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Print Concept Knowledge in Young Children with Autism: Why Should it be Impaired and What are the Implications for Intervention?

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Abstract

Emergent literacy skills are developmental precursors to formal literacy. They are predictive of later reading and writing ability. Identifying children with poor emergent literacy can increase the likelihood of timely intervention. Children with autism spectrum disorder (ASD) are a group at risk of poor reading comprehension. However, there is relatively little research into their emergent literacy. It is often cited that they show a pattern of strong *code-related* and poor *meaning-focused* skills. There is a problem with using these composites, as children with ASD show strengths and weaknesses within the code-related domain, where letter naming is good, but *print concept knowledge* (PCK) is impaired. PCK relates to knowledge of print function and conventions and the organisation of books. In this essay, reasons for this discrepancy are explored. It is argued that weak central coherence in children with ASD can account for their ability to process local features such as letters but not global book features such as the front cover. This is exacerbated by adults who may find it challenging to engage these children in literacy activities, and therefore show an instructional bias towards the skills they already show aptitude and interest in. Based on this explanation, possible interventions are considered. These include systematic, explicit instructional techniques such as *print referencing* and *task analysis*, as well as interest development strategies to encourage motivation for looking at books. It is concluded that educational psychologists (EPs) should play a role in evaluating and promoting these strategies to improve PCK in children with ASD.

The ability to read and understand text is a vital skill in many aspects of life (De Koning & van der Schoot, 2013). Therefore, early identification of reading difficulty is important for timely intervention (Piasta, Justice, McGinty & Kaderavek, 2012). *Emergent literacy abilities*— the "skills, knowledge and attitudes that are developmental precursors to reading and writing" (Whitehurst & Lonigan, 1989, p. 848)— develop in the home and early years settings between

birth and the first years of school (Justice & Kaderavek, 2002). They are predictive of later reading success and can help to identify children who may encounter reading challenges in the future (Hammill, 2004; National Early Literacy Panel [NELP], 2008). Children with autism spectrum disorder (ASD) are one group at risk of reading problems. While they typically show sufficient word reading ability, recent estimates suggest that over half struggle with reading comprehension, which can affect progress across the curriculum (Chiang & Lin, 2007; Westerveld, Paynter, O'Leary & Trembath, 2018).

Two years ago, a systematic review of the emergent literacy skills of children with ASD revealed just three studies which met the inclusion criteria (Westerveld, Trembath, Shellshear & Paynter, 2016), though coverage of the topic has increased recently (e.g. Baker, Rivera, Devine & Mason, 2018). In available studies, it is suggested that young children with ASD present with intact *code-related* abilities— these include knowledge of the alphabet, print conventions and phonological awareness— and impairments in *meaning-focused* skills, which concern language comprehension (Fleury & Lease, 2018). In this essay I will address the danger of using these composite measures, because analysis of the code-related skills of children with ASD reveals a discrepancy, where letter naming skills are relatively strong and knowledge of print concepts is significantly poorer (Davidson & Ellis-Weismer, 2014).

Print concept knowledge (PCK) involves children's understanding of the conventions of written language. In the most stringent sense, it is defined as knowing the rules that govern an orthography, and therefore what constitutes readable print. This includes awareness that certain combinations of letters can be combined to form words, and of the correct orientation, direction and spacing of written letters and words (Levy, Gong, Hessels, Evans & Jared, 2006). In typically developing (TD) children, this knowledge is thought to develop systematically between the ages of three and seven years. For example, at three years old, children cannot distinguish between scribbles and legible words (Lavine, 1977). By four, they can do this, and by six years old they start to be able to identify acceptable spelling patterns (Levy et al., 2006).

There is another broader definition of PCK, which includes knowledge of print conventions, but also of the organisation of books, and the function of print (Justice & Ezell, 2004). These concepts are distinct, yet related, and can be reliably measured as a single trait by tools such as the Pre-school Word and Print Awareness Measure (PWPA; Justice, Bowles & Skibbe, 2006). The 14 concepts on the PWPA include the location of the front of the book, the location and function of the title, the organisation of the print on the page including the direction, and the meaning of print in context (Justice et al., 2006). Scores on the PWPA are seen to improve over time. For instance, the mean score out of 18 in a group of three to four-year-old TD children was 7.74 (*SD*= 3.93), and 12.65 (*SD*= 2.87) a year later (Dynia, Brock, Logan, Justice & Kaderavek, 2016). Over the same period, the score of children with ASD changed from 3.09 (*SD*= 2.56) to 7.48 (*SD*=4.79), indicating that their PCK may be around a year behind their TD peers during the early years. Therefore, PCK is a construct with the potential to develop over time. For the purposes of this essay, the term PCK will be interpreted to reflect this broader definition, given that it is more frequently measured this way in the literature.

The PCK of children with ASD merits research attention because knowledge about the written conventions of language is one of the strongest predictors of later reading comprehension (Cain & Oakhill, 2012; Hammill, 2004; NELP, 2008; Tunmer, Herriman & Nesdale, 1988). Furthermore, the current options for intervention to improve PCK in children with ASD are sparse (Kimhi, Achtarzad & Tubul-Lavy, 2018). Therefore, in this essay I will consider causes such as oral language proficiency, home literacy environment, *print interest* and weak central coherence, to explain impaired PCK in children with ASD. Drawing on evidence from theories of autism and shared reading interventions, I will argue that weak central coherence, exacerbated by an instructional bias toward children's already strong local processing skills, can explain these PCK deficits. The consequences for intervention given this explanation will be discussed. I will conclude that *print referencing*, *task analysis* and interest development models may all have utility when encouraging children with ASD to attend to the global features of books during shared reading. Implications for educational psychologists (EPs) will be considered.

Consistent with the *simple view of reading* (Gough & Tunmer, 1986), which recognises word recognition and language comprehension as discrete dimensions of reading ability, emergent literacy is thought to include skills related to both decoding, and understanding text (Chen & Kuo, 2017; Fleury & Lease, 2018), which differentially predict later decoding and comprehension (Hammill, 2004; Lonigan, Purpura, Wilson, Walker & Clancy-Menchetti, 2013; NELP, 2008).

School-age children with ASD typically display at least average word reading, and disproportionately weaker comprehension (Lanter, Freeman & Dove, 2012a; Nation, Clarke, Wright & Williams, 2006). Given this pattern, it is unsurprising that the literature describes relative strengths in code-related and weaknesses in meaning-related abilities in the emergent literacy of children with ASD (e.g. Chen & Kuo, 2017; Hudson et al., 2017). For example, Fleury and Lease (2018) compared the emergent literacy skills of three to six-year-olds with ASD and their TD peers. They used phonological awareness and print knowledge scales to test code-focused skills and a vocabulary scale for meaning-focused skills. They interpreted significantly lower performance of the ASD group on the meaning, but not the code-focused scales to mean that children with ASD show impaired meaning-related and intact code skills.

However, caution should be taken when interpreting broad composite profiles of emergent literacy. Within Fleury and Lease's (2018) measure of code skills was *print knowledge*, an umbrella term encompassing both PCK and specific knowledge of the alphabetic system (i.e., letter naming) (McGinty, Justice, Piasta, Kaderavek & Fan, 2012). Multiple studies analysing component code skills have found large discrepancies in the alphabetic knowledge of children with ASD relative to their PCK (Westerveld et al., 2016). Therefore, conflating component skills may cause misrepresentation of children's code-focused abilities and reduce the specificity of our understanding of their emergent literacy (Lanter et al., 2012a).

Other methodological problems when using ASD samples include difficulty obtaining sufficient sample sizes, and variability in how diagnoses are obtained (Westerveld et al., 2016). Therefore, the findings of studies which attempt to control for these factors should be given

more weight. One such study is by Davidson and Ellis-Weismer (2014), who assessed the emergent literacy skills of 84 children with ASD and five with pervasive developmental disorder. Diagnoses were validated by experienced examiners using established assessments such as the Autism Diagnostic Observation Schedule (ADOS). The Test of Early Reading Ability, Third Edition (TERA-3) was used to capture literacy, consisting of alphabet knowledge, conventions and meaning subtests. It is standardised and norm-referenced to allow comparison with TD peers. At a mean age of five and a half years, the overall reading ability of the sample fell within the typical range, with discrepancies in subtest performance. Alphabet knowledge was average, while meaning and conventions skills were significantly lower. This pattern of relatively strong letter naming and weak PCK in the emergent literacy of children with ASD has been replicated through parent reports (Lanter et al., 2012a) and direct assessment (Dynia et al., 2016; Dynia, Lawton, Logan & Justice, 2014; Lanter, Watson, Erickson & Freeman, 2012b; Westerveld et al., 2017b).

So far in this essay, I have established that PCK is an area of challenge for children with ASD. To consider the features of successful intervention, it is necessary to first understand why this difficulty arises. I will start by addressing the impact of language ability, which is associated with emergent literacy (Dynia et al., 2014) and is a core deficit in individuals with ASD (Happé, Ronald & Plomin, 2006).

There is evidence to suggest that impaired language alone cannot account for poor PCK. Lanter et al. (2012b) found no significant differences in PCK between children with ASD who had typical, moderately impaired or severely impaired oral language. Furthermore, Dynia et al. (2014) found that the PCK of three to five-year-olds with ASD was significantly lower than their peers' when controlling for oral language ability. Therefore, there is likely something other than language proficiency at play in determining the PCK of children with ASD.

Next, I will consider the home literacy environment. In TD children, opportunities for reading, access to literacy materials, and parent instruction, education and attitudes are associated with literacy development (Chen & Kuo, 2017). Therefore, children with ASD may have poorer PCK because they receive fewer literacy opportunities at home. This could be the case, given that they are more likely to present with social, attentional and behavioural differences that could make literacy instruction more challenging for parents (Fleury, 2015; Hartley, Sikora & McCoy, 2008). However, when Fleury and Lease (2018) used the Parental Reading Beliefs Inventory (PRBI) to compare the attitudes of parents with TD children and those whose children had ASD, the latter did not report significantly different beliefs on any of the seven subscales, which included teaching efficacy, enjoyment of shared reading, availability of resources and use of direct reading instruction strategies. In similar research, parents of children with ASD did not read to their children less frequently or provide reduced literacy instruction (Dynia et al., 2014; Lanter et al., 2012b). Although, these studies do report significantly lower shared reading in ASD compared with TD samples. Shared book reading is different from reading to children as it involves parent and child commenting on and responding to the book (Fleury, 2015). However, shared book reading is designed primarily to improve oral language ability and has been found to improve vocabulary in children with ASD,

but not PCK, so is unlikely to be the causal factor here (Fleury & Schwartz, 2017; Hudson et al., 2017).

It is also possible that reduced print motivation (sometimes termed *print interest*), defined as "children's relative interest in reading and writing activities" could limit PCK in children with ASD (Whitehurst and Lonigan, 1998, p. 835). This explanation has face validity as it is unlikely they could develop sufficient knowledge of the conventions of print if they spent less time attending to it. Interestingly, print motivation in children with ASD is reported to be both above and below average, depending on the way it is understood. Where it is conceived as a desire to share literacy materials socially, motivation is typically low. For instance, on items asking whether children with ASD request adult help with reading words and writing their names, print interest is significantly lower than TD peers' (Dynia et al., 2014). Where print interest is seen as a fascination with letters, it is reportedly greater compared with TD children (Lanter et al. 2012b; Nation et al., 2006).

Both conceptions can be considered useful, as they shed light on the attentional processes at work when children with ASD engage with literacy materials, which appear consistent with the way their emergent literacy develops. For instance, parents of children with ASD report that they show a strong interest in letters, which could explain why their alphabetic skills are relatively strong (Davidson & Ellis-Weismer, 2014; Lanter et al., 2012b). That children with ASD show less interest in adult help with word reading and name writing may be evidence that they are less concerned with the function of print as a method of communication, which is an element of PCK (Koppenhaver & Erickson, 2003; Whitehurst & Lonigan, 1998). These strengths and weaknesses reflect something meaningful about our knowledge of ASD and the concept of central coherence. *Central coherence theory* was developed to explain the non-triad impairments associated with autism. These are cognitive differences not explained by impaired social interaction or communication, or restrictive and repetitive interests, the core deficits of ASD (Happé et al., 2006). Central coherence is "the tendency to draw together diverse information to construct higher-level meaning in context" (Frith & Happé, 1994, p. 121). It has been found to differentiate between three to five-year-old children with and without ASD, suggesting it is a reliable feature of the ASD profile (Morgan, Mayberry & Durkin, 2003).

Frith and Happé (1994) state that weak central coherence in children with ASD explains their relative strengths on tasks requiring local features to be processed, and difficulty with processing a stimulus holistically, to infer its global meaning. Therefore, weak central coherence can explain why young children with ASD have strengths in letter naming, which requires processing of isolated letters, and weaknesses in PCK, which involves processing information in the context of the whole book or page and making links between different text features to extract meaning (Nation et al., 2006). Similarly, integration of information from parts of a sentence or paragraph is a skill needed for reading comprehension in older children (O'Connor & Klein, 2004).

A preference for local features in children with ASD may also influence the way adults support their emergent literacy development. Children with ASD can be more challenging to engage in

adult directed literacy activities, so parents and educators may be biased towards teaching aspects of reading in which children are naturally more interested (Lanter et al., 2012b). Indeed, Lanter et al. found parents frequently reported that their children were skilled in letter naming, suggesting parents are alert to the skills their children possess. Similarly, teaching about letters is more frequently reported by parents of children with ASD than other types of literacy instruction (Dynia et al., 2014).

In addition, an instructional focus on the local features of text could explain why shared reading interventions for children with ASD result in gains in book-specific vocabulary (Pamparo, 2012). These single words could be considered local features of text. Fleury and Schwartz (2017) evaluated the effect of a shared reading intervention called *dialogic reading*, where a reading partner uses prompting and questioning, to encourage children to talk and respond. There are a series of prompt types that can be employed to this end. These include *open-ended questions* about what is happening in the pictures, and *distancing questions* which require children to make links between the story and their own lives. The adapted version for children with ASD also uses *special prompts* which offer binary options such as "*Is it a cow or a horse?"* (p. 20) as well as requests for the child to repeat a target word or point to an image. The authors found that the most frequent prompts used by the reading partners were special prompts, and *wh- questions*, which target a specific vocabulary item as the response. These prompts appear to direct focus to local features such as single words, which may explain why book specific vocabulary improved in response to the intervention.

The reading partners in Fleury and Schwartz's (2017) intervention were experienced special educational needs practitioners, indicating that a bias to local features is not just amplified by parents. Furthermore, neglecting to point out the global features of print may not be unique to adults supporting children with ASD. In fact, adults rarely make explicit references to features of print during shared reading in general (Piasta et al., 2012). Yet, this oversight is perhaps more detrimental for children with ASD, who may struggle to infer PCK from unstructured shared reading and likely require a higher level of intervention to develop their knowledge of global book features (Sénéchal & LeFevre, 2002).

Understanding poor PCK as a reflection of weak central coherence intensified by biases in adult instruction gives rise to ideas for intervention. An example of this is print referencing, born from acknowledgement of a lack of spontaneous, explicit references to print by adult reading partners (Piasta et al., 2012). Print referencing is distinct from dialogic reading because it is more structured and explicit. Referencing techniques include tracking and commenting on print, and posing questions directly related to print (Justice and Ezell, 2004). For instance, a parent might point out the author's name, or ask what the book might be about given the illustrations. Justice and Ezell explain that the mechanism of change here is explained by Vygotsky's (1978) *socio-cultural perspective* and the assertion that learning must occurs via adult mediation in a social context, within the child's *zone of proximal development* (ZPD) and is then internalised. Therefore, if adult prompts can be pitched just beyond what the child is capable of recognising about print independently, their PCK should improve.

Accordingly, Gong and Levy (2009) found that, in TD four-year-olds, a computer program drawing attention to print did not improve PCK, but the children's active engagement with print during shared reading with a mediating adult did. Similarly, in TD pre-schoolers, a print referencing teaching style was found to improve PCK, alphabet knowledge and name writing (Justice, Kaderavek, Fan, Sofka and Hunt, 2009). While several studies of print referencing have found PCK improvements in children with specific language impairments (e.g. Justice, Logan, Kaderavek & Dynia, 2015; McGinty & Justice, 2009), there appears to be little or no available research on the impact of print referencing on children with ASD (Westerveld, Paynter, Trembath, Borucki & O'Leary, 2017a). Although, it is promising to note that explicit print-related instruction seems to have a greater effect for children whose attention (McGinty et al., 2012) and code-related skills (Connor, Morrison & Slominski, 2006) are initially poorer. Therefore, there is a need for research on the effectiveness of print referencing for cultivating PCK in children with ASD, as well as other forms of intervention.

Another technique which may show promise is to use task analysis and chaining. Here, the skill to be taught is split into component sub-skills. Skills can be taught in several orders. Correct responses for each step are pre-defined and reinforced until each skill has been learnt to mastery level (Baker et al., 2018). In a pilot study of five children with ASD aged five to eight, teaching an emergent literacy curriculum in this way resulted in emergent literacy gains over a six-week period (Kimhi et al., 2018). Significant PCK increases were not recorded, perhaps due, in part, to the small sample size. However, this preliminary evidence provides support for a highly systematic, explicit approach for teaching PCK to children with ASD. Furthermore, Baker et al. suggest that at each stage of the task analysis, the educator can select which teaching methods to use. Therefore, an explicit, PCK-specific intervention like print referencing could sit within a wider task analysis model.

Justice and Ezell's (2004) flowchart of *metalinguistic milestones* sets out five concepts of print knowledge to be acquired. These are; *print interest*, *print functions*, *print conventions*, *print forms*, and *print part-to-whole relationships*. Although the model is hypothetical and has not yet been validated empirically, it serves as an example of how PCK can be divided into component skills which gradually increase in sophistication, much like in task analysis. The authors state that the milestones should not be treated as a stage model, as skills can develop in parallel. However, they do build on one another to some extent. Furthermore, the milestones involve understanding the global features of print, starting with showing an interest in contextual print, and working towards an understanding of how print is organised and how aspects of print can be linked to form meaning. If we accept a weak central coherence explanation of poor PCK in children with ASD, then teaching these sub-goals specific to global processing may be considered a way of targeting the cause of poor PCK.

Given that the first milestone, print interest, requires the child to show an interest in print in highly contextual situations, it is worth considering how parents and educators might promote interest in books for children with ASD, in a way that directs attention to the global features rather than individual letters. Hidi and Renniger's (2006) *four-phase model of interest development* is of relevance here. In the model, they outline how interest begins as *triggered*

situational interest, where something about the task captures the learner's attention. Recruitment of emotions can be useful here, for instance if the task prompts curiosity (Renniger & Hidi, 2011). Then comes *maintained situational interest*, where the nature of the task sustains interest. Renniger and Hidi (2011) suggest that engaging tasks can include active tasks, and those of personal relevance. *Emerging* and *developed personal interest* arise when the learner has acquired relevant knowledge and perceives the subject as valuable. Therefore, when attempting to catch the initial interest of a child with ASD, adults could consider how to make the task of attending to global features of print emotionally appealing and personally relevant. For young children with ASD this might involve using books with sensory features such as textures and sounds, books on topics that relate to their special interests or using rhyme and repetition during shared reading, to encourage increased interest in books and their features and conventions.

In this essay, I have demonstrated that composite measures of code-related skills are insufficient to describe the emergent literacy skills of children with ASD, who show discrepancies within the domain of code-focused emergent literacy skills. More specifically, these children tend to present with typical letter naming abilities, and poor print concept knowledge (Davidson & Ellis-Weismer, 2014). Oral language ability is related to emergent literacy skills yet is unlikely to be the sole cause of weak PCK, as children with ASD show significantly poorer PCK relative to their TD peers, even when oral language ability is controlled for (Dynia et al., 2014). The home literacy environment is also important in the development of emergent literacy (Chen & Kuo, 2017), but parents of children with ASD do not engage in significantly less literacy instruction with their children (Fleury & Lease, 2018). The print interest of children with ASD can shed light on a potential explanation for their reduced PCK. That they are fascinated by letters (Lanter et al., 2012a), but not the communicative function of print (Dynia et al., 2014) suggests that children with ASD show a preference for the local rather than global features of books and text, consistent with the weak central coherence theory of ASD (Frith & Happé, 1994). This inherent attentional bias may be exacerbated by parents and educators who find it easier to engage children with ASD in literacy activities in which they already show an interest, leading to developed letter naming at the detriment of PCK (Lanter et al., 2012b).

Therefore, teaching strategies such as print referencing which explicitly draw children's attention to the global features of print may be of merit (Justice and Ezell, 2004). As unstructured interventions such as shared book reading appear to have little effect on the PCK of children with ASD (Fleury & Schwartz, 2017), systematic instructional approaches such as task analysis appear more appropriate (Baker et al., 2018). Justice and Ezell's metalingustic milestones framework is an example of how PCK can be broken down into component sub-skills. Given that contextualised print interest is the first milestone, Hidi and Renniger's (2006) interest development model could provide insights into how book-related tasks might be made more appealing for children with ASD. Consequently, EPs could seek to promote discussion among early years practitioners regarding how they might implement print instruction which is interesting for children with ASD, as well as systematic and explicit in nature. Longitudinal research on the impact of such interventions on PCK and later reading

comprehension would also be highly valuable.

References

Baker, J. N., Rivera, C., Devine, S., & Mason, L. (2018). Teaching emergent literacy skills to students with autism spectrum disorder. *Intervention in School and Clinic, 00*(0), 1-7. https://doi.org/10.1177/1053451218767907

Chen, Z., & Kuo, L.-J. (2017). Language and literacy development among children with autism spectrum disorder. *Journal of Childhood & Developmental Disorders, 3*(14), 1-4. https://doi.org/10.4172/2472-1786.100052

Chiang, H.-M., & Lin, Y.-H. (2007). Reading comprehension instruction for students with autism spectrum disorders: A review of the literature. *Focus on Autism and Other Developmental Disabilities, 22*(4), 259-267. doi:10.1177/10883576070220040801

Connor, C., Morrison, F., & Slominski, L. (2006). Preschool instruction and children's literacy skill growth. *Journal of Educational Psychology, 98*(4), 665-689. doi:10.1037/0022-0663.98.4.665

Davidson, M., & Ellis Weismer, S. (2014). characterization and prediction of early reading abilities in children on the autism spectrum. *Journal of Autism and Developmental Disorders, 44*(4), 828-845. doi:10.1007/s10803-013-1936-2

De Koning, B., & van der Schoot, M. (2013). Becoming part of the story! Refueling the interest in visualization strategies for reading comprehension. *Educational Psychology Review, 25*(2), 261-287. doi:10.1007/s10648-013-9222-6

Dynia, J., Brock, M., Logan, J., Justice, L., & Kaderavek, J. (2016). Comparing children with ASD and their peers' growth in print knowledge. *Journal of Autism and Developmental Disorders, 46*(7), 2490-2500. doi:10.1007/s10803-016-2790-9

Dynia, J., Lawton, K., Logan, J., & Justice, L. (2014). Comparing emergent-literacy skills and home-literacy environment of children with autism and their peers. *Topics in Early Childhood Special Education, 34*(3), 142-153. doi:10.1177/0271121414536784

Fleury, V. (2015). Engaging children with autism in shared book reading. *Young Exceptional Children, 18*(1), 3-16. doi: 10.1177/1096250613505098

Fleury, V., & Lease, E. (2018). Early indication of reading difficulty? A descriptive analysis of emergent literacy skills in children with autism spectrum disorder. *Topics in Early Childhood Special Education, 38*(2), 82-93. doi:10.1177/0271121417751626

Fleury, V., & Schwartz, I. (2017). A modified dialogic reading intervention for preschool children with autism spectrum disorder. *Topics in Early Childhood Special Education, 37*(1), 16-28. doi:10.1177/0271121416637597

Frith, U., & Happé, F. (1994). Autism: Beyond "theory of mind". *Cognition*, *50*(1-3), 115- 132. Retrieved from http://tarjomefa.com

Gong, Z., & Levy, B. (2009). Four year old children's acquisition of print knowledge during electronic storybook reading. *Reading and Writing, 22*(8), 889-905. doi:10.1007/s11145-008-9130-1

Gough, P., & Tunmer, W. (1986). Decoding, reading, and reading disability. *Remedial and Special Education, 7*(1), 6-10. doi: 10.1.1.905.7606

Hammill, D. (2004). What we know about correlates of reading. *Council for Exceptional Children, 70(*4), 453-469. doi:10.1177/001440290407000405

Happé, F., Ronald, A., & Plomin, R. (2006). Time to give up on a single explanation for autism. *Nature Neuroscience, 9*(10), 1218-1220. doi:10.1038/nn1770

Hartley, S., Sikora, D., & McCoy, R. (2008). Prevalence and risk factors of maladaptive behaviour in young children with autistic disorder. *Journal of Intellectual Disability Research, 52*(10), 819-29. doi:10.1111/j.1365-2788.2008.01065.x

Hidi, S., & Renninger, K. (2006). The four-phase model of interest development. *Educational Psychologist, 41*(2), 111-127. doi:10.1207/s15326985ep4102_4

Hudson, R., Sanders, E., Greenway, R., Xie, S., Smith, M., Gasamis, C., . . . Hackett, J. (2017). Effects of emergent literacy interventions for preschoolers with autism spectrum disorder. *Exceptional Children, 84*(1), 55-75. doi:10.1177/0014402917705855

Justice, L., & Ezell, H. (2004). Print referencing: an emergent literacy enhancement strategy and its clinical applications. *Language, Speech and Hearing Services in Schools, 35*, 185-193. Retrieved from https://pdfs.semanticscholar.org

Justice, L., & Kaderavek, J. (2002). Using shared storybook reading to promote emergent literacy. *Teaching Exceptional Children, 34*(4), 8-13. doi:10.1177/004005990203400401

Justice, L., Bowles, R., & Skibbe, L. (2006). Measuring preschool attainment of print-concept knowledge: A study of typical and at-risk 3- to 5-year-old children using item response theory. *Language Speech and Hearing Services in Schools, 37*(3), 224. doi:10.1044/0161-1461(2006/024)

Justice, L., Kaderavek, J., Fan, X., Sofka, A., & Hunt, A. (2009). Accelerating preschoolers' early literacy development through classroom-based teacher–child storybook reading and explicit print referencing. *Language Speech and Hearing Services in Schools, 40*(1), 67. doi:10.1044/0161-1461(2008/07-0098)

Justice, L., Logan, J., Kaderavek, J., & Dynia, J. (2015). Print-focused read-alouds in early childhood special education programs. *Exceptional Children, 81*(3), 292-311. doi:10.1177/0014402914563693

Kimhi, Y., Achtarzad, M., & Tubul-Lavy, G. (2018). Emergent literacy skills for five kindergartners with autism spectrum disorder: A pilot study. *Journal of Research in Special Educational Needs, 18*(3), 211-221. doi:10.1111/1471-3802.12406

Koppenhaver, D., & Erickson, K. (2003). Natural emergent literacy supports for pre-schoolers with autism and severe communication impairments. *Topics in Language Disorders, 23*(4), 283-292. doi:10.1097/00011363-200310000-00004

Lanter, E., Freeman, D., & Dove, S. (2012a). Procedural and conceptual print-related achievements in young children with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities, 28*(1), 14-25. doi:10.1177/1088357612459270

Lanter, E., Watson, L., Erickson, K., & Freeman, D. (2012b). Emergent literacy in children with autism: An exploration of developmental and contextual dynamic processes. *Language Speech and Hearing Services in Schools, 43*, 308-324. doi:10.1044/0161-1461(2012/10-0083)

Lavine, L. (1977). Differentiation of letterlike forms in prereading children. *Developmental Psychology, 13*(2), 89-94. doi:10.1037/0012-1649.13.2.89

Levy, B., Gong, Z., Hessels, S., Evans, M., & Jared, D. (2006). Understanding print: Early reading development and the contributions of home literacy experiences. *Journal of Experimental Child Psychology, 93*(1), 63-93. doi:10.1016/j.jecp.2005.07.003

Lonigan, C., Purpura, D., Wilson, S., Walker, P., & Clancy-Menchetti, J. (2013). Evaluating the components of an emergent literacy intervention for preschool children at risk for reading difficulties. *Journal of Experimental Child Psychology, 114*(1), 111-30. doi: 10.1016/j.jecp.2012.08.010

McGinty, A., & Justice, L. (2009). Predictors of print knowledge in children with specific language impairment: Experiential and developmental factors. *Journal of Speech Language and Hearing Research, 52*(1), 81. doi:10.1044/1092-4388(2008/07-0279)

McGinty, A., Justice, L., Piasta, S., Kaderavek, J., & Fan, X. (2012). Does context matter? Explicit print instruction during reading varies in its influence by child and classroom factors. *Early Childhood Research Quarterly, 27*(1), 77-89. doi:10.1016/j.ecresq.2011.05.002

Morgan, B., Maybery, M., & Durkin, K. (2014). Weak central coherence, poor joint attention, and low verbal ability: Independent deficits in early autism. *Developmental Psychology, 39*(4), 646-656. doi:10.1037/0012-1649.39.4.646

Nation, K., Clarke, P., Wright, B., & Williams, C. (2006). Patterns of reading ability in children with autism spectrum disorder. *Journal of Autism and Developmental Disorders, 36*(7), 911-919. doi:10.1007/s10803-006-0130-1

National Early Literacy Panel. (2008*). Developing early literacy: Report of the National Early Literacy Panel*. Washington, DC: National Institute for Literacy. Retrieved from https://www.nichd.nih.gov

Oakhill, J., & Cain, K. (2012). The precursors of reading ability in young readers: Evidence from a four-year longitudinal study. *Scientific Studies of Reading, 16*(2), 91-121. doi:10.1080/10888438.2010.529219

O'Connor, I., & Klein, P. (2004). Exploration of strategies for facilitating the reading comprehension of high-functioning students with autism spectrum disorders. *Journal of Autism and Developmental Disorders, 34(*2), 115-127. doi:10.1023/b:jadd.0000022603.44077.6b

Pamparo, V. (2012). *The effect of dialogic reading on early literacy outcomes for children with autism spectrum disorders* (Doctoral dissertation). University of Washington, Seattle, WA. Retrieved from http://hdl.handle.net/1773/20842

Piasta, S., Justice, L., McGinty, A., & Kaderavek, J. (2012). Increasing young children's contact with print during shared reading: Longitudinal effects on literacy achievement. *Child Development, 83*(3), 810-820. doi:10.1111/j.1467-8624.2012.01754.x

Renniger, A., & Hidi, S. (2011). Revisiting the conceptualization, measurement, and generation of interest. *Educational Psychologist, 46*(3), 168-184. doi:10.1080/00461520.2011.587723

Sénéchal, M., & LeFevre, J-A. (2002). Parental involvement in the development of children's reading skill: A five-year longitudinal study. *Child Development, 73*(2), 445-460. doi:10.1111/1467-8624.00417

Tunmer, W., Herriman, M., & Nesdale, A. (1988). Metalinguistic abilities and beginning reading. *Reading Research Quarterly, 23*(2), 134. doi:10.2307/747799

Vygotsky, L. (1978). Mind in society: The development of higher psychological processes. Cambridge, MA: Harvard Press.

Westerveld, M., Paynter, J., O'Leary, K., & Trembath, D. (2018). Preschool predictors of reading ability in the first year of schooling in children with ASD. *Autism Research, 11*, 1332-1344. doi:10.1002/aur.1999

Westerveld, M., Paynter, J., Trembath, D., Borucki, Y., & O'Leary, K. (2017a). *Shared book reading intervention for preschoolers on the autism spectrum. Final report.* Cooperative Research Centre for Living with Autism, Brisbane. Retrieved from https://www.autismcrc.com.au

Westerveld, M., Paynter, J., Trembath, D., Webster, A., Hodge, A., & Roberts, J. (2017b). The Emergent Literacy Skills of Preschool Children with Autism Spectrum Disorder. *Journal of Autism and Developmental Disorders, 47*(2), 424-438. doi:10.1007/s10803-016-2964-5

Westerveld, M., Trembath, D., Shellshear, L., & Paynter, J. (2016). A systematic review of the literature on emergent literacy skills of preschool children with autism spectrum disorder. *The Journal of Special Education, 50*(1), 37-48. doi:10.1177/0022466915613593

Whitehurst, G., & Lonigan, C. (1998). Child development and emergent literacy. *Child Development, 69*(3), 848-872. doi:10.1111/j.1467-8624.1998.tb06247.x