacher ratings of child understanding (0-10 scale: 0 = no understanding; 10 = Complete understanding)

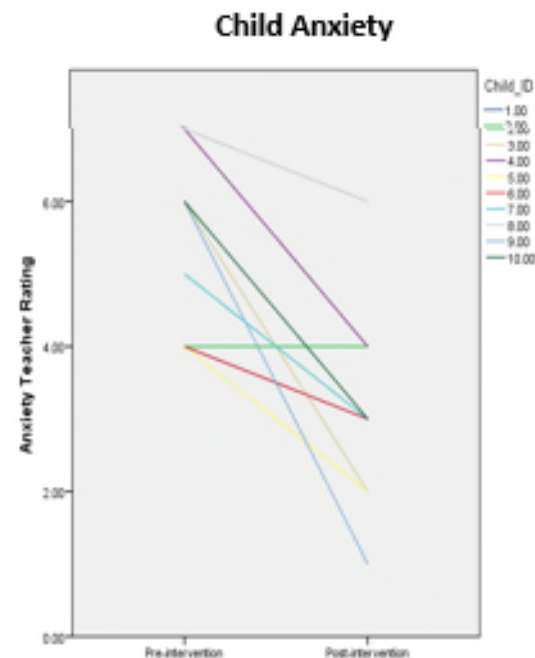


Figure 2: Teacher ratings of child anxiety (0-7 scale: 0 = no anxiety; 7 = severe anxiety)

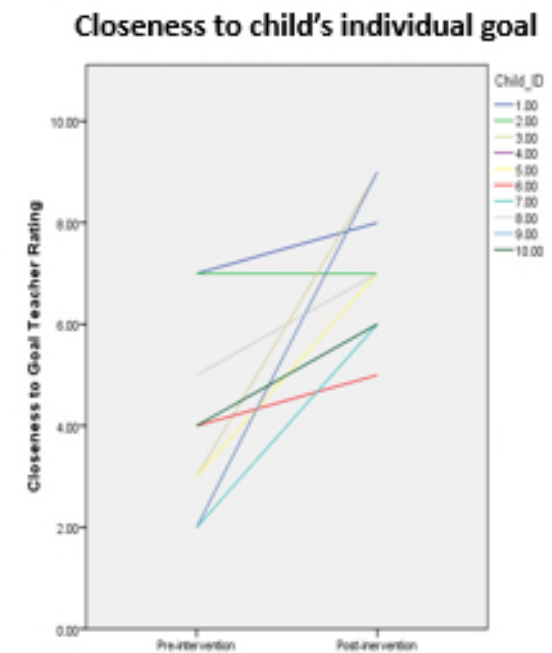
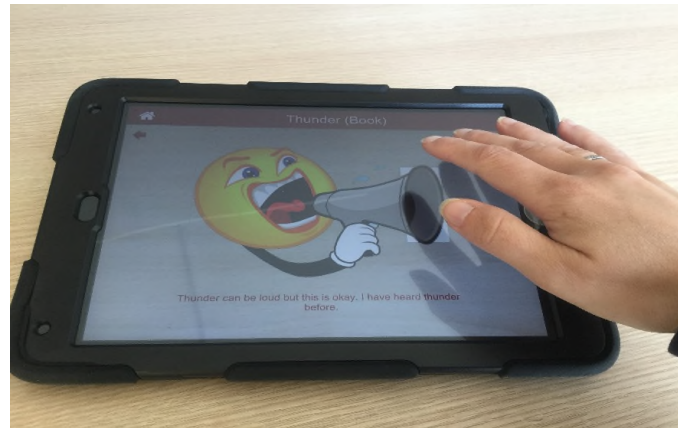


Figure 3: Teacher ratings for how close child is towards reaching their target goal (0-10 scale: 0 = far away from goal; 10 = goal achieved)

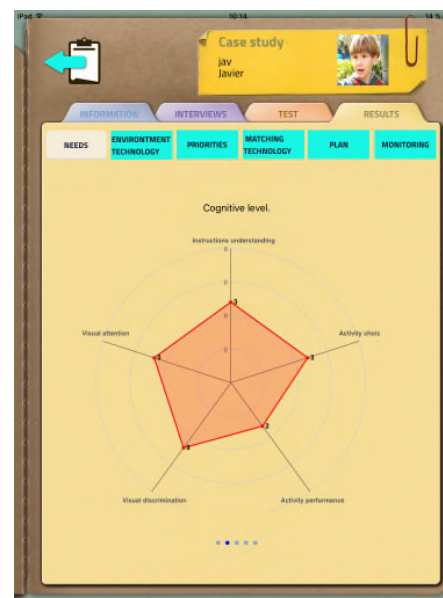
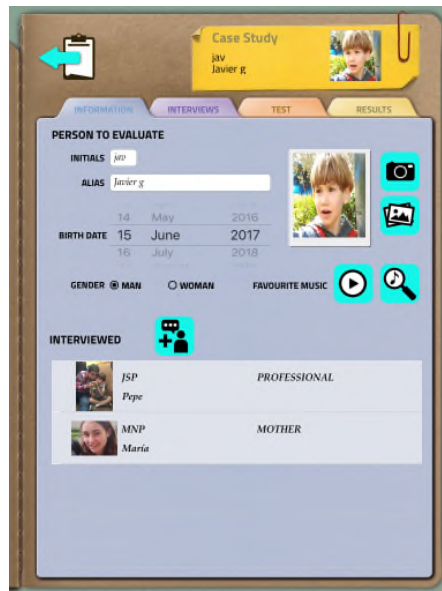
<http://go.bath.ac.uk/social-stories>
(coming in 2019...)



Deloitte.



<http://smart-asd.eu/>





FutureLearn.com



Erasmus+

<https://www.futurelearn.com/courses/supporting-autism>

Asdtech.ed.ac.uk/beta



Email: zervogianni@isir.upmc.fr

Digital Autism

- Inclusion or Intervention
- Participatory Design



Autism-units.eu (Sept 24th)

<https://www.futurelearn.com/courses/autism-education>

ONLINE COURSE


Good Practice in Autism Education

Autism is a highly varied condition and can be associated with exceptional academic ability through to intellectual disability.



Join course for free

Overview Topics Start dates Requirements Educators



DURATION
4 weeks

WEEKLY STUDY
3 hours

LEARN
Free

UPGRADE
£42

What's this?

Why join the course?

Currently there are many modalities of schooling for students with autism, including general special schools, autism-specific special schools, autism units within mainstream schools and being in a mainstream classroom.



With thanks to the autistic community, and...

- Laura Benton
- Helen Brown
- Emma Chapman
- Aurora Constantin
- Sue Fletcher-Watson
- Jeff Gavin
- Judith Good
- Matthew Goodwin
- Beate Grawemeyer
- Ouriel Grynszpan
- Gerardo Herrera
- Hilary Johnson
- Denise Lengyel
- Sarah Parsons
- Patricia Pérez-Fuster
- Eleanna Skoulikari
- Elizabeth Smith
- Danae Stanton-Fraser
- Phoebe Toms
- Elise Triquell
- Nicola Yuill
- Vanessa Zervogianni

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Autism summer school: go.bath.ac.uk/ubass

Autism employment school: go.bath.ac.uk/bessa



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