Group Members: ____Jen & Emily_____

Criteria	Below expectations	Meets expectations	Exceeds expectations
The paper must meet the "green" level on Turnitin before it can be graded for this course.	Yes - ___x_____		
Introduction • Highlights key points well • Clearly describes potential relevance of intervention to occupational therapy practice • Clearly states evidence-based intervention question/objective			X
Methods • Describes search (databases, key terms used; # articles at each step) • Describes inclusion/exclusion criteria • Describes how quality of articles was judged		X	
Results • Minimum of 8 relevant references • Minimum of 6 peer-reviewed references that address identified intervention • Includes clear description of intervention • Clearly ties intervention to occupation-based outcomes • All necessary information included – adequate depth provided to understand points • Terms/concepts adequately defined • Table contains necessary information without too much overlap with text			XX
Conclusion • Identifies common themes across studies; findings and range of quality to base recommendation on • Describes strengths and limitations available in research about identified intervention • Includes paragraph with reasons from above information that support or refute use of intervention in occupational therapy practice		X	
Writing Style – very minor issues • Organizes presentation of key points well. Paper has a logical flow of ideas. Transitions well between topics • Breaks up paragraphs appropriately (avoids long paragraphs) • Does not over-quote (i.e. quotes are well chosen; no more than three quotes used) • No errors in grammar; spelling is accurate • Paper is approximately 6 to 8 pages (not including title or reference page[s]), with 1" margins all around, and a minimum of 11-point font (12 if using Times).		X	
APA for Entire Paper and Reference List • APA style is followed throughout paper –some minor issues/see comments • Uses citations as needed to give authors appropriate credit for ideas and assessment tools • Uses appropriate APA style for in-text references • Uses appropriate APA style for Reference List • All references in text are included in the Reference List; all references in list are in text • Authors' names are spelled correctly		X	
Grade: Meets expectations = 91/100 (A-) For each below expectation = -2 For each "exceeds expectation" = +1 (X) OR +2 (XX)	91 - (0) + 3 =		94

Comparing the Efficacy of Augmentative and Alternative Communication Interventions

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Introduction

Autism spectrum disorder (ASD) is a developmental disability that is characterized by difficulties in social skills, communication, and emotional regulation. (Centers for Disease Control and Prevention [CDC], 2015). Because it is defined as occurring on a spectrum, symptoms are extremely variable from person to person. Autism is also one of the fastest growing diagnoses in the country: in 2000, one in 150 children had an ASD diagnosis, in 2010, the prevalence was 1 in 68 (CDC, 2015). Furthermore, the cost is high. It costs about $17,000 more per year to care with a child with ASD (CDC, 2015).

Communication problems in children with autism can be extremely frustrating for the child as well as his or her parents and teachers. Most children with an ASD diagnosis don't start speaking until much later than their typically developing peers, and some remain nonverbal throughout their lives (Brunner & Seung, 2009). For these children, it is particularly important that an effective, evidence-based solution exists to help them acquire verbal language skills as well as communicate without the use of verbal language. This is also of particular importance to occupational therapists, as many of the performance skills outlined in the Occupational Therapy Practice Framework (2014) are directly related to both verbal and nonverbal communication: questioning, replying, disagreeing, thanking, and clarifying.

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One solution to this problem is the use of augmentative and alternative communication (AAC) interventions. These interventions teach the nonverbal child communication methods other than speech in order to express their needs and thoughts

(Brunner & Seung, 2009). AAC interventions have been shown to improve communication skills in children with ASD (Flores et al., 2012).

There are currently a variety of AAC interventions that are widely used in homes, clinics, and special education classrooms. Because of the assortment of AAC interventions available, it is imperative to know which options have been shown to be most effective for increasing communication. Parents and teachers of children with ASD are faced with a staggering number of choices to make, with limited time and resources. Furthermore, the ability to communicate is an enormous factor in the quality of life for children with an ASD diagnosis. Therefore, the purpose of this review is to determine the most effective AAC intervention for increasing communication in children with autism.

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Methods

A systematic review methodology was utilized to find articles for this review. In order for an article to be included in this review it needed to meet the following criteria: A) A study on the effectiveness of different types of augmentative or alternative communication. B) The study had to be predominantly focused on children with autism. C) The study had to be dated between 2005 and 2015. D) The articles selected came from peer-reviewed journals. Articles that included an adult population were excluded from the review.

The two-general purpose databases that were used to find the articles are The Cumulative Index to Nursing and Allied Health (CINAHL) and PubMed. The search terms used were Augmentative and Alternative Communication AND children with autism. Initially, these search terms produced 30 hits on PubMed, and 44 on CINAHL.

Twelve articles were initially found that fit the criteria. A literature review chart was completed in order to organize the data from the articles. Upon review of these charts, five articles were excluded due to duplicate information, leaving a total of seven articles discussed in this review.

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Results

There were a total of three different AAC interventions addressed across the seven articles ~~mentioned~~ in this review. These interventions included picture based systems, voice output systems, and manual signing. Picture-based systems are centered on the use of pictures to replace or supplement spoken words, and the most commonly used of these is the Picture Exchange Communication System (PECS) (Brunner & Seung, 2009). Voice output systems, sometimes called Voice Output Communication Aids (VOCAs) or Speech Generating Devices (SGDs), are electronic devices that produce a recorded spoken word when the user presses a button or an icon. Manual signing is the act of using hand or body symbols in order to communicate words or phrases. Refer to ~~the table at the end of this review~~Table 1 for more detailed information regarding the individual articles.

Five of the seven articles examined the efficacy of picture-based systems. Of these, only two represented upper levels of evidence (Level II, small randomized control trials). Schreibman and Stahmer (2014) conducted a randomized trial comparing the communication gains of children using either PECS or Pivotal Response Training (PRT), which is a non-AAC intervention that uses verbal strategies to encourage children to use spoken language~~.~~ (Schreibman & Stahmer, 2014).This study found that while both strategies significantly increased communication on a number of scales, effects were

roughly equal across both interventions. One limitation of this study is that a no-treatment control group was not included, so some effects may have been due to maturation. This RCT receives a PedDRO score of six based on internal validity and statistical measures criteria.

Howlin et al. (2007) also conducted an RCT of PECS. In this study, PECS was observed in the natural school setting, and found to have significant effects on both speech and picture communication compared to the no-treatment group. This RCT receives a PeDRO score of five. In a follow-up study, Gordon et al. (2011) found that less severe autism symptoms and more expressive language at baseline predicted higher effects of the PECS intervention.

The remaining three articles investigating PECS or other picture-based systems are of lower levels of evidence, having no control or alternate treatment group. In a descriptive study, which warrants a level V evidence rating, Flores et al. (2012) sought to determine whether the Apple iPad was a feasible alternative to using traditional picture cards, using a single subject, alternating treatments design. The results showed that communication behaviors did not increase or decrease with the introduction of the iPad, suggesting that the iPad may be a valuable tool in the delivery of picture-based AAC interventions.

Son, Sigafoos, O'Reilly, and Lancioni (2006) also used an alternating treatments design (evidence level IV) to compare a picture-exchange system with voice-output communication aid (VOCA) in preference and acquisition. Speed and ease of acquisition was equal among both systems; however, two out of three children preferred picture exchange over VOCA. These results show that it is important to include autistic children

in clinical decision-making, because both speed of acquisition and preference are critical in choosing AAC systems. Van der Meer et al. (2013) had similar research goals. They also utilized an alternating treatments design to test whether preference of intervention was consistent over time, as well as influence of preference on acquisition of three AAC options: picture exchange, manual signing, and SGDs. Both participants achieved mid to high level mastery of multi-step requesting on all three intervention strategies, and their preferences remained stable over time.

Of the remaining two articles used in this review, one used a peer-mediated VOCA intervention, and the other more specifically examined different iPad applications as AAC delivery systems. Trembath, Balandin, Togher, and Stancliffe (2009) conducted a multiple base line, single subject design, with an evidence level IV, in order to compare naturalistic peer-mediated teaching with peer-mediated teaching using a VOCA device. All of the participants increased communication skills immediately after intervention, but when the intervention stopped only one child maintained the increase in communication skills. The findings of this study showed evidence that peer-mediated teaching and use of VOCA is effective, but needs to be maintained in order to show continued results.

The multi-element design study conducted by Gevarter et al. (2014) is a descriptive (level V) study that examined the effect that the design and display of an iPad application would have on mand, or request, acquisition. Results show display and design of iPad applications effect mand acquisition.

Discussion

Overall, the research contained in this review did not represent strong evidence in support of AAC?. The majority of articles were Level IV single subject pre-post or

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THEN go into the "buts" or limitations. Something to then support your last paragraph in which you recommend use (with considerations).

Does that make sense?

Otherwise, this discussion is really nice!

alternating treatments designs, which contain threats to validity due to the small sample size, lack of control group, and lack of randomization. The randomized control trials were also lacking some validity due to the absence of concealed allocation, blinding of assessors, and explicitly stated intention to treat analyses.

There were other gaps in validity across the articles in the research, particularly relating to the settings in which the interventions took place. Most of the interventions occurred during snack time, either at school or at home. This could present as a weakness in the research, because food is a highly motivating reward. These studies do not show efficacy for AAC in other real-world situations.

The research showed that in addition to the type of AAC intervention used, the delivery system can play a role in the effectiveness of the intervention. Two examples of this are use of the iPad and peer mediated teaching. In three of the seven interventions, the iPad was used for photo representations, symbol representations, as a speech generating device, or a combination of these. Due to the convenience, ability to easily transport, and peer approval, tablets and smart-phones have had increased popularity in use as AAC devices (Flores et al., 2012).

In one previously mentioned study, the researcher measured the effectiveness of peer mediated teaching with and without the use of a speech generating device. The evidence showed that all participants immediately improved with peer interaction. However, when the peer mediation component of the intervention was stopped, two out of three children regressed. This shows the power of peer involvement in the teaching of AAC (Trembath et al., 2009).

Based on the content and quality of the research, augmentative and alternative communication can be an effective treatment for increasing communication in children with autism; however, one intervention did not show superiority over the others. It is recommended that more research is conducted, and that parents, teachers and therapists try more than one intervention with the child to ascertain which AAC style is the best fit.

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Schreibman, L., & Stahmer, A. (2014). A randomized trial comparison of the effects of verbal and pictorial naturalistic communication Strategies on Spoken Language for Young Children with Autism. *Journal Of Autism & Developmental Disorders*, *44*(5), 1244-1251 doi:10.1007/s10803-013-1972-y

Son, S., Sigafoos, J., O'Reilly, M., & Lancioni, G. (2006). Comparing two types of augmentative and alternative communication systems for children with autism. *Pediatric Rehabilitation*, *9*(4), 389-395.

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Trembath, D., Balandin, S., Togher, L., & Stancliffe, R. (2009). Peer-mediated teaching and augmentative and alternative communication for preschool-aged children with autism. *Journal of Intellectual & Developmental Disability*, *34*(2), 173-186.doi:10.1080/13668250902845210

van der Meer, L., Kagohara, D., Roche, L., Sutherland, D., Balandin, S., Green, V. A., & ... Sigafoos, J. (2013). Teaching multi-step requesting and social communication to two children with autism spectrum disorders with three AAC options. *AAC: Augmentative & Alternative Communication*, *29*(3), 222-234. doi:10.3109/07434618.2013.815801

Author/Date	Sample	Design/ Variables	Measures/ Data Collection	Findings
Van Der Meer et al. (2013)	2 children- Ian (10) and Hannah (11) -ASD diagnosis & little/no communication, had participated in previous study & learned to make one-step requests on 3 AAC systems & established preference for one.	Single subject alternating treatments design IV= Manual signing, picture exchange, and speech generating devices (and preference) DV= multistep requesting & social communication.	Used each AAC to request objects Baseline; Interventions for each AAC until participants reached 79% across 3 sessions; preference assessment; and follow-up. Instructors measured correct communication. Interobserver agreement.	Ian- PE increased steadily to 100% in all categories at follow up, iPod-based SGD and MS more variable but reached high levels near the end of intervention. Preference for SGD consistent with 1st study. Hannah- With modifications, reached midlevel proficiency on all AAC systems with best results for PE. Preference for PE consistent with 1st study.
Trembath et al. (2009)	9 participants Six typically developing children 3-5 years (3 boys and 3 girls) 3 male children with autism 3-5 years	Multiple baseline design assessed the outcomes of two different intervention conditions. IV= One used speech generation devices and one did not. DV= the number of times the children with autism were able to produce communicative behaviors.	Data were collected in baseline and intervention phases during 10 minute play sessions in the classroom. Peers were randomly assigned to condition a and b.	Peer mediated teaching and use of SGDs is effective, but needs to be maintained.
Schreibman and Stahmer (2013) 1	39 children (34 male, 5 female) between 20 and 45 months, autism diagnosis, absence of prior treatment using PECS or PRT	Experimental RCT IV= Picture Exchange Response System, Pivotal Response Training DV=Overall communication, expressive vocabulary, pictorial communication, and parent satisfaction.	Mullen Scales of Early Learning, Expressive One-Word Picture Vocabulary Test, MacArthur Communicative Developmental Inventory, Vineland Adaptive Behavior Scale, & Parent satisfaction survey. Child participants received 247 hrs of treatment, parents received weekly education sessions.	One intervention modality not found superior to the other. Both groups made similar gains in spoken communication. Extreme variability in verbal progress, gains on each assessment were statistically significant in both groups. Parental satisfaction high with both groups. Only significant difference was that PRT was easier to implement.

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Author/Date	Sample	Design/ Variables	Measures/ Data Collection	Findings
Son et al. (2006)	3 children (2 male, 1 female) between 3 and 5 years old, ASD diagnosis, lack of speech.	Single subject, alternating treatments IV= Voice Output Communication Aid, Picture DV= Speed of acquisition, preference	Baseline, Intervention (for each AAC system) and Preference Assessment phases. Intervention phase continued until participant reached 75% accuracy on snack requests (coded and assessed for reliability with 95% agreement.) Preference Assessment- option considered preferred if chosen 70% of choice opportunities.	All three children showed increased percentage of requests across intervention sessions. Speed of acquisition varied, no significant differences. 2 preferred Picture Exchange, 1 preferred VOCA, and all used preferred intervention with high (86-100%) proficiency consistent with intervention phase.
Gordon et al. (2011)	84 children, (73 boys, 11 girls) from 17 Sp. Ed. classes, ages 4-10, autism diagnosis, little or no functional language. Immediate Treatment Group= 26, Delayed Treatment Group=30, No Treatment Group=28	Exploratory research of previous RCT (Howlin et al., 2007) IV=Picture Exchange Communication System & moderator effects DV= child-initiated communication: picture (IC-p), speech (IC-s), both p. and s. (IC-ps) request & social interaction (IC-d)	15-min videotaped observation in class snack session at baseline and twice further over 20 months. Child-initiated communication coded and counted. Poisson regression model used for all DVs. When PECS was found to have significant effect, 2nd analysis was conducted to ID response moderators.	Poisson Analysis: IC-p, IC-s, IC-ps increased significantly following training. IC-r also increased significantly, but IC-d did not. ITG observed 9mo post training, IC-S only persisted. Intervention moderators: least severe autism symptoms (at baseline) showed greatest ++ in IC-s. Better expressive language (at baseline) showed greatest ++ in IC-ps.
Flores et al. (2012)	Five boys, ages 8-11, 3 have autism spectrum disorder, 2 have intellectual disabilities.	Descriptive study Comparing two communication interventions. IV= Use of iPad or picture card system DV= Communication behaviors	A teacher in the room that was not involved in the activity collected data at snack time. Condition 1: picture card system Condition 2: iPad use. Conditions were implemented in the order of condition 1, condition 2, condition 1, condition2, and condition 1. Each condition was implemented for three days.	The results for all participants were analyzed visually. Communication behaviors increased or remained the same as using the picture cards when using the iPad

Gevarter et al. (2014)	Three males Diagnosed with autism spectrum disorder. All 3 years old.	Multi element Design Compared three different displays in two different iPad augmentative communication applications. DV = mand acquisition	The sessions occurred in the participants' homes. Three sessions, one for each condition was implemented each day. Correct responses were recorded only when the child independently pressed the correct response.	Two of the participants did better with photographical hotspot than with the symbol button format, and did not show rapid or consistent acquisition with the combined format. . The third mastered all three. Results show display and design of iPad applications effect mand acquisition.