

Cognitive differences in Older Adults with Autism

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Aging and cognitive functioning

- Aging in typically developed adults is associated with a decline in specific sub types of memory and cognitive functioning.
- Not clear how autism affects degree or type of cognitive change in autistic people as they age.
- Important to understand any changes as specific changes in cognitive functioning are an early indication of dementia in TD adults.

Differences in cognitive functioning in children and young adults with autism

- Overall verbal IQ in those with autism is similar to those without, but processing speed and working memory tend to be areas of relative weakness.
- Research also suggests children/young adults with autism have differences in executive functioning and episodic memory (Geurts & Vissers, 2012; Happe et al, 2006; Pellicano, 2010).

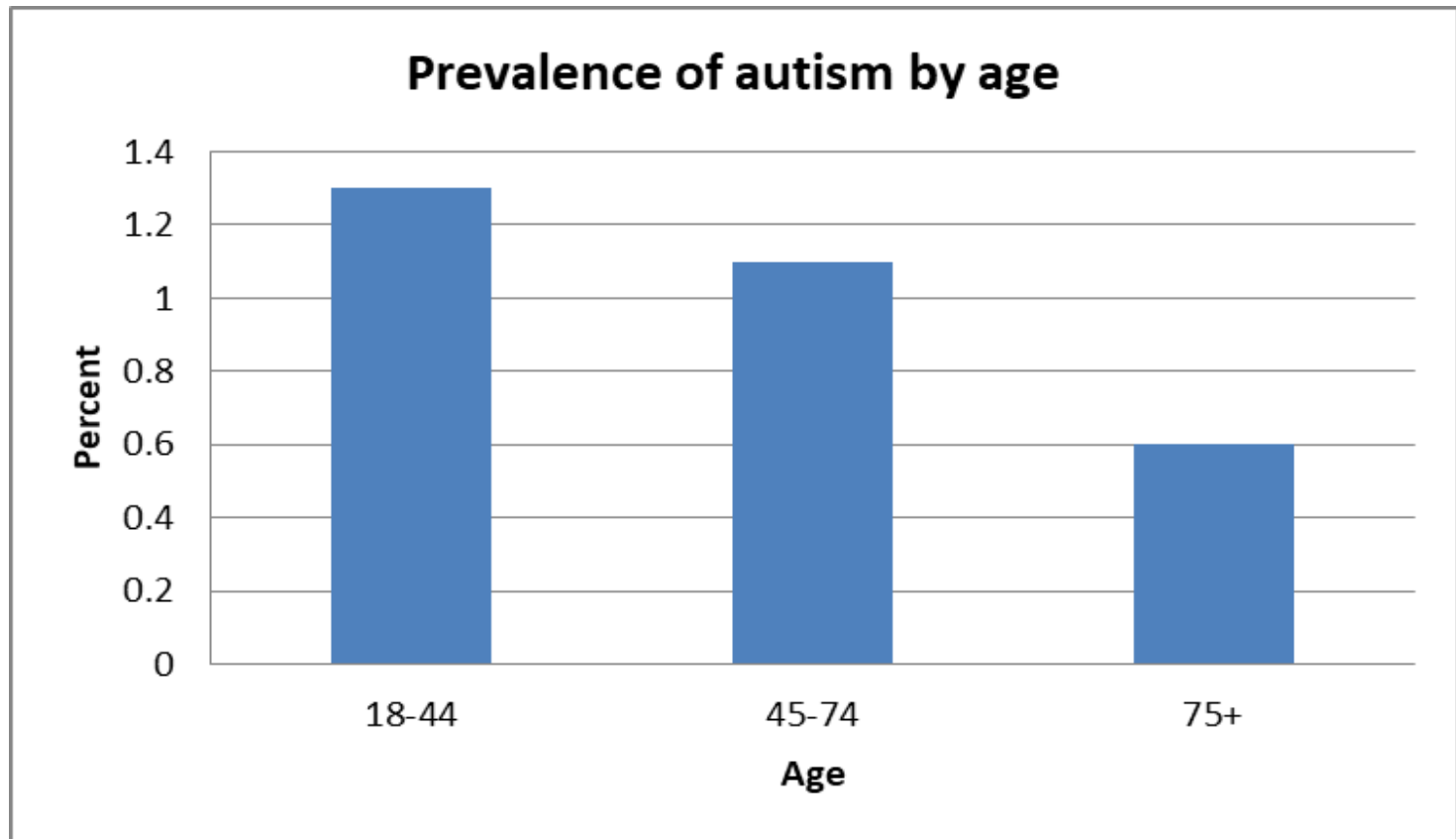
Research with older adults with Autism

Research is scarce

- Autism only included as a psychiatric diagnostic classification around 3 decades ago
- Historically seen as a childhood and not life long diagnosis
- Focus of research on causes, diagnosis and treatment in children.
- Few adult diagnostic services until recently

Therefore comparatively far fewer older adults in receipt of a diagnosis and far less research.

Estimates of the prevalence of autism (Bruga et al. 2012)



Research with older adults with Autism

- Remarkably little is known about the lives of older people with autism
- Research important to assess unique needs of older adults with autism and how best to support.
- Any research findings to date have been inconsistent

Research with older adults with Autism

- Little known about risks to physical health, despite risk of premature mortality
- Less of a deterioration in mental health and quality of life in older adults with autism (Van Heijst and Guerts, 2015)
- Risk of developing Alzheimer's disease possibly lower than general population (Barnard-Brak et al., 2019)
- Suggestion of similar patterns of strengths and weaknesses in memory to younger adults (Lever et al., 2015)



Tse, Crabtree, Islam & Stott (2019)

- Aim
- To compare cognitive and memory abilities between older adults with and without autism aged over 50.
- Cognitive ability assessed using the WAIS IV
- Memory ability assessed using the WMS IV
- 28 older adults with autism
- 29 Typically developed older adults

Group comparisons on each WAIS-IV Index Score

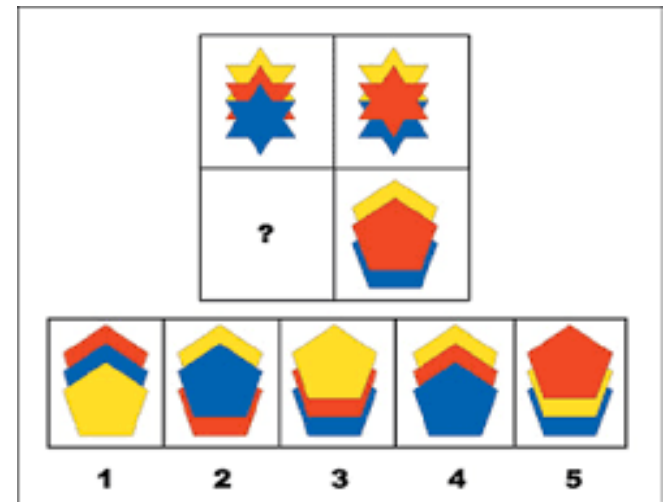
	Control <i>n</i> = 27	Autism <i>n</i> = 28	<i>p</i> -value	Effect size (Cohen's <i>d</i>)	Total sample <i>N</i> = 55
WAIS-IV Index Scores, Mean (SD)					
VCI	112.74 (11.27)	116.54 (15.47)	0.31	0.34	114.67 (13.59)
PRI	118.74 (13.96)	111.14 (18.08)	0.09	0.54	114.87 (16.49)
WMI ^a	116.85 (11.33)	114.25 (16.87)	0.51	0.23	115.53 (14.35)
PSI	111.30 (13.12)	99.39 (15.33)	0.003*	0.91	105.24 (15.38)

^aThe scores were winsorized due to extreme outliers

**p* < 0.0125 indicating significant *p*-value after Bonferroni correction

Group comparisons on each WAIS-IV Index Score

- The control group scored significantly higher than the autism group on processing speed.
- Trend for the control group to perform better on perceptual reasoning tasks
- Trend for those in the autism group to perform better on verbal comprehension



Group comparison on each WMS-IV Index Score

	Control <i>n</i> = 27	Autism <i>n</i> = 28	<i>p</i> -value	Effect Size (Cohen's <i>d</i>)	Total sample <i>N</i> = 55
WMS-IV Index Scores, Mean (SD)					
AMI	114.59 (15.56)	108.96 (18.02)	0.22	0.36	111.73 (16.94)
VMI ^a	106.85 (18.08)	98.29 (14.45)	0.06	0.47	102.49 (16.74)
VWMI ^a	116.40 (14.53)	102.86 (18.24)	<0.01*	0.93	109.51 (17.74)
IMI	111.63 (16.47)	104.00 (17.23)	0.10	0.46	107.75 (17.15)
DMI	113.41 (16.17)	105.11 (18.68)	0.08	0.51	109.18 (17.83)

^aThe scores were winsorized due to extreme outliers

**p* < 0.01 indicating significant *p*-value after Bonferroni correction

Group comparison on each WMS-IV Index Score

- On verbal working memory the control group scored significantly higher than the autism group.
- Overall trend for the autism group not to perform as well in all memory indices, but not significantly different from the control group.

Understanding cognitive differences

- Poorer performance in processing speed found across the life span in people with autism.
- Possibly due to executive functioning differences e.g. set shifting, focusing attention, disregarding unrelated details
- Also tendency to adopt a more careful and conservative response strategy (Lever et al., 2017)

Understanding memory differences

- Suggestion that working memory may be linked to sensory functioning, poorer interference control and reduced processing speed – All linked to executive functioning

In conclusion...

- Cognitive and memory functioning in older adults with autism follow a similar profile to children and younger adults with autism.
- No evidence of increased risk of cognitive decline
- Cognitive and memory functioning differences in individuals with autism appear to be linked to overall differences in executive functioning

So...what is executive functioning? And what strategies can help with executive functioning differences?

Executive functions are cognitive skills that are central to:

- Planning and doing tasks
- Organising
- Regulating behaviour
- Working memory
- Impulse control
- Attention

The two areas of Executive Functioning

First there are skills that help us choose goals and achieve them. These include:

- **Planning:** e.g. knowing how to start and finish a task, prioritising, filtering for relevance
- **Organisation:** The skills required in staying on task and completing tasks in order
- **Time management:** Predicting how long a task will take, monitoring the passage of time
- **Working memory:** Remembering information/instructions for short periods of time, completing more than one task at a time
- **Thinking about our own thinking:** Including checking on how things are going for ourselves, recognising emotions and managing anxiety and frustration

The two areas of Executive Functioning

The second area is skills that guide behaviour. These include:

- **Response inhibition:** Stopping ourselves so that we can think through what we should do next, waiting turn
- **Emotional control:** Managing emotions so that we can finish a task
- **Attention:** Being able to pay attention without distraction, even if we're bored or tired
- **Task initiation:** Starting a job when needed
- **Flexibility:** Being able to change plans or change approach to solve a problem
- **Persistence:** Keeping going to finish a job

Executive functioning skills

These skills allow us to:

- Make plans
- Finish work on time
- Cope with distractions
- Ask for help
- Figure out whether something is a good idea
- Help us not to over react to small problems
- Focus on more than one thing at a time
- Make decisions
- Check for mistakes
- Change plans if we need to

Executive Functioning and Autism

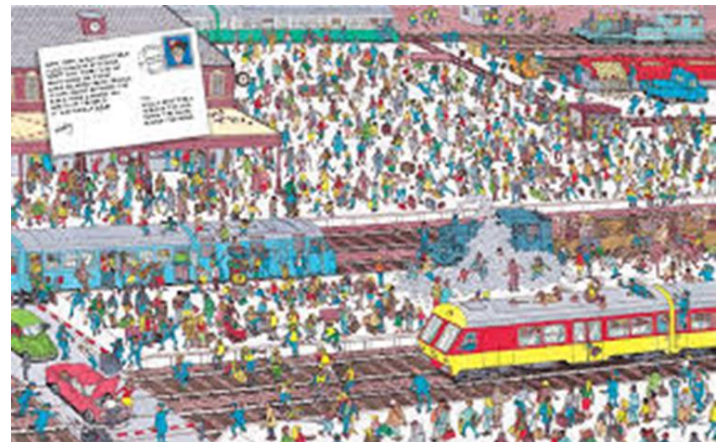
- Some sources say that up to 80% of those with autism experience a degree of executive function disorder.
- This can lead to difficulties managing time, completing tasks, and making what for many of us would be simple tasks – like cleaning our rooms – very complicated or seemingly impossible.
- Overlaps with difficulties those with ADHD and Tourette's can experience

Executive Functioning and Autism

Individuals with EF difficulties can look very different from one another. Here are some examples of how EF difficulties may affect individuals with Autism:

- Some people notice small details but have difficulty seeing how these all fit into a larger picture, unless outside support is available to help them structure the pieces.

Attention to Detail ✓



Executive Functioning and Autism

- It may be difficult to shift from one thing to another. This can lead to a person appearing to get stuck on a tiny detail or routine, finding it difficult to move on unless the routine is satisfied.
- For example, one individual may have trouble with an unexpected change in the routine, such as needing to change a familiar route, or another person may struggle to complete a work task if they have to move to a different office.

Executive Functioning and Autism

- EF differences could make it difficult for someone working with others on a project. If one individual has an idea it may be difficult for the person to integrate other's ideas within their own making it difficult for the individual to be a contributing member of the team.
- It may also be difficult controlling impulses or regulating behaviour, especially when upset or frustrated.

Sensory differences and executive functioning

Different sensory sensitivities are likely to be linked to executive functioning difficulties:

- Increasing the number of distractions
- Finding it difficult to focus on task
- Impacting ability to retain information (working memory)
- Overload of information

Assessing executive functioning skills

Tasks that assess executive functioning skills:

Problem solving

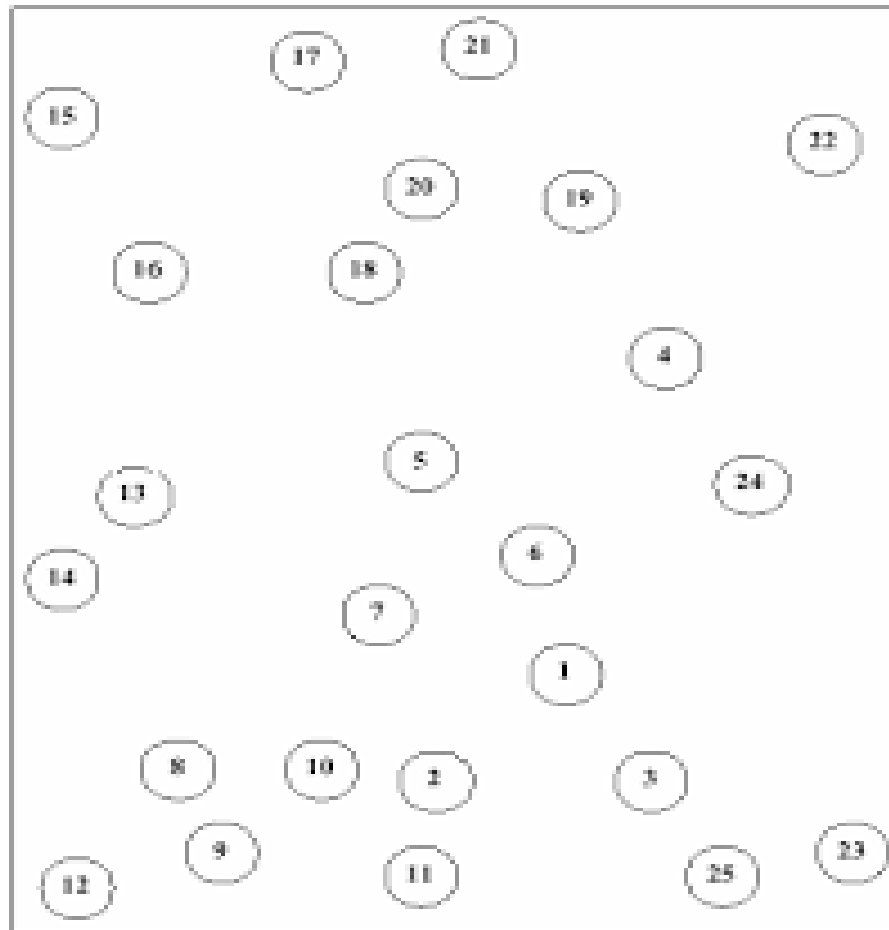
Ability to generate new ideas

Ability to change from one rule to another

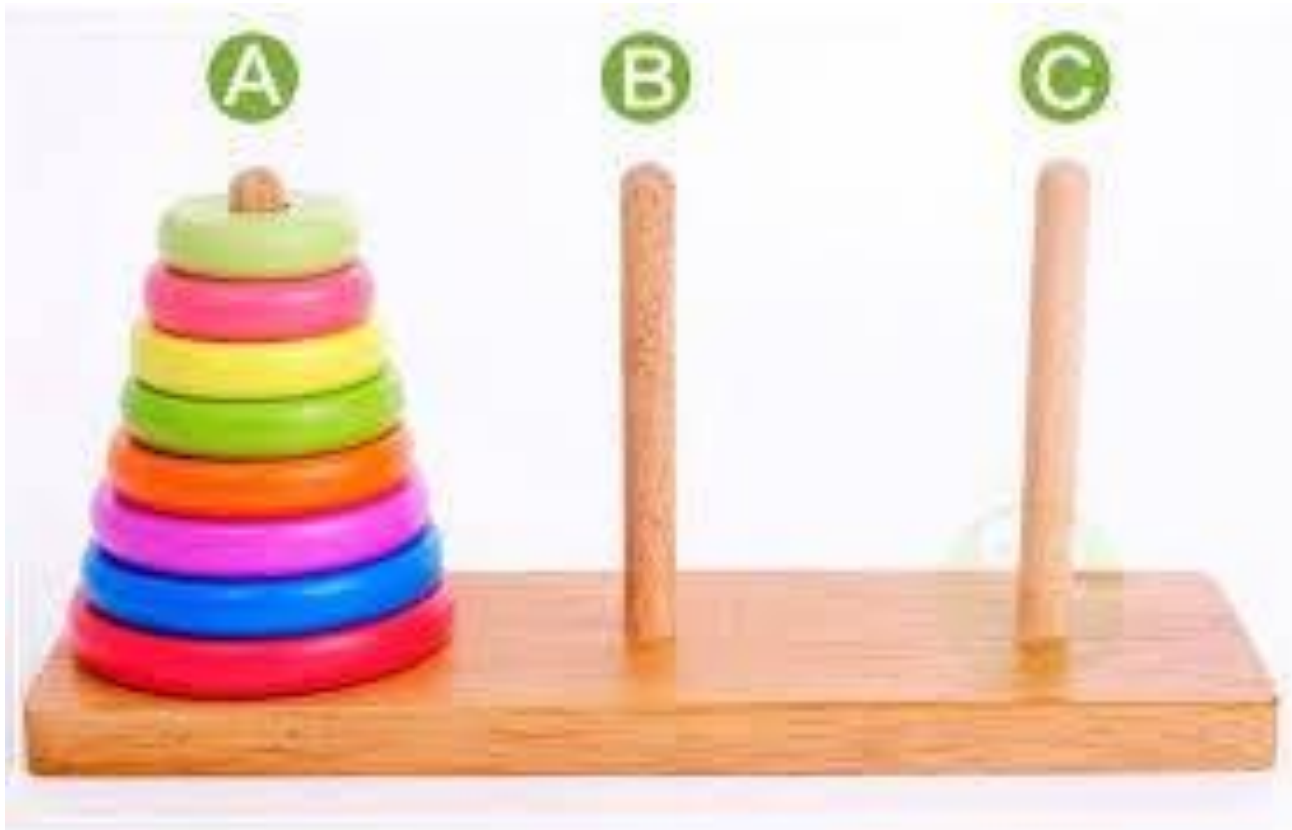
Stopping unhelpful/conflicting responses

Working Memory

Visual scanning, number sequencing, rule changing



Planning, rule learning and inhibition



Inhibition and flexibility

BLUE	RED	YELLOW	ORANGE
GREEN	BLUE	PURPLE	RED
PURPLE	YELLOW	RED	BLUE
ORANGE	BLUE	YELLOW	RED
RED	GREEN	ORANGE	BLUE
PURPLE	YELLOW	BLUE	ORANGE

Difficulties with EF can lead to....

- Increased levels of anxiety
- Feeling like not fulfilling potential
- Academic failure
- Difficulties in work setting
- Getting into trouble because of not being able to inhibit responses
- Frustration due to finding it difficult to solve problems when the rules seem to keep changing

What strategies are helpful?

Visual supports may be helpful to:

- support change and transitions,
- making steps in a tasks easy to follow, and
- help manage emotions.

Practical strategies, such as:

- Breaking tasks into smaller steps
- To do lists and schedules
- Using timers
- Planned breaks

What strategies are helpful?

- Assistive Technology: Assignment notebooks or checklists, annotated calendars, picture schedules, and colour-coded information to distinguish subjects or projects. Apps to support planning.
- Students may benefit from sitting closer to the teacher.
- Employees may benefit from working out of the main flow of traffic, where distractions are minimized.

What strategies are helpful?

When faced with large projects (either in school or at work), individuals can benefit from:

- Having the project broken down into manageable pieces so the project can be completed one piece at a time.
- Having intermediate deadlines, e.g. instead of one deadline for the whole project, the first part can be due in one week, the second part the second week, etc., until the project is completed. Often people learn to do this for themselves.