COGNITIVE ACCESSIBILITY IN AUTISM: EVIDENCE FOR SPECIFIC GUIDELINES?

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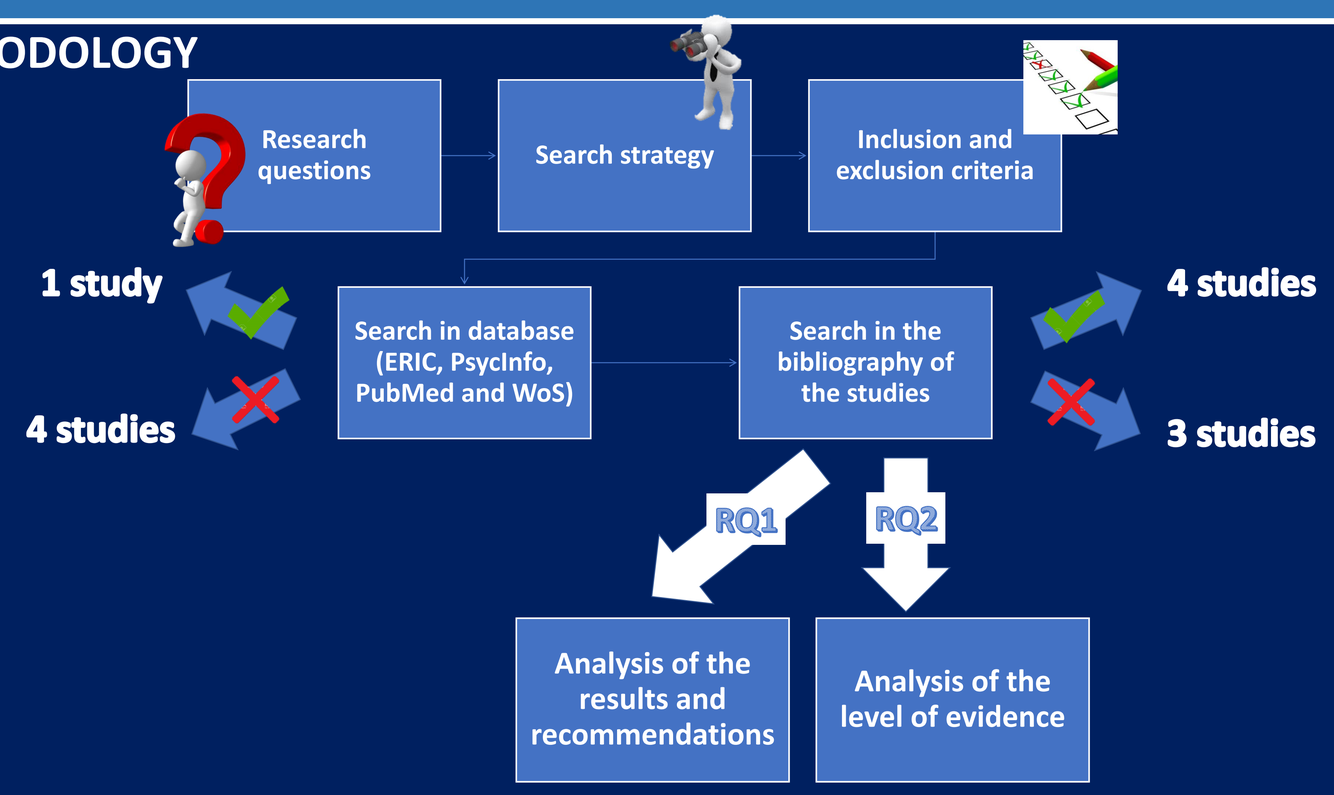
INTRODUCTION

Cognitive accessibility involves removing barriers to inclusion caused by a mismatch between contextual demands and individuals' perceptual, attentional, memory, problem-solving, social skills, and styles. Context needs to be adapted to respond to these skills and styles. For example, changes have been introduced in urban environments and transport through the use of pictograms or pictures. Texts are written in an Easy-to-Read style. Usability of web pages is increased by adapting formal aspects and content.

There are specific guidelines and recommendations for the adaptation of physical contexts and of written materials. However, many of these recommendations have originated in the field of intellectual disabilities and learning disorders and are non-specific to autism. Also, it is unclear how much evidence supports their impact on the inclusion of persons with autism.

In our study we aimed to carry out a systematic review that: 1) Determined the specificity of recommendations of cognitive accessibility for persons with autism, and 2) the level of empirical evidence which supports different recommendations.

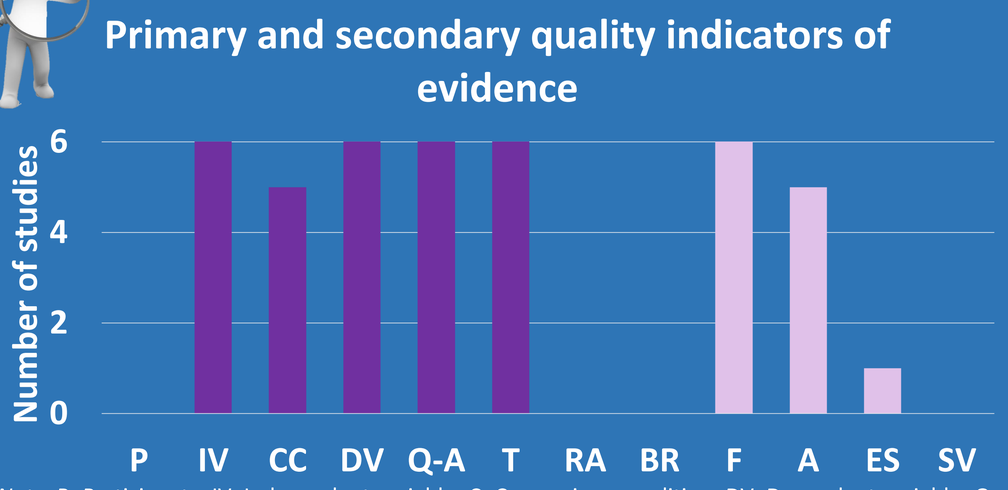
METHODOLOGY

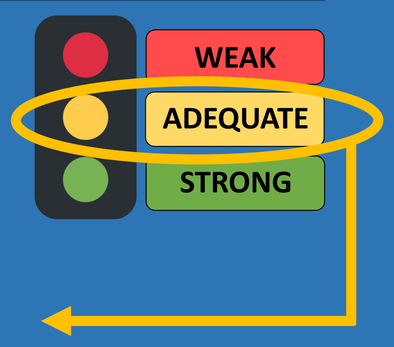


What do studies on cognitive accessibility specifically recommend for persons with autism?

	Domain	Findings	Recommendations
Eraslan, Yaneva, Yesilada & Harper, 2019	Accessible web	People with autism: less success in searching tasks which there is a limited time, a tendency to look at more elements on the web pages, more transitions between the elements, and shorter but more frequent fixations on elements which are not directly related to a given search task.	**ATTENTION TO CONTENT OF WEB PAGES!** The differences in web page search patterns between neurotypical people and people with autism should be taken into account in order to adapt the content of web pages correctly for people with autism.
Yaneva, 2016	Easy-to-read texts on the web	Images did not have an effect on comprehension and memorisation as measured through objective measures, but autistic participants felt that images did help them comprehend and memorise the text better.	**ATTENTION TO IMAGES!** Insertion of images (e.g. insertion of images relevant to the meaning of the paragraph), types of images (e.g. do not insert logos), positioning of images (e.g. preferably image above the word or on the right-hand side of the word).
Yaneva, 2016	Easy-to-read texts on the web	Autistic participants spent more time looking at images and text paragraphs; both photographs and symbols elicit similar cognitive load on the participants; documents written in Plain English are understood by all autistic participants but are not all ranked as 'very easy'; and the majority of people with autism prefer to read texts with images, unlike neurotypicals, whom have not any preference.	**ATTENTION TO CONTENT OF TEXT!** Supporting comprehension (e.g. use texts written in Plain English), supporting memorisation (e.g. presenting a summary of important information after the text has been read), reading speed (e.g. allow readers to skip through pages at their own pace).
Yaneva & Evans, 2015	Easy-to-read texts	Six readability indices were identified as highly-discriminative of text complexity for readers with autism: the number of words per sentence, the number of metaphors per text, the average number of words occurring before the main verb in a sentence, syntactic structure similarity for adjacent sentences, Flesch-Kincaid Grade Level, and the Automated Readability Index.	**ATTENTION TO SENTENCES!** Easy-to-read texts must contain shorter words and sentences, and fewer words before the main verb in a sentence (the main verb must be close to the starting of the sentence).
Štajner, Yaneva, Mitkov & Ponzetto, 2017	Easy-to-read text on web	There were no differences between the level of comprehension of the texts between ASD group and control group, but there were differences in the reading patterns (more fixations and revisits, longer viewing times per word in autistic group). The variables which there were related to the viewing times were: word length, age of acquisition, frequency, familiarity, concreteness and imageability, in that order.	**ATTENTION TO WORD MEASURES AS INDICATORS!** Do not use isolated word measures as indicators of task complexity (e.g. word length, age of acquisition, frequency, familiarity, concreteness and imageability). A given word could be perceived as challenging or not based on the surrounding context.
Matthews et al., 2019	Accessible web	There were no differences in arousal between autistic and neurotypical participants and there were differences in visual and physiological patterns between both groups.	**ATTENTION TO ELEMENTS ON THE WEB!** Re-position the user interface element in a more visually accessible location or using a more attractive design to draw the attention of the users towards that particular content, when there is frustration registered by visual scan path and arousal levels.

What level of evidence do these studies present?





Note. P: Participants; IV: Independent variable; C: Comparison condition; DV: Dependent variable; Q-A: Link between research question and data analysis; T: Use of statistical tests; RA: Random assignment; BR: Blind raters; F: Fidelity; A: Attrition; ES: Effect size; SV: Social validity (Reichow, Volkmar & Cicchetti, 2008)

CONCLUSIONS

- There are few studies found on cognitive accessibility in autism and they are carried out by the same research team. Most studies are oriented to adapt the content of web pages.
- The recommendations are similar to those shown in the European recommendations' guidelines.
- No studies showed the characteristics of the interventionist, participants were not assigned to conditions using a random assignment procedure, and the raters were not blind. Furthermore, most of the studies did not report effect sizes or they were low, and none fulfilled the condition of social validity. Consequently, most of the studies presented an adequate level of empirical evidence.

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