



Background

Presently the number of children diagnosed with Autism Spectrum Disorder (ASD) continues to increase (CDC, 2012); thus we will see an increase of students needing specialized services to accommodate their learning differences. ASD is a complex developmental disability characterized by impairments in social interaction and communication. As a spectrum, it encompasses varying intellectual, cognitive, and social strengths and weaknesses. While 44% of children with ASD are at average or above average intelligence (Christensen et al., 2012) their innate differences still may require an alternative approach to literacy. The researchers of this review were interested in exploring which reading and literacy interventions have been effective in school-aged (K-5) children with ASD. It is important to close this gap in reading ability between children with ASD and their typically developing peers, because studies show that children with stronger reading skills are more likely to experience positive academic outcomes, encounter fewer emotional and behavioral difficulties (Willcutt et al., 2007) and achieve more positive employment outcomes (Roman, 2004). These literacy skills lay a foundation for lifelong learning and success, and children with ASD may require more effortful accommodations so they can access this skill set.

Objective

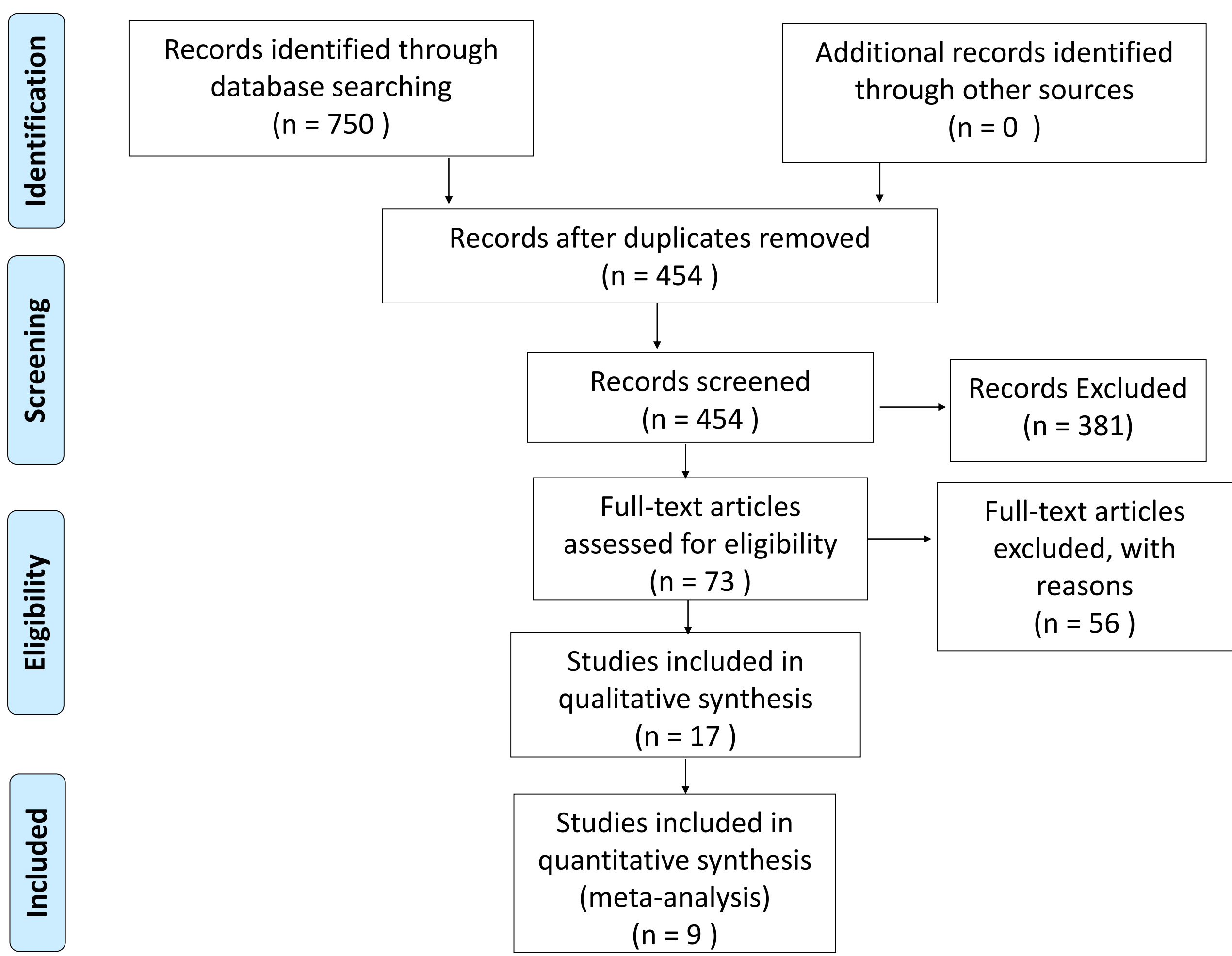
In school-aged children with autism, what is the impact of literacy interventions with embedded reading comprehension strategies on literacy and language outcomes?

Methods

- This study conducted a systematic review of the current research on literacy interventions with children with Autism Spectrum Disorder. The researchers began with 5 databases: PubMed, ERIC, CINAHL Plus, Education Full Text, and Psych Info.
- Inclusion/Exclusion Criteria**
 - Include:
 - Peer reviewed
 - Articles in English
 - Autism
 - Literacy interventions
 - School-aged participants
 - Exclude:
 - Articles not in English
 - Non-peer reviewed
 - Articles with adult participants
 - Meta-analyses/systematic reviews
 - Search terms:**
 - Autism
 - ASD
 - Autistic
 - Autism Spectrum Disorder
 - Asperger's
 - Literacy interventions
 - Literacy
 - Reading comprehension
 - Reading skills
 - Reading tests
 - Literacy therapy
 - Literacy treatment

Using these search terms with the inclusion and exclusion criteria, the researchers conducted their search. Following deduplication and reviewing of the titles and abstracts, the researchers continued with a full text review. Quality appraisals of the remaining articles resulted in the final selection of articles from which data was extracted for the purposes of this review. Inter-rater reliability was conducted for each step in this process.

Results



Outcome	Study name	Intervention	Brief note on results
Language	Effects of the TWA strategy on expository reading comprehension of students with autism	Thinking before, while, & after reading	Statistically significant improvements in comprehension questions in 4 children with ASD. More variable responses in retell with only 2 students showed statistical effective.
	Effects of wh-question graphic organizer on reading comprehension skills of students with autism	Wh- questions graphic organizer	Statistically significant improvements in answering wh- questions in 3 children with ASD
	Exploring computer and storybook interventions for children with high functioning autism	Adult reading along with story book; computer read along	Statistically significant improvements in reading comprehension and retell in 3 children with ASD; no significant results in 2 children.
	Effects of story-mapping procedure using the iPad on the comprehension of narrative texts by students with ASD	Story map on iPad	Statistically significant improvements in number of correct pairings of story elements to definitions, labeling of the electronic story map, and number of comprehension questions answered correctly in 3 children with ASD
	Efficacy of intervention to enhance reading comprehension of students with high functioning autism	30 minute sessions of reading instruction	Statistically significant improvements in definition knowledge (effect size=1.06), main idea identification (effect size = .92) and comprehension (effect size = .67) in 45 of children with ASD. No significant results found in anaphoric identification.
Literacy	Effects of reading mastery as a small group intervention for young children with ASD	Direct instruction - Reading Mastery	Statistically significant improvements in words correctly read, letter sound identification, and word identification in 62 children with ASD.
	A preliminary investigation of evidence-based interventions to increase oral reading fluency in children with autism	Listening passage preview and repeated readings	Statistically significant improvement in oral reading fluency from listening passage preview but significantly higher improvements with repeated readings in 4 children with ASD.
	Effects of ABRACADABRA literacy instruction on children with autism spectrum disorder	ABRACADABRA computer program	Statistically significant improvement in word level reading (effect size = .24), passage level reading (effect size = .37), and passage level comprehension (effect size = .37) in 23 students with ASD.
	Effects of a story map on accelerated reader post-reading test scores in students with high-functioning autism	Story mapping	Statistically significant improvements in AR quiz scores in 3 children with ASD.

Discussion

- This systematic review may serve as a clinical reference for speech language pathologists, literacy specialists, or educators looking for interventions for their students with ASD to expand their reading and literacy skills.
- Most interventions showed significant improvement, demonstrating that just providing additional supports can really benefit students with ASD.
- This search found there is a wide variety of literacy interventions, reflecting the variance between students with ASD. In most domains of learning, there is no “gold-standard” intervention for children on the spectrum since it can impact them in vastly different ways. Each child with autism has different strengths and weaknesses than the others, so there is not one single approach that is appropriate for the wide range of this disability.
- It seems that the when the intervention focuses on equipping the student with tools like a graphic organizer or strategy they can use beyond the direct instruction, more effectiveness and maintenance is observed. These interventions allow the learner to generalize the techniques to their own individual work time, so we would expect to see more clinically significant results since they are able to demonstrate success without the researcher directly providing instruction.
- The researchers also noted that the computer-based strategies and strategies that require individual effort on the student tended to be more effective. This is perhaps because of the nature of the social impairments associated with ASD. Since these strategies did not rely on the student interacting with another individual or learning from an instructor, there were less stressors or boundaries to impair their education.

Conclusion

This study found a range of reading interventions that showed statistical significance for students with ASD. In order to allow access to appropriate literacy skills for our learners with autism, educators need to provide additional supports to level the field among their typically developing peers. Future studies should focus on comparing specific types of interventions in children with ASD to explore which best accommodate their learning differences. It would be interesting to explore the difference in efficiency between direct instruction where the child must interact with another individual and use their social skills, or interventions that are completed individually by the student.

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