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Parent Perceptions of Literacy Development for Females Later Diagnosed With Autism Spectrum Disorder

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A thesis submitted to the faculty of
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ABSTRACT

Parent Perceptions of Literacy Development for Females
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Little is known about the early literacy development of girls later diagnosed with autism spectrum disorder (ASD) or autism traits. In this study, parents of 21 girls later diagnosed with ASD or as having significant ASD traits were each interviewed about their daughter's early literacy development.

In general, findings indicated that parents reported their daughters' early success with word level reading. Initially, parents conflated that one area of reading success to also indicate an overall accomplishment in broad reading skills. Findings also indicated that parents simultaneously acknowledged successful word level reading, yet over time noted specific challenges in early literacy domains such as speaking, listening, writing, and reading comprehension. Implications for practice and directions for future research are discussed.

Keywords: females, autism, parent perceptions, early literacy development

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

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DESCRIPTION OF THESIS STRUCTURE AND CONTENT

This thesis, “Parent Perceptions of Literacy Development for Females Later Diagnosed with Autism Spectrum Disorder,” is written in a hybrid format. This hybrid integrates thesis requirements in a journal format. The preceding pages of this thesis adhere to the requirements for submission to Brigham Young University.

The literature review is included in Appendix A. In this thesis, Appendix B covers information involving the Institutional Review Board Approval Letter to conduct this research. Appendix C includes the Individual Interview Protocol. Appendix D includes a sample of a coding worksheet used for cross case analysis. Appendix E includes a list of key terms relevant to literacy and autism.

In this thesis, you will find two reference lists. The first reference list contains all the references included in the journal-ready article. The second reference list includes all of the citations used in the Appendix A, “Review of the Literature.”

Introduction

Currently one out of every 59 children in the United States is diagnosed with Autism Spectrum Disorder (ASD; Barnard-Brak & Reschly, 2019). Research suggests that boys are diagnosed at a much higher rate than girls. In fact, boys with autism are typically diagnosed at three times the rate that girls are diagnosed (Loomes et al., 2017). Nobody knows why girls are identified at a lower rate. However, researchers suspect that many children, particularly those who are female, are never or are later diagnosed (Milner et al., 2019).

In terms of literacy development, individuals with ASD may experience difficulties with literacy including inferencing, synthesizing information, and comprehending (Grimm et al., 2017). Children with autism or autism traits tend to struggle with communication (American Psychiatric Association, 2013; Diehl et al., 2006) and may experience academic, social, and educational challenges (Baldwin & Costly, 2016). For these reasons, we want to explore the patterns of literacy development of girls who were later diagnosed with ASD or have ASD traits that could possibly target additional information about the literacy development of individuals with autism.

Early Literacy Development

The *Simple View of Reading* (SVR; Gough & Tunmer, 1986; see Figure 1) proposes that in depth meaning making is the product of decoding words and linguistic comprehension skills (Suggate et al., 2018). Schema theory adds that for meaningful comprehension to occur an individual must understand content, linguistic and formal schemata (Paul & Christopher, 2017). Early literacy encompasses the development of a child's ability to talk, listen, write, and interact with text—a process that naturally evolves throughout childhood interactions and provides the foundation for lifelong literacy (Suggate et al., 2018).

Autism and Early Literacy Development

Research has revealed that many children who have been diagnosed with ASD struggle with the ability to answer questions involving inferencing yet are able to answer factual questions regarding the same context or story (Diehl et al., 2006). In addition, regardless of the placement on the autism spectrum, children diagnosed with ASD often demonstrate strong skills in word recognition yet experience significant delays in reading comprehension (Nation et al., 2006; Randi et al., 2010).

Furthermore, Johnson and Rakison (2006) revealed that preschool aged children diagnosed with autism showed significant delays in the area of *concept formation* as they performed at the level of infants in the area of comprehension, rather than typically developing children equal to their preschool age (Randi et al., 2010). Randi et al. (2010) found that children identified with autism spectrum disorder were not able to place things in categories when they were asked to complete a task that required abstract thinking, such as sorting based on certain "features of animate and inanimate objects" (p. 894).

Parents' Perceptions

Increasingly researchers are looking to understand parents' perceptions. Geelhand et al. (2019) probed parents' perceptions of the severity of autism symptoms between boys and girls. Gray et al. (2021) and Sproston et al. (2017) explored parents' views on educational services for daughters with ASD. Another study examined more than 300 parents' reports of ASD symptoms in their previously diagnosed boys or girls (Sutherland et al., 2017). While parents rated few differences between the girls and boys with ASD in terms of their repetitive behaviors, limited interests, communication and social strengths, Sutherland et al. (2017) noted one distinction—parents reported daughters, not sons, as attempting to mask/camouflage difficulties. Given the

disparity of diagnosis rates and the academic and social struggles that accompany ASD and the insight parents might lend, researchers are seeking to understand development and literacy trajectories for girls with ASD (Grimm et al., 2017; Loomes et al., 2017).

Statement of the Problem

Autism is being diagnosed more frequently, yet there continues to be a gap in diagnosis between genders (Loomes et al., 2017). Many girls who are diagnosed with ASD are either diagnosed later or never at all (Milner et al., 2019). Compounding the process of identification and implementation of support, scant research focuses or includes a meaningful sample of girls with autism (Tint & Weis, 2018). This lack of research limits educators,' parents,' professionals,' and students' abilities to access needed educational and family services understanding and support. There is also a lack of understanding of how girls who have ASD process literacy skills such as inferencing and comprehension skills (McIntyre et al., 2017).

Statement of the Purpose

Individuals with ASD may experience difficulties with literacy including inferencing, synthesizing information, and comprehending (Grimm et al., 2017). The purpose of this study is to explore parents' recollections of the developmental literacy experiences of young girls later identified with ASD or ASD traits.

Research Questions

Congruent with the purpose of this study, the following research questions will be examined.

1. What are the parent perceptions of early literacy development of young girls who were later identified with ASD or had significant ASD traits?

2. In what areas of literacy did young girls, later identified with ASD or had significant ASD traits, seem to demonstrate strengths or experience challenges?

Method

Approval was obtained from Brigham Young University's Institutional Review Board (IRB) for this study and parent participants consented to the interview. The participants, setting, procedures, research design, and analysis are described in the following sections.

Theoretical Framework

The SVR theory suggests that in order to read and understand text, individuals need strong skills in both decoding unfamiliar words and understanding them (Gough & Tunmer, 1986). Under the SVR theory, rapidly and accurately calling out individual words (word calling) when interacting with text, would not be considered reading unless there was an indication that the meaning of the words was comprehended.

Development of schema is important for comprehension. One needs to obtain developed schema in order to begin to understand the world around them, understand social interactions, create relationships, and connect with the world. Che (2014) states, "schema is the mental structures which store our knowledge, while the theory of comprehension based on schema is called schema theory" (p. 441). One can think of schema as blocks of knowledge one acquires through experiences that builds an understanding of their world. Schemata is knowledge regarding principles and how they interrelate to multiple situations (Paul & Christopher, 2017).

Schema theory suggests that all these experiences or knowledge are stored into compartments. These compartments of information fall under three main areas of schemata. These are linguistic, formal, and content schemata (Paul & Christopher, 2017). Schemata's role

is paramount in accounting of previous knowledge interacting with fresh knowledge in how one perceives, speaks, thinks, and remembers (McVee et al., 2005).

Linguistic Schemata

Linguistic schemata are in reference to the readers' language ability in vocabulary, grammar, and idioms which provides a foundation for other types of schema. If one takes away linguistic schemata, it would prohibit a reader from being able to decode and understand text (Paul & Christopher, 2017). Stronger linguistic ability may yield stronger understanding of written text.

Formal Schemata

Formal schemata are composed of the individual's knowledge of genres, various texts, and how to use the types of texts such as text organization, structure of language, vocabulary, grammar, and how they differ. Readers utilize formal schema to help comprehend information from a text (Paul & Christopher, 2017).

Content Schemata

Content schemata refers to the background knowledge that an individual has of a topic or subject within a given text. This includes familiarity of a topic, cultural understanding, and previous experiences (Paul & Christopher, 2017). This is a key to understanding a given text. When an individual has a new experience or is given new information, the individual utilizes his/her own background knowledge to assimilate the new knowledge (Twiss, 1997). Imagine learning about a boat and one has never seen a body of water, much less a boat. Without content schema, understanding and relating to a text can be a daunting task.

Schema Theory and Literacy Development in Individuals With Autism

With schema theory, comprehension is a process between the background knowledge of the reader and the content of the text. This type of exercise demonstrates one's ability to connect the text and one's background knowledge to derive meaning (Paul & Christopher, 2017). A common attribute observed with people in autism is their challenge to focus on a global meaning, with perseveration on a specific topic or subject (Norbury & Nation, 2011). This can limit their ability to have a broadened and well-rounded background knowledge. With these potential limitations and the understanding that as one comprehends, one is utilizing one's understanding of the world at the same time (Paul & Christopher, 2017), one may conclude that an individual with autism could have limitations in their ability to comprehend and connect with text. In addition, as people gain experiences, their schema is adjusting and expanding at the same time. However, schemata are not constant. Rather, they are constantly changing with new educational experiences and daily activities. This type of change in schema is an indicator of cognitive development of the reader (Khanam et al., 2014). As an individual reads, misunderstanding or confusion may arise when schemata in linguistic, formal, or content are absent, or when an individual is unable to identify clues to activate or connect to the existing schemas (Che, 2014).

The research indicates reasons why some students have challenges with comprehension. First, students may lack proper schema. Second, students may possess adequate schema, but may not know how to activate their schema if the author does not provide concrete clues to activate that schema (Paul & Christopher, 2017).

Current research suggests that individuals with ASD may experience significant challenges with reading comprehension. In this research project, we studied the perceptions of parents relative to their daughters' (who were later diagnosed with ASD or as exhibiting

significant traits of ASD) literacy development. Therefore, the theoretical frameworks which undergirded the current study include the SVR and Schema theory.

Participants

Study participants included parents/guardians of females with autism or autism traits. The females with autism or autism traits (ages 14 and older) were members of a larger study centered on understanding the lived experiences of these participants. This study was a follow-up sub-study with the parents/guardians to explore and examine the parents' experiences and perceptions regarding their daughters' developmental histories, especially related to literacy development.

This sample of parents consisted of 23 individuals from across the United States. Parents were selected for this sub-study based on their daughter's Broad Autism Phenotype Score (BAP-Q; >3). The BAP-Q is a questionnaire for parents/guardians that measures personality and language characteristics of the broader autism phenotype (Hurley et al., 2007). In this way, this sampling method allowed the researcher to select information-rich participants in order to gain in-depth insight into the research questions (Tracy, 2020).

In all, 22 interviews were completed with 23 participants. One interview included two individuals and the other 21 interviews were conducted one-on-one with individual participants. The majority of individuals were middle to upper middle class (n=21, 90%). Most of the interviews were conducted with participants who were White (n=18, 78%); five members were of the BIPOC community (Black, Indigenous, and People of Color). Eighteen participants (78%) identified as a mother of a daughter with autism or autism traits. Interviews conducted with participants other than mothers included interviews with two fathers (both White) and one interview with a grandmother (White) who was the legal guardian of her granddaughter with

autism. One interview included both mother and father together (both were White). The average age of the participants was 49 years old with an age range of 37–74 years old.

Parents selected for the study were contacted by a research team member via phone or email and asked if they were willing to participate in the study. These parent participants were compensated with $10 per hour on a gift card, which was sent to them after completion of the interview. Participants were permitted to stop the interview at any time and were informed that they would still receive the gift card. However, all participants completed the interview.

Settings

In depth, semi-structured interviews were scheduled according to each participant's convenience. And as such were conducted over an online platform (such as Zoom). Each interview was audio-recorded and then transcribed verbatim.

Interviews

In-depth semi-structured interviews were conducted as this type of interviewing allows for probing. This type of approach to the interviews allowed the researcher to listen to the participants, reflect on what the participants are saying, then adapt to what participants are saying by probing participants' answers to understand information more fully related to the research questions (Tracy, 2020). Interviews are valuable as they can provide background and information about a topic that cannot not easily be accessed or observed (e.g., the child literacy development of adolescent or adult women with autism or autism traits; Tracy, 2020). In addition, the researcher's interview stance is important. In this study, the researcher adapted the interview stance of deliberate naïveté. In this interview stance, the interviewer deliberately brackets presumptions (e.g., set aside preconceived notions of autism and what they mean in the study) in order to maintain an openness to findings which are unforeseen or new (Tracy, 2020).

Procedures

Each interview lasted approximately 30 minutes to one hour and was guided by an interview protocol which was employed to guide the researcher in exploring and understanding each participant's perceptions during the interviews. Participants were individually interviewed one time. The premise of the interviews was predicated on the stance noted above about the importance of open communication with and respect and empathy for the participants is vital. In addition, similar interview protocols were used, then adapted for each participant. Interview protocols served as a platform to gaining knowledge and understanding from the participants. Information derived throughout the interview process were kept confidential and not disbursed between study participants. Prior to conducting interviews, participants were presented and required to sign consent forms to engage in the interviews.

Research Design

Interpretative Phenomenological Analysis (IPA; Smith & Osborn, 2014) was employed analyze the data. This type of qualitative inquiry methodology can be used to understand participants' personalized interpretations of a particular phenomenon. It was developed to explore how people make sense of their own life experiences (Dewinter et al., 2017). In IPA designs, researchers gather evidence from participants who share similar circumstantial experiences (e.g., parents of daughters who were later diagnosed with ASD or autism traits; Larkin et al., 2019).

IPA incorporates ideographical (a deep-seated empathetic view of participants); phenomenological (a concentration on experienced events), and analytic methods (Smith & Osborn, 2014). Consequently, IPA combines a double hermeneutic, meaning that the researcher seeks to understand the members as they are attempting to understand specific life events or

circumstances (Smith, 2011). Researchers implementing IPA are urged to organize a comprehensive investigation of evidence from within and across study participants.

Research Team

The research team consisted of 11 members. The research team was led by a female assistant research professor who is experienced in conducting qualitative research, specifically in conducting interviews and analyzing data from such interviews. Team members included both graduate (*n*=5) and undergraduate students (*n*=5). Most of the team members were female (*n*=10) and White (*n*=9). There was one male (White) undergraduate student and two students (1 undergraduate and 1 graduate) who self-identified as members of the BIPOC community.

Training of research teach members was provided by the assistant professor. Team members met twice a month for two semesters to learn and practice qualitative methodology including IPA interviewing and data analysis. One graduate-level team member interviewed each of the participants. Graduate and undergraduate research members helped to transcribe, mine data, and complete initial data analysis, including providing citational authority for initial codes. In the final stages of the analysis, the graduate team member who had interviewed all of the participants met weekly with the research professor to discuss codes, categories, and final themes, as well as to monitor trustworthiness.

Data Analysis

The data for this study were collected via semi-structured interviews with parents of daughters later diagnosed with autism or autism traits. The data were then be analyzed in two distinct phases. In phase one, the data were reviewed through cycles of repeated readings. Upon completion of each consecutive review, the research team identified patterns or codes. Data episodes were compiled with evidence from the interview transcripts to support phase one codes

and to create participant profiles. In phase two, participant profiles with accompanying data episodes were compared and contrasted across cases. This process allowed themes that stand true across cases to be generated from the evidence from the data. Themes were then back checked with the original transcripts to ensure accuracy of representation. The researcher was also careful when working with the data to look for and understand deviant cases, or cases that may be different from the others. Rather than numerical representation, themes were generated and developed based on salience to the research questions. These themes were then worked into a narrative to explain the findings of the study.

Coding

This study incorporated an Interpretive Phenomenological Analysis (IPA) as the *analysis strategy*. The purpose of utilizing IPA was the advantage of being able to look at issues in a greater breadth and depth which allowed the researchers to capture real life experiences of the literacy development of girls that had demonstrated ASD traits or were later diagnosed with ASD. This served as a greater platform of which to build the research rather than closed-ended questions that would affirm positive or negative to developmental questions. Transcriptions of each interview were downloaded into a word document which served as a tool to read, code, and analyze the data. The analysis was completed through iterative rounds of coding both within and across the participants.

Within-Case Analyses. The goal of this study was to understand the perceptions of parents about the early literacy development of their daughters who were later diagnosed with ASD or displayed autism traits. Two major *a priori* codes were used during first cycle coding in order to organize the data. These a priori codes were: (a) early language development progression, and (b) early language development skills. Binding the data according to these a

priori codes supported the researcher in organizing the data. Coders worked through all 22 interview transcripts and organized the data according to these first two a priori codes. Figure 2 provides an example of how the a priori codes were used to help understand the data from each participant. Next *process-coding* was used to help the researcher understand shifts or changes in literacy development over time. Table 1 provides a sample of the complete codes after this cycle was completed.

Cross-Case Analysis. Next, the research team engaged in multiple rounds of data reviews across participants. The purpose was to more deeply understand how the codes represented perceptions across all of the participants (see Figure 3). Next the team met in multiple sessions to reduce the codes into meaningful themes and subthemes to capture the meaning of the participants. This resulted in two overarching themes.

Theme 1: Parents Reported Early Literacy Development

Theme 2: Parents Simultaneously Acknowledged Daughters' Advanced Fluency in Word Level Reading and Challenges With Other Early Literacy Development Skills

Trustworthiness

Tracy (2020) suggested eight *big tent* criteria for researchers to consider in order to ensure excellent qualitative inquiry. These are: (a) worthy topic, (b) rich rigor, (c) sincerity, (d) credibility, (e) resonance, (f) significant contribution, (g) ethical, and (h) meaningful coherence.

Worthy Topic. To get at the idea of a worthy topic, Tracy (2020) suggests researchers ask themselves a series of questions regarding the study's theoretical relevance, practical application, and/or opportunity for social transformation. In addition, researchers are encouraged to think about whether or not their study is interesting, helps to solve a problem or provide something new to the field. The topic for this study is a worthy topic because autism is on the

rise with one in 59 children being diagnosed (Barnard-Brak & Reschly, 2019). In addition, girls are diagnosed much less frequently; one girl to every three boys (Loomes et al., 2017). This study seeks to understand if there were any indications of challenges with inferring during literacy development (a possible early indicator of ASD). For these reasons, this study contains a worthy topic.

Rich Rigor. Rich rigor includes the idea that the researcher has collected appropriate and sufficient data and adopted appropriate data collection and analysis practices. One aspect of rigor in qualitative inquiry is concerned with information power (Malterud et al., 2016). Information power is provided by the participants. In other words, in order for a qualitative interview study (such as this study) to be considered rigorous, researchers are concerned with how many participants are needed to reach the appropriate information power for the study. Five characteristics are considered in order to understand whether or not a study has sufficient information power. These characteristics are: (a) study aim, (b) sample specificity, (c) use of established theory, (d) quality of dialogue, and (e) analysis strategy (Malterud et al., 2016).

Study aim is concerned with whether the study aim is narrow or broad. The broader the study aim, the larger the interview sample size needed. The aim for this study is narrow. The researcher is seeking to understand the literacy development of females with autism or autism traits.

Sample specificity is related to how closely interview participants experienced the phenomena under inquiry. In this study, the parents of females with autism or autism traits are intimately connected with their daughters' literacy development; therefore, a smaller interview sample size is adequate. The daughters were not interviewed because we wanted to understand parents' perceptions of their daughters' early literacy development.

In order to have sufficient information power, researchers must also contemplate whether or not they will apply *established theory* or not. Studies with few study participants can be rigorous if they uncover new learning relative to established theory. This study examined whether or not females with autism or autism traits had challenges with inferring during their literacy development. Individuals with ASD exhibiting challenges with inferencing has been established in the literature (Lucas & Norbury, 2015).

An interview with strong dialogue between the participant and interviewer requires fewer participants to reach adequate information power (Malterud et al., 2016). It is hoped that the interview protocol as well as researcher training in interviewing skills allowed for a high level of *dialogue quality* within each interview.

Sincerity. This quality marker encourages researchers to discuss self-reflexivity or an honest awareness of one's own identity and approach to the data while maintaining a respect for the participants and other research stake holders. To this end, my perspective as a researcher is provided below.

Statement of Positionality. In my work as a teacher of individuals with special needs for the past 16 years, I have helped to mold the academic and social abilities of some of our most fragile learners. I have witnessed many students misplaced within the school system in classes that were not a good match for their present or underlying needs. I have watched parents struggle with a sense of hopelessness without knowing what to do, how to access resources, or how to help their growing and struggling children. I have noticed that when parents and children are misdiagnosed or later diagnosed, many do not receive needed resources while others end up slipping through the cracks in quiet silence and deep desperation. Many of these students were not able to progress to their highest potential. I have often wondered in bewilderment what more

I can do as a special educator to truly reach children with autism or autism traits. Some of these children have robust challenges with connecting to peers, understanding their reading, or making sense of the world around them. I know what it looks like when children are either mis- or under-diagnosed or diagnosed later. If diagnosed earlier, they could receive intervention much earlier. I understand what it looks like when these children are unable to receive services that will empower their ability to soar academically and socially. Due to these deep questions and concerns, this has led me to seek further light and knowledge through research focused to better understand girls or women with autism or autism traits and their literacy development needs at an early age.

Credibility. In qualitative research, credibility means a sense of dependable trustworthiness that the researcher is expressing a reality that seems plausible (Tracy, 2020). Credibility in qualitative research can be achieved when the researcher provides an abundant detail about the participants, processes, and activities of the research. As such, a careful description of all study activities is provided.

Resonance. Resonance speaks to the transferability or naturalistic generalization of the research. Naturalistic generalization includes a process in which readers appreciate then intuitively apply a study's findings to their own situations (Tracy, 2020). This study provided interviews from parents of girls who have been diagnosed with autism or autism traits. The results from this study lend to naturalistic generalization and may aid parents and teachers to deeply consider what it means when young girls demonstrate challenges with inferencing skills along with other autism traits.

Significant Contribution. Significant contribution is concerned with how the findings in the study extend, transform or complicate a body of knowledge, theory or practice in new and/or

important ways including new implications for practice (Tracy, 2020). It is hoped that the findings from this study will inform ways to work with girls with autism in new and effective ways relative to reading— specifically reading comprehension and inferencing skills.

Ethical. After the university Institutional Review Board (IRB) approved the study, the data were collection. All aspects of this study followed the approved IRB guidelines. Individual names and identifying information were kept confidential.

Meaningful Coherence. To reach meaningful coherence means that researchers work to ensure that research studies adhere to the following standards:

> (a) achieve their stated purpose; (b) accomplish what they espouse to be about; (c) use methods and representation practices that partner well with espoused theories and paradigms; and (d) attentively interconnect literature reviewed with research foci, methods, and findings. (Tracy, 2010, p. 848)

In other words, to achieve meaningful coherence in this current study which is interested in the developmental histories relative to literacy of later diagnosed adolescent or adult females with autism or autism traits, a meaningful coherent study means the researcher actually examines the developmental histories relative to literacy of later diagnosed adolescent or adult females with autism or autism traits.

Results and Discussion

This study discusses 23 parents' perceptions of their daughters' literacy development. Findings on the data analysis included two overarching themes with reductive subthemes. The two overarching themes were (a) parents report early reading development, and (b) parents simultaneously acknowledged daughters' advanced fluency in word level reading and challenges with other early literacy development skills such as speaking, listening, writing and reading

comprehension. This discussion will connect the parents' perceptions with the SVR Theory and Schema Theory. As is common in qualitative reporting of the findings, the themes and subthemes will be accompanied by thick descriptions of the participants' lived experiences as described below.

Main Theme One

The first main theme involved parents identifying their daughters as early readers. Specifically, the first main theme was identified as, "Parents report early reading development." All of the participants except one perceived their daughters' literacy development as emerging quite early in their development. This early emergence of children's reading skills was typical of parents' descriptions. One parent offered the following description of her daughter's reading path:

> Yes, uhum, she is super intelligent. And so she knew all her ABCs, and could recognize them by the time she was eighteen months old. And she knew, I worked with her, with little words like "cat," "dog," "bat," by the time she was like three or four, and she could read. [PFAS-0001]

Similarly, another parent shared, "She was reading by age three" [PFAS-0002]. The following parents seemed to agree that their daughters' reading development came early, "She's always loved to read, and reading came easy to her" [PFAS-0003]. "Um, she was already reading at like, you know, four years old" [PFAS-0004]. A different parent shared how her daughter was able to read high level books at an early age,

> She read her first book at age four. She, um, she was able to read the Magic Tree House um, chapter books. I don't know if you know what those are, they're about a second-

grade level, when she was five. Um, she comprehended easily. At eight she was reading everything. She had read all the Harry Potters by the time she was eight. [PFAS-0005]

Sub Theme: Voracious Readers

In addition to perceiving that their daughters learned to read early, many of the parents described their daughters as voracious readers. One parent remarked, "She would read all the time. She was a voracious reader." [PFAS-0002]. A different parent seemed to agree that her daughter was prodigious in her reading, "She did read *a lot*. Yes, she liked to read a lot" [PFAS-0006]. Further illustrating the idea of voracious reading, the following parent described that even though her daughter did not attend preschool, and had little knowledge of letters, it only took a very short time in Kindergarten for reading to seem insatiable for her daughter, "So when she started kindergarten, she didn't know all her letters, but she didn't go to preschool, so she caught up and became a voracious reader" [PFAS-0007].

Another parent described how her daughter would hyper focus and read, "She would get very, very hyper focused then read a lot" [PFAS-0002]. Likewise, the following parent shared that all her daughter wanted to do was read, "She was four years old. And that's all she, she wanted to do was read. She just loved reading, and we'd buy books and go to the library and, I always felt like she excelled at that" [PFAS-0004].

Sub Theme: Advanced, Above Grade Reading

The majority of participants not only explained how their daughters' reading came early and seemed voracious, they also described their daughters as advanced and/or above grade level in reading, "I think she was advanced. Uh, in the top, you know, ninetieth percentiles, in all of her standardized tests as far as reading goes" [PFAS-0008]. Another participant explained,

"She was always ahead and excelled at reading. She picked it up very fast, she was always reading, um, multiple grades ahead of where she was supposed to be" [PFAS-0009].

Likewise, the following vignette illustrates this idea of advanced reading:

> They recommended her for the gifted program. And the day she took the test I picked her up from school and I was like, 'what, how was school' and she said 'um, well we took this test,' and I was like 'oh' and she was like 'I read at a twelfth grade level,' and I am like 'how do you know that?' and she said 'I looked on the test and I could have gone further, but we ran out of time so.' [PFAS-0010]

Sub Theme: Reading Happened Like Magic

One surprise finding from the data analysis was that several participants described that while reading came early, it seemed to happen suddenly, almost by magic as it were. One participant shared how she did nothing to teach her daughter to read, yet her daughter just started to read, "She learned to read before she could talk really. I mean, so, as near as I can tell. I never remember teaching her anything about blending words, blending sounds, decoding, any of that kind of stuff. She just read" [PFAS-0011]. Seemingly in awe, another parent participant shared that her daughter could read anything the teacher would put in front of her at a young age, "It just seemed like she could suddenly read anything. Anything we or the teachers put in front of her to read she could read. Yeah" [PFAS-0012]. Furthermore, the following participant described how her daughter progressed suddenly and quickly from the lowest to the highest reading group in Kindergarten:

> She started kindergarten about a month after she turned five. She was on the younger end, umm, she didn't know any letters. I mean I taught her to write her name and that was all. One of the moms, who was a teacher's aide said to me one day, 'I don't know why your

> daughter is in the lowest reading group —the other kids in that reading group are the naughty boys' and I said 'What!? She's in the lowest reading group?' She's like 'Yeah, it's your daughter and the three little naughty boys.' Come to find out they [Kindergarten students in the class] were supposed to get on and do this little reading thing clicking on stuff [on the computer] and my daughter would just sit there. It was not interesting to her. She'd kinda look at the screen, and then she might click on something, and then she'd twiddle her hair and doo duh doo like that. It was just not engaging; there was no teacher involvement and so she wouldn't finish the exercise. That's how it was decided and she stayed in that lowest reading group!! I thought 'Well holy cow!! No wonder!! She's not—this is not working at all for her.' So, we started over, she got an awesome teacher, and within two months she was in the top reading group, She's reading, umm—I mean it just clicked—[snaps]. It was just—it's like amazing—as soon as she was given instruction – she read. [PFAS-0007]

In a similar fashion the vignette below illustrates how the parent participant viewed reading happening suddenly,

> It just sort of happened. I mean, like she would always *talk* about letters, a lot... But I didn't really think it was strange 'til we were at a playgroup, when she was three. They had sidewalk chalk. And I remember that she was writing everybody's name in the family. So, she'd write Grandma [Name], Grandpa [Name], my brother's name, my sis-, you know, my sister-in-law's name. You know, all spelled out perfectly and all the other moms were like, 'What are you doing to teach her this?' And I'm like, 'Literally nothing! I mean we read books to her, but I haven't really taught her anything! It just sorta, happened! [PFAS-0002]

Sub Theme: Subtle Issues With Advanced, Voracious Reading

Although the majority of parents indicated that reading came early, seemed an insatiable need, and was advanced, many of the participants seemed to perceive a few subtle issues with their daughters' reading. For example, several parents described how their daughter developed sleep issues because of the hyper focus on reading.

> Even though she was reading by age three— she doesn't feel confident with it unless she can do it really, really well. So, she would read all the time. In fact, we have, there was sleep issues when she'd just sit there and read for hours." [PFAS-0002]

In a similar way, another parent described her daughter as a great reader, but seemed to indicate some worry about her daughters' anxiety over not reading correctly, "Um, she was always a good reader. Always, again, always got the answers. But again, she was paranoid to get the wrong ones, but she, she, she liked to read" [PFAS-0013].

Parents also described missed social opportunities because of the focus on reading,

> Reading. She spent so much time reading in school in lieu of social opportunities. Most kids in school can't get enough of their friends. She just didn't spend a lot of time with friends. She occupied herself with books. [PFAS-0007]

Further, even though parents described their daughters as excelling in reading, and seemed to conflate reading success with word calling. In general, parents indicated a subtle concern about their daughters' lack of or lagging comprehension skills. One commented, "She read very well. It just seemed to Um, first, I think, you know, when you're first beginning, she would just try to sound all of the words, so I think comprehension always kind of came a lot later" [PFAS-0004]. The following parent described how her daughter thought she was reading but in fact was memorizing text,

> She was a great reader. I would read Dr. Suess books for her and she memorized them. She couldn't, she would think she was reading them, but she didn't know the words, she would, she memorized them. She couldn't read in the back without knowing what the first words were. [PFAS-0010]

In describing the early literacy development of their daughters later identified as having significant ASD traits or diagnosed with ASD, all but one parent recalled that their daughters reading early, voraciously—a skill that happened as if by magic. However, full-fledged reading consists of the combination of both the capacity to decode words and activate linguistic comprehension (Suggate et al., 2018; see Figure 2). Parents also noted that there were some difficulties that accompanied the reading including missed social opportunities and missed sleep.

Main Theme Two

The second main theme involved parents' perceptions of their daughters' fluency. More specifically we identified this topic as, "Parents simultaneously acknowledged daughters' advanced fluency in word level reading and challenges with other early literacy development skills such as speaking, listening, writing and reading comprehension."

Sub Theme: Speaking

One of the domains of early literacy development that parents acknowledged seemed to be challenging at times was speaking. Multiple parent participants noted that their daughter struggled with speaking for various reasons.

Speech Therapy. One area of speaking that seemed challenging for participants' daughters was a delay in speaking. Multiple parent participants described how their daughters needed support from a speech language therapist, "She did go to speech therapy for her "S's" and "L's" I think in second or third grade" [PFAS-0010].

The following participant also shared how her daughter participated in speech therapy because the daughter seemed delayed in learning to talk, “She was just slower in learning to talk. She did go to [place’s name] speech therapy. Yeah, and now she doesn’t stop talking ever [laughs]. Once she learned she was always opening her mouth” [PFAS-0012]. Another parent participant shared how her daughter had also been delayed in language,

> She had a really hard time; she was very delayed in language. For example, she couldn’t understand prepositions like over, under, and around. The teachers would act it out for her and she could mimic. But then if they said the words, she would be like: “I don’t know what you are talking about” [PFAS-0011].

Several participants shared how they felt language development happened suddenly, “She wouldn’t say much, and then she went from not saying much to speaking full sentences. It’s almost like she wouldn’t say anything until she knew she could do it well” [PFAS-0002]. It was noteworthy to the research team how descriptions of language developing suddenly mirrored descriptions of how word level reading seemed to develop suddenly as well.

Not all of the parents described daughters’ attending speech therapy for delayed language. For example, the following vignette demonstrates how the daughter was advanced in language but needed support for articulation issues. The vignette also describes how even though the daughter was advanced in language, some of her language mechanics were a bit off because the daughter spoke too loudly,

> By one year’s old she talked in full sentences and by 18 months she talked in compound sentences. She went to speech therapy for her ‘R’s. She could not figure out how to correctly pronounce words that she read, that she had only read so her pronunciation was always off. And there, there are several words like that, that she just pronounces wrong

> because she doesn't know how to apply all of the pronunciation rules that are just inherent with so many of us. And she always talked too loud, she was always too loud. She didn't know how to whisper. [PFAS-0005]

Speaking too loudly was the topic with another participant as well. This participant shared, "But she would just speak loud, you know. Sometimes she was just very really loud" [PFAS-0012].

Language Tired. In addition to sharing about challenges with language development, articulation or mechanics, parent participants shared how difficult it was to try and support their daughters to talk, "She never talked much. I don't know if she just don't know how to initiate, you know, a conversation" [PFAS-0009]. "She would only speak to people she is close to" [PFAS-0008]. Likewise, the following participant explained in detail how difficult this process seemed for both she and her daughter,

> Yeah you kinda have to dig to get her to talk. You can say 'How are you?' (in a high-pitched voice, scrunches up shoulders towards ears). She might answer 'I'm fine! I'm good!' But then I'm like 'Okay, really, how?' And she wouldn't answer. So, she's just not a sharer, she doesn't—(shakes head no and shrugs with left shoulder) You have to uh, she always parrots (in high pitched voice again) 'Fine and good and everything is great!' but, uh yeah she doesn't really ever share. [PFAS-0007]

On this same topic, multiple participants shared how tiring talking seemed for their daughters. For example, the following parent described how her daughter seemed to become "language tired,"

> She was very interested in things, but not so much in people. After about 5 minutes she was like 'no, I don't, I don't talk to you anymore.' You know? The teachers were like 'it is so fascinating because I am trying to engage her and she clearly can understand me, but

> she just doesn't, she doesn't, she is not interested.' They said she got what they called language tired. So she would interact with you, and then she would just shut off. Like, 'I'm done.' And the teacher said to her [name] what did I just say? And my daughter could repeat it back to her verbatim. But if you asked her what she talked about she wouldn't, she was done, you know. I remember people saying, 'Oh it's too bad you didn't teach her sign language.' and I'm like, 'You don't understand. It is not that she couldn't talk, she had words, I could list them for you, it's that she didn't care if she was talking to you or not.' She wasn't motivated by that. [PFAS-0011]

Talking is Stressful. In addition to becoming "language tired," several participants shared how exhausting and stressful talking could be for their daughters. The next example illuminates how difficult talking with others become for the daughter,

> There was this neighbor friend, um that always wanted my daughter to be with her all of the time. She would talk to her all the time and ask 'Oh, can I do that with you? Can I sit with you? Can I, can I, can I?' I noticed my daughter backing away. So she started to kind of back away socially, like she didn't know how to handle it so she would kind of avoid. Later, my daughter explained to me she just feels so tense and like kinda sweating and just, um, feels like her face is turning red and she's, she's not sure why that happens when she's talking in social situations. Yeah so, so I think just like with friends, you know, talking with other adults or adults um, a generation older than her, can still be kind of stressful for her. I've seen her sometimes she's like, chooses to avoid instead of um, interact with someone, but she can do it, it's just still stressful. She's I guess learning how to manage that. [PFAS-0014]

Misperceptions About Conversations. Conversations seemed to be particularly challenging for the daughters. Many study participants shared examples of these challenges. For example, one parent described the challenge of her daughter not understanding the purpose of conversations,

> When she would talk it was more like facts spewing than was a conversation. She maybe would talk about some things that the person didn't care about. She was very factual. So, she liked to watch documentaries, um, and, and like animal planet. Stuff like that, you know. And she would maybe talk, spew out some facts that a person or kid didn't care about, type thing. No give and take. You know what I mean? [PFAS-0006]

Multiple participants also brought up that they felt their daughters understood talking was a tool for dominating conversations. One parent commented,

> [In conversations] She would reason and she would try to turn any reasoning to her advantage. She could be violent if [anyone else's] understanding of the world was different from what she started to see the world to be. She's like, 'No, I'm into world domination.' [PFAS-0005]

On the other hand, other participants shared how their daughters could dysregulate if they felt anyone else seemed to be dominating the conversation,

> [She] expects that when a conversation is entered into, that everybody's-everybody expresses their opinion, everybody, you know, nobody dominates the conversation, nobody deviates from the direction the conversation is taking. So, that's just something that's very indicative, uh-from [her]. If [she] wants to talk about something, [she's] gonna talk about this. [She] hates having the conversation be controlled. [She] doesn't like being dominated in the conversation. [PFAS-0009]

Finally, relative to misperceptions about talking, several participants shared examples of how challenging it was when the intent of their daughters' conversation was misperceived,

> She's not an extroverted bubbly personality. Um, she's more, speaks her mind, and, and, had less of a filter sometimes. One example, um, is at church, someone brought in bananas that looked, um, that were slightly brown, and she said, 'Those are ugly bananas.' And that person got very offended and started a whole fight. For her, it was more just, 'those bananas are ugly, because they are brown, you know, that's just how it is.' Matter of factly, you know what I mean? So, she wasn't much of a talker. People would always get upset at what she said. She wasn't trying to be mean in any way you know. She was I think kind of strong willed so she maybe wanted to do things her way and the other is just not knowing what to say that wasn't gonna, you know, set off the other person or bother the other person. [PFAS-0006]

Discrepant Case—Talking. Even though most of the study participants shared that talking was a challenging domain within their daughters' early literacy development, one participant shared how talking was a strength for her daughter,

> She's very verbal. But um, she could speak. She was babbling, I'm not kidding you when I tell you at about three months. Twelve weeks, she was starting to, she, I think she said "dada" first or like "dad" like at, I'm not kidding you! I was, it blew me away, even though I didn't know a lot about babies, I felt like that was kind of odd. [PFAS-0001]

Sub Theme: Listening

Only two of the study participants talked about their daughters' listening. In the first example, the participant talked about the lack of reciprocity in social relationships at work, even

though her daughter was described as a good listener. It seemed that those whom the daughter listened to, did not listen back,

> People really like her. And boys really like her. And I think it's because she's a good listener to them. But there's no two way give and take. She doesn't develop a relationship with any of them. She doesn't choose to take a break and eat lunch with any of them. She'll, you know, watch something on her phone or read something on her phone and eat alone instead. [PFAS-0007]

The only other participant who shared about her daughter listening remarked that she did not feel her daughter truly listened, rather it seemed more like her daughter was observing,

> At four years old I was reading her Harry Potter of course, and then she, you know, she just very, listened intently and she was just very into it. Even though she was just only four years old. But yeah, she didn't know really how to be a friend, like, truly listen a lot of times. It was more like she would just kind of observing. [PFAS-0004]

In both cases, listening was described as a more passive activity. It seemed almost as if the daughters did not know to listen to comprehend or understand the reading or social context.

Sub Theme: Writing

Multiple parents spoke about their daughters' writing. During the analysis phase, there were two distinct trends noticeable in the writing data. The first trend was that participants' daughters seemed to demonstrate a relative strength in creative storytelling, "She was very good at writing. Like she'd make up these elaborate stories. And you know, write these books, and, of different characters and, so she definitely was like really into it, into the characters like" [PFAS-0004].

Similarly, another parent described her daughter's ability to write stories,

> She wrote some dramatic stories about dating relationships and a boyfriend that, that uh dies. I do remember that, but um, she was in the writing club. She wrote a really awesome murder mystery. Mostly true life is what she wrote. [PFAS-0013]

The daughters seemed to demonstrate a relative strength when writing their own stories. However, many of the parents described how writing in response to questions was a more difficult task, "If you had to write an answer, that was, that was her problem. Verbally, she was ahead you know, her writing was hard. Like she could verbally answer things, but not, not, you know, respond on papers as well" [PFAS-0012]. Another parent remarked about how her daughter's concrete or literal thinking, impacted her ability to respond in writing to questions,

> For example, the last question was a 'what do you think?' question. They asked, 'How do you think the first Americans got here?' She just, she wrote, 'They were born here.' You know [laughs], She's like, 'I have no idea, why would they would even ask that question? I mean, they were American, they were born here. [PFAS-0011]

In addition, one participant shared that even though her daughter could write very well, the behaviors surrounding the writing was challenging,

> She's always been someone who's written very well. But she would write on her paper and if it didn't look just right, she'd have to go get another paper and start over. She would do that over and over. So, we had to set things up. We had to set up rules with the teacher. She couldn't have more than 2 papers for her writing. Like that was the limit. [PFAS-0002]

Sub Theme: Comprehension

Study participants perceived reading comprehension to be the most challenging domain of early literacy development for their daughters. Specifically, study participants described challenges for their daughters' reading comprehension in the following areas: struggle to identify feelings and emotions impacted making connections, over connecting with story characters, literal understanding, general lack of comprehension, and affinity for one type of genre.

Struggle to Identify Feelings and Emotions Impacted Making Connections. Many participants described how their daughters struggled to identify feelings and emotions.

> I know she, she has told me she really struggles with understanding people's um emotions. She, um, always has. I didn't know that she was struggling with that. I did know that I had to tell her what she must be feeling. Like when she was four, five, six, and she was having some feelings, I would try to get her to say what she was feeling, and she never would. But if I said, 'I think you're feeling angry right now,' She would say, 'I think I am feeling angry right now.' She couldn't identify it. I had to identify it for her, and then we could put a name on it and then we could talk about her anger and why she might be feeling angry. [PFAS-0005]

A different parent described this struggle to connect as a type of "blank face,"

> I feel like my daughter maybe has a little bit of a miss when it comes to the emotional connections. It is hard to, to kind of understand what she is or isn't feeling or thinking. She kind of has a blank-face, it seems like. [PFAS-0006]

Likewise, another parent participant described her daughter's struggle in this area,

> The first time I saw her do imaginative play she was eight and a half. Up until that point it was always just moving, waving things around, or lining the animals up, or organizing

> them. She'd never make them talk. She didn't take her animals to play with them, she didn't feed her animals, she didn't interact with them, you know what I mean? She just kind of organized them. It's difficult for her to connect or understand emotions. Even now if I'm doing something, she will say to me 'Mom, are you tired?' I'll say, 'No, I'm not tired.' Then she will ask, 'Mom, are you angry?' I'll say, 'No, I am not angry.' She'll keep going and ask, 'Did what I say make you angry?' I'll repeat, 'No, I'm not angry.' She'll continue, 'Are you sad?' I will answer, 'Yes, I am very sad right now. Something sad happened.' Then she will say 'Oh, okay.' But she still is not sure, she kind of needs me to help her to see the emotions. [PFAS-0011]

This parent continued on and explained how this struggle to identify emotions impacted reading comprehension,

> She was not able to connect to characters in books. She never even did it in elementary school. I remember they got her to read Junie B. Jones books in second grade. She could tell me all about what happened, she could even quote the book to me, but no, there was never any 'oh, that's a person' 'that's a thing.' Then teachers started wanting her to read Steinbeck and figure that out and she can't even handle [lower level inferences], much less The Pearl. I remember trying to do Midsummer Night's Dream with her and cutting things out and saying, 'This is one story line, this is another story line, this is another story line.' My daughter could not put that together. Now, she could tell you discrete facts about – say – the layers of the earth and the ocean, and all of that, she can do that. But not people. And not people's feelings, and not people's motivations. [PFAS-0011]

One parent remarked that even though her daughter did not seem to connect to the emotions of characters in a story, she did connect to the animals,

> Um, she could empathize better with the animals in the books. Um, I read a, like I did a whole, a whole series of um, books about dogs. So, we've read all the books about dogs. We read Lassie, Old Yeller, Where the Red Fern Grows, Sounder, you know, we went through all the dog books. And she really, really identified with the dogs. she cried when Old Dan died. Um, she had two stuffed animals that she named Old Dan and Little Ann. Like she really identified with the dogs each time. She didn't quite connect or see the, the boy's feelings towards the dogs when they died, it was more, she was mourning the loss of Old Dan and Little Ann, too. But she wasn't thinking about the boy's feelings of losing his dogs. [PFAS-0005]

Another mother shared how the only time her daughter seemed to connect to a story character was when a dragon character described being hungry. It seemed her daughter did connect to the dragon feeling hungry, however, this did not generalize to understanding other real animals such as cats,

> I remember her really liking this series of books where there is cats. She was very, very into cats. When we would try to do vocabulary words that were abstract, she would draw the cats doing that action. But she could never understand that these cats had feelings, that these cats had fears. [thinking face]. Even if she understood that, she did not express it to me. [PFAS-0011]

Over Connecting With Characters. Ironically, some parent participants described the challenges of their daughters over-connecting with characters in stories. Parents described this over-connecting to characters as a challenge because it seemed at times that their daughters could not discern that certain characters were not real. One parent explained,

> She gets very emotional about things, **very**—she hates cliff hangers ‘cause she gets so like—she loves these characters! They’re real people to her, ya know, like she just is dejected with their sorrows and elated with their highs. In her real life, she would get emotionally attached to these characters and be devastated when someone died. [PFAS-0002]

Another parent described how her daughter would over-connect with characters,

> Like she was watching, uh, she’s really into Korean culture right now and, and was watching this K-drama. And you know, she, she was in tears. She just found herself, like, emotionally invested in the characters and when um, whatever sad ending happened she cried over caring about how the characters would have felt if that had been real. [PFAS-0014].

The following parent described how the family would talk with the daughter to understand that not everything authors have characters say in books is real,

> In real life she doesn’t engage with people. But with Harry Potter she knows everything. She’s read the series multiple times and she retains it all and she remembers who and what and where. And I don’t know if it was immaturity, but she would believe everything that is said in a book. And sometimes we’re like ‘You know, this is their opinion. You need to take it with a grain of salt. Just because you read something convincing doesn’t mean it’s true.’[PFAS-0007]

Literal Thinking. Another area that was challenging for the daughters relative to reading comprehension was a literal or concrete thinking,

> She would read books and take them literally. If the book reads ‘He kicked the ball’ she knows they kicked the ball. Did she infer that he was angry because someone didn’t share

> with him and so now he kicked the ball—Not so much. I'd say she didn't necessarily infer everything that's going on. Like she'd read something--reread something years later and say 'Ooohhh, I always wondered why he kicked the ball! It was because he was mad!' and didn't pick up on that necessarily the first time [PFAS-0007].

Another parent gave multiple examples of how the literal thinking impacted comprehension, "She knew a pen is something you write with, and when they went to [a farm]. They gave a whole other spiel about 'don't go in the animal pen,' she couldn't figure out what they were talking about" [PFAS-0011]. This parent continued,

> She was good at mathematics, but she could not do story problems. Some of the problem was vocabulary. Because the [story problem] would say, 'the kids went on a band trip, and they traveled this many miles, at this much speed, and this many hours,' and She would go 'I can't do this problem.' And I would go 'okay, what can I help you with?' And she goes 'what's a band trip?' And so, I would draw a picture of a bus and kids in the bus and she'd go 'Oh, I thought they were tripping on something.' [PFAS-0011]

In the next example, the parent first explains how her daughter thinks in 'literal pictures.' This parent then went on to describe and explain how a church leader's misunderstanding of her daughter's literal understanding of things negatively impacted her daughter:

> She thinks in literal pictures and I had to—if she doesn't understand what I am saying-she would ask me to rephrase it until I rephrase it in a way that a picture could form for her. And she was never very good at understanding sense of humor. She was extremely literal with any kind of pun and never understood unless we told her why it is funny. Even then she wouldn't quite, she would just wouldn't quite understand what had happened. One day the primary president called me and told me these boys were making

> fun of my daughter for singing loudly and she would like my daughter to stop singing so loudly so she wouldn't be made fun of. I got after the primary president and told her, 'First of all, my daughter doesn't care, because she doesn't even comprehend that the boys are making fun of her. So, if she doesn't know that they're making fun of her it doesn't matter that they're making fun of her. And second of all, I want her to love singing like I do. Let her sing. ***Do not quiet*** my child.' To this day, all my daughter remembers is that the primary presidency wouldn't let her sing. She still doesn't remember the boys. [PFAS-0005]

Lack of General Comprehension. Parent participants also described a lack of general comprehension. This parent described how even though her daughter could read (word level reading) in order to comprehend the stories, she needed her mother to read the stories aloud to her,

> We read stories to her. Sometimes she'd have her book upside down but that was really really early on. I actually read the books out loud to her. And then after that she never needed me again to read to her; she was able to do it. She was certainly capable of reading, it was more the, um, words she was unfamiliar with, and um, if I read it to her she *could* understand it, but if she read it to herself, she couldn't. I don't know— that could've just been anxiety, she *couldn't* comprehend. I don't know if it was taxing to her or if it was just difficult to comprehend it. I remember going to her sixth grade teacher who had a PhD and saying 'I wish I could explain to you that my daughter is able to listen to you and do well enough on your exams, but she's not really learning; she's more saying things back to you. She's not reading or anything.' She was able to do that all

> through school and maintain Bs. And then when she got in college, she couldn't read her college books. [PFAS-0015]

Another parent described a similar lack of general comprehension skills in understanding stories,

> So, she didn't have a deep understanding. It's like she is really good at reading and then they ask her a comprehensive question, and she can go back and find the words they were looking for really quickly. [um] But if you ask her what it means or what to predict or what she feels about it, then she can't do it. She doesn't understand the stories. She didn't read stories. She read science books. She read about rocks, and stars, and animals. She always needed pictures. To this day, she doesn't read books without pictures. If there was one single story line with pictures, she could do it. This happens, then this happens, and then this happens, then this happens. No surprise endings. Once you start getting unto two or three characters and they have different things going on, she won't even finish it, because she is confused. [PFAS-0011]

The following parent describes how even though her daughter was a fluent word level reader, her reading comprehension was lacking,

> My daughter was a good reader, she could read very fast. But then you ask questions about it and she's 'I don't know.' One thing that her teachers commented on a lot was that she was such a fast reader. She needed to slow down, take a minute to understand the content, that kind of thing. There was a little disconnect between her reading speed and her comprehension. (PFAS-0007)

This parent went on to explain how her daughter always read [word level reading] above grade level, but that her comprehension skills lagged behind her reading skills, which made it

challenging for her daughter to understand the higher-level texts, even though she could easily read the material. The mother commented,

> Her reading ability was above. But her inferring skills, her understanding, her comprehension [pauses] has not been up there. She was reading above grade level, reading like a 12-year-old but comprehending like an 8-year-old, and so she'd sometimes have to read it several times. Umm she—so, you know like, I don't know if you're familiar with the Percy Jackson series in books, I'd say that's a good like fifth-grade book. Well she'd read it in second or third grade (7–8 years old). And she could—It's like she could see the words and she knew what those words meant, but she really wasn't comprehending and inferring above her grade level even though she was reading those books. The Percy Jackson books, have the Greek gods er—you know, all the Greek gods—and so man if you wanna know anything about a Greek god she's your girl. She knows everything because she's read the series multiple times and she knows who the Greed gods are. She read that in the second grade, but it took her getting to the fifth grade so that she could actually understand the why in those stories. [PFAS-0007]

Affinity for Only One Type of Genre. The general comprehension skills of the participants' daughters could have been impacted by their affinity for only one type of genre. It was typical for the participants to explain that their daughters enjoyed only one type of book,

> Her favorite one was this cat series. I think she stuck with the genre. She read almost every book in the series. And there were a lot of books in that series. Um, I think that she, I don't think she liked to branch out as much but stuck to one genre. [PFAS-0006]

This following vignette describes how the participant's daughter would only read other book genre if she was tasked to do so by a specific class assignment. Otherwise, she would read The Boxcar books repeatedly,

> She would read Boxcar children books over and over, and over, and over and I would talk to her teachers, and um like her third, and fourth grade teachers about it. They assigned her to read books in different genres to get her to expand but she never read a book other than Boxcar children books without it being an assignment she had to do. Even then, she could quote, lots of lines from the books, but she never, I don't remember her ever talking about what was actually going on in the book [PFAS-0010]

Lastly, parents reported that there was a lack of their child's ability to infer while reading. For example, "So, she is really good at reading and then they ask her a comprehensive question, and she can go back and find the words they were looking for really quickly. [um] If you ask her what it means or what to predict or what she feels about it, that, then she can't do it. She does really well with reading and multiple choice and math problems, but she couldn't do the story problems" (Participant PFAS-0011). In addition, "She could quote, lots of our children books, but she never, I don't remember her ever talking about what was going on in the book" (Participant PFAS-0010). Children were unable to identify the meaning between the lines.

Through 22 interviews, two main themes were identified from the parents' understanding of their children with autistic traits. Parents report early reading development and simultaneously acknowledged daughters' advanced fluency in word level reading and challenges with other early literacy development skills such as speaking, listening, writing, and reading comprehension.

Main Theme Three

The third main theme was identified as, “Rigid or incomplete schema.” According to schema theory, meaningful comprehension rests on an individual’s understanding of content, linguistic and formal schemata (Paul & Christopher, 2017). Che (2014) explained that the more complete the three schemas (referencing, linguistic, formal and content), the quicker one could read and increase in their comprehension skills. Of note, the parents’ descriptions of their daughters’ early literacy illuminated patterns of strengths and weaknesses in content, linguistic and formal schemata development.

Linguistic Schemata

Linguistic schemata include reading proficiency, current vocabulary, and understanding of grammar and idioms and provides the foundation of all other schemata (Paul & Christopher, 2017). Parents reported that their daughters had a strong base vocabulary, however, idioms, puns, jokes or multiple meanings could block their ability to comprehend a given text. For example, one parent shared, “So, a pen is something you write with, and when they went to Thanksgiving Point, and they gave a whole other spiel about “don’t go in the animal pen,” she couldn’t figure out what they were talking about” [PFAS-0011]. This parent understood that her daughter was confused due to a lack of understanding vocabulary within a given text. Lack of linguistic schemata could have interfered with full comprehension.

Formal Schemata

Formal Schemata includes an individual’s knowledge of genres, various texts, and the utilization of text formats to enhance reading comprehension. Readers use their schemata of various genres, narratives, poetry, and news articles, magazines, and academic journals to help increase reading comprehension (Paul & Christopher, 2017). Parents in this study shared that

some of their daughters did not know how to understand complex texts, while others said they could understand texts much higher than their age and grade level. Most parents reported their children were most comfortable with one or two literary genres (fantasy, dystopia, or expository text). The hyper-focus on one genre may be an indication of lack of formal schemata in that an understanding of divergent text structures allows a person to access varied genres.

> One parent explained her daughter's difficulty with following narrative text.
>
> Understanding stories. She couldn't follow that. If there was one single story line with pictures, she could do it. Which are what most children's books are... No surprise endings. Once you start getting into two or three characters and they have different things going on, she won't even finish it, because she is confused. [PFAS-0011]

This parent was able to recognize that her daughter could not follow a complex story line. Essentially, she had not acquired the formal schemata to comprehend complex story lines.

Content Schemata

> Paul and Christopher (2017) report,
>
> Content schemata refer to the background knowledge of the content area of a text or the topic a text talks about. Content schemata deal with the knowledge relative to the content domain of the text, which is key to the understanding of texts. (p. 14)

Parents expressed that their daughters had background knowledge, that at times was fixed. This parent expressed a time when her daughter was very rigid when asking for rice. She stated,

> I remember going to a restaurant, she picked up the menu, held it up to me and pointed out to the word and said "rice." And she read, she read the word rice, rice. She didn't say I want rice, she just said rice. I said, "oh you want rice?" she just said "yes, okay." What are you, you are four and you can read? [laughs]. But then the rice came, and it was

yellow had turmeric in it and she was all over the floor screaming because rice was not yellow. [PFAS-0011]

Her daughter's content knowledge, or background knowledge was that rice was white. When she saw that it was yellow, she did not understand that rice could be yellow, and proceeded to express herself via screaming. An individual's background knowledge plays a vital role in the understanding of one's reading comprehension.

Limitations and Implications for Future Research

Qualitative studies, by design, explore the subjective experiences of individuals or groups of individuals. As such, qualitative studies are not generalizable to a broad population. Instead, qualitative designs encourage readers to make naturalistic generalizability. Quantitative analysis of distinct measures may be used to determine reliability, validity, and generalizability of the findings.

This study explored the retrospective memories of 23 parents of daughters identified with significant ASD traits or diagnosed with ASD later in life. Additional studies probing the literacy development of girls at the time of diagnosis may add to the body of literature and act as a valuable foil for comparing and contrasting the literacy development of girls diagnosed later in life.

Parents in this study related multiple instances where comprehension occurred if texts were read aloud. Future researchers may wish to explore dialogic reading to learn what characteristics, if any, enhance comprehension for girls with ASD.

Implications for Practice

Information regarding early literacy development of girls later identified with significant autism traits or diagnosed with ASD may allow practitioners and school staff to engage students

who seem to be hyperlexic but have difficulty with comprehension and inferring. Parents in this study reported that they felt their daughters were fluent and accurate readers and were concerned that their daughters were memorizing and not comprehending the text. However, parents were told their daughters were on pace for reading success. The results in this study may assist a teacher in understanding more fully that students may mask their ability to comprehend when reading fluently on grade level. Understanding the SVR, that reading includes both decoding and language comprehension, may empower teachers to look beyond tests like the Dynamic Indicators of Basic Early Literacy Skills® (DIBELS) in order to report that students have obtained grade level reading comprehension.

In this study the participants indicated that their daughters were able to answer fact-based questions in writing. Participants also described their daughters seemed to have a relative strength in writing stories where they could control the character's stories. On the other hand, participants described their daughters having relative weaknesses when their daughter was asked to respond to a prompt that required inferencing and synthesis. Teachers may wish to attend to students who struggle with synthesis and inferencing while excelling in other reading and writing domains.

Training for general, special and literacy teachers could include schema theory. Teachers may also take notice of a student's content schema. If the students are very rigid in their understanding of content (e.g., thinking all rice is white) this may be an indicator that a student's content schemata needs enlarging to bring greater levels of comprehension. If teachers notice students who perseverate on only one or two types of genres, teachers may consider broadening formal schema. Last, teachers should also attend to a student's mastery of linguistic schema, specifically multiple meanings and inferencing skills.

Of note, parents disclosed their perceptions that their daughters were voracious, highly fluent readers, yet struggled with comprehension. Many parents also indicated that teachers reported high levels of reading success. One explanation for this may be stereotype threat in reading. Studies show that teachers rate boys as academically inferior to girls (Hartley & Sutton, 2013). Because the girls in this study excelled in word calling, perhaps teachers did not investigate further to fully probe for lagging comprehension skills, whereas if the student were a boy perhaps the teacher might have evaluated both decoding skills and broad comprehension capacity. School-based professionals may wish to attend to stereotype threat in their personal teaching practice and incorporate broad comprehension evaluation for female students with grade level decoding skills.

Conclusion

This study discussed 23 parents' perceptions of their daughters' literacy development. Findings on the data analysis included three overarching themes with reductive subthemes. The three overarching themes were (a) parents report early reading development, (b) parents simultaneously acknowledged daughters' advanced fluency in word level reading and challenges with other early literacy development skills such as speaking, listening, writing and reading comprehension, and (c) parents report rigid or incomplete schema.

Early literacy, including a child's ability to talk, listen, write and interact with text, typically evolves naturally through childhood (Suggate et al., 2018). Some parents in this study reported that their daughters' literacy development did not mirror other typically developing children. For example, some parents were surprised to see their child spontaneously writing or reading without receiving instruction. Parents also reported that their daughters' speaking development was atypical, with speech happening much earlier (full compound sentences at 18

months), being too loud, being avoided, missing social norms like turn taking, or requiring speech therapy.

Parents also tended to equate word decoding with full reading comprehension. Full-fledged reading consists of the combination of both the capacity to decode words and activate linguistic comprehension (Suggate et al., 2018; see Figure 2). All but one parent simultaneously lauded their daughters' fluency and accuracy with reading, noting that they read above grade level, yet comprehended only at or below grade level. The parents in this study seemed to indicate that their daughters may have adequate word recognition, yet experienced inadequate comprehension development.

Researchers are seeking for understanding in why females are diagnosed less frequently with ASD. Perhaps the disparity between teacher understanding of literacy development including full-fledged reading (e.g., SVR) and comprehension schema AND issues surrounding gender stereotype threat may illuminate gaps in our understanding of what ASD looks like in girls' literacy development.

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Tables

Table 1

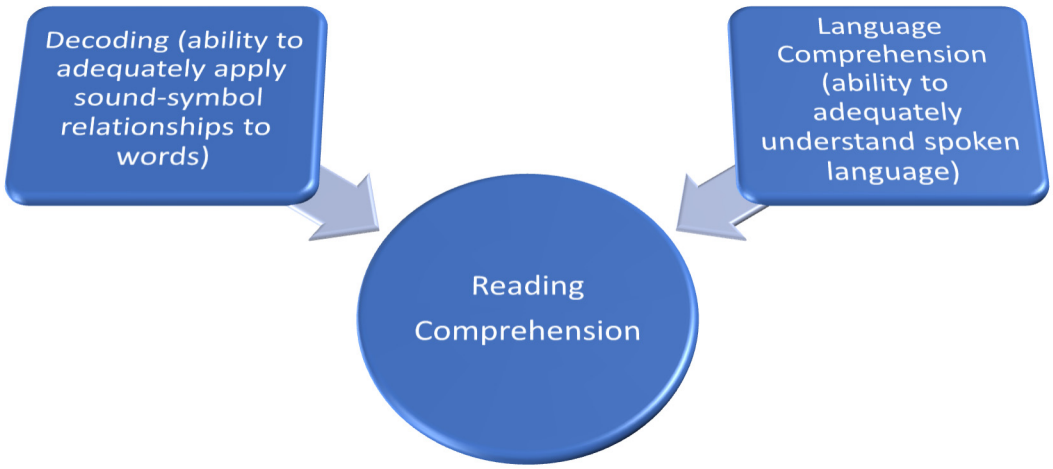
Sample of Cycle 1 Codes for A Priori Codes 1 and 2

A priori codes	Process codes
Early literacy development progression	Hyperlexic Word Calling Listening to Reading Lacking book connection Memorizing Order of appearance of Skills Reading advanced books Reading above Reading a lot, insatiable Reading came early Reading came easy Reading onset Reading out loud Timing of Reading Word Level Reading
Early literacy development skills	Avoiding through reading Being Rigid reading/writing Concrete meaning making Developing Language (not)Connecting (characters) (not)Connecting (people) (not)Connecting (animals) Over connecting Controlling through writing Global Understanding Having verbal conversations Imagining Inferencing Literal comprehending Making Isolated Connections Paying Attention to details Perseverating on details Story Telling Confusing Recognizing Factual Details Recognizing narrative Structure Showing Broad understanding Showing empathy for characters Summarizing Talking about reading Thinking Stories are Real Universal meaning making

Figures

Figure 1

A Simple View of Reading Development



Note. Adapted from Gough, P. B., & Tunmer, W. E. (1986). Decoding, reading, and reading disability. *Remedial and Special Education*, *7*(1), 6–10. https://doi.org/10.1177/074193258600700104

Figure 2

Sample of Within-Case Analysis

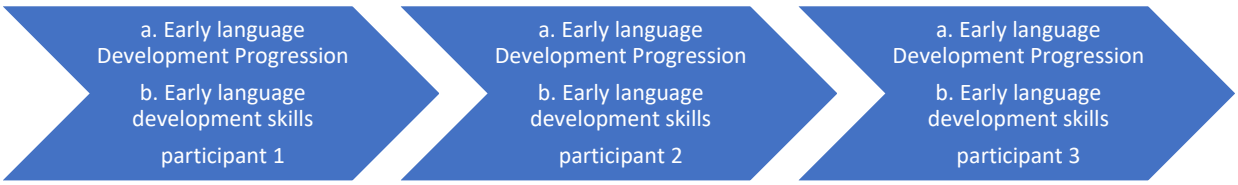
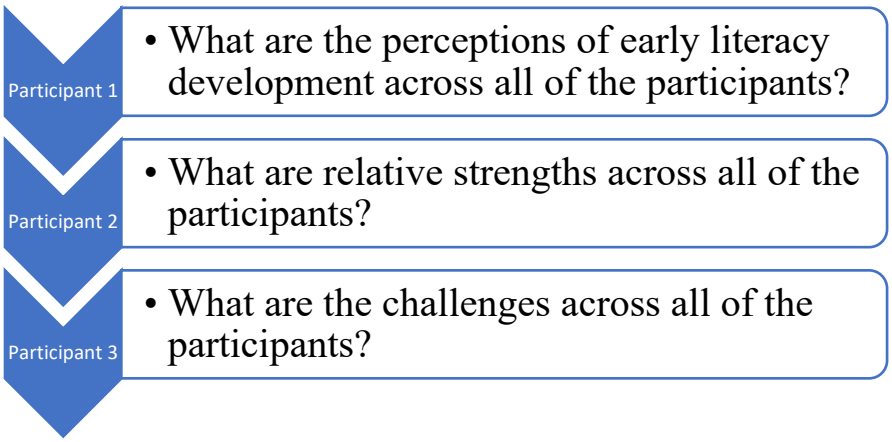


Figure 3

Cross Case Analysis



APPENDIX A

Review of the Literature

The following literature review examines the historical and current challenges in diagnosing females with Autism Spectrum Disorders (ASD). In addition, this literature review discusses the literacy difficulties children with ASD face related to oral language and linguistic communication, demonstrating empathy (towards characters in stories); and discreet comprehension strategies such as understanding inferences and developing the skill of inferring. Underachievement in reading comprehension is the one of the most frequent areas of impairment by students with ASD (Solari et al., 2017).

Girls and Autism

Historically, boys are diagnosed with ASD at higher rates, even when girls demonstrate similar autism-like traits (Parish-Morris et al., 2017). One possibility is that some girls with autism or autism traits learn to "camouflage" behavioral or emotional responses when in social situations, making the diagnosis of ASD more complex (Parish-Morris et al., 2017). In addition, public schools may be an unintentional contributing factor for the under diagnosis of girls with ASD. When young children come to school and are symptomatic, boys tend to be more referred by teachers and school personnel to a health care provider for a diagnosis for ASD. Is this due, in part, to the girls camouflaging autistic traits? When public school systems serve as the primary mental health care providers for children, more boys receive ASD diagnoses as compared to when a clinical diagnosis is made outside of the school system (Barnard-Brak & Reschly, 2019).

The under-diagnosis of females with ASD can create many problems. A child who is not given the proper diagnosis, is vulnerable to social, emotional and educational risk factors. This could mean one negative outcome (not being diagnosed), leading to other negative outcomes

(e.g., struggling academically or socially). By identifying girls who may have ASD at an earlier age, it may not only provide them with additional resources to assist with their educational development, it may be the diagnosis that could prevent spiraling down in many areas of girls' life (Demirkaya et al., 2016).

In addition, under-diagnosis of ASD could impact undiagnosed children's ability to better communicate in many ways. Children with autism or autism traits tend to struggle with communication (American Psychiatric Association, 2013; Diehl et al., 2006). Linguistic communication skills, or the ability to communicate through a spoken or written language, are vital to be able to relate to others, understand social norms, and build relationships which can greatly impact a child's ability to connect verbal and written information. This is a fundamental skill developed in the first few years of formal education.

Linguistic Communication and Autism

There are different patterns of skill that are associated with the ability to communicate. While it appears that children with ASD have a strength in syntactic processing (i.e., the ability to understand the arrangement of words), it seems they struggle to understand semantics, or to understand how the words relate to others (Randi et al., 2010). Children with autism or autism traits may also find it challenging to use language in a pragmatic way (Landa, 2007). These children tend to struggle with what to say, to whom to say it, and how much to say. In turn, this challenge with using language in pragmatic ways can impact their ability to understand written discourse (Diehl et al., 2006). Grimm et al. (2017) noted that among students with ASD, linguistic comprehension deficits were strongly linked to reading comprehension issues. This challenge would also impact the ability to understand context while merging new information to create deeper meaning (Solari et al., 2017). An inability to utilize new information can impact

their ability to organize information into categories (Landa, 2007). The struggle with the practical use of language can also impact the child's ability to communicate intentions and understand social context. Randi et al. (2010) suggest that children with ASD are challenged with understanding when reading narratives. Typically developing children may be more likely to seek global understanding in the world around them to understand characters in text, while children with ASD or autism traits may look for concrete explanations instead (Diehl et al., 2006).

The literature confirms that children with autism or autism traits struggle with skills that require them to make connections to characters in stories, such as being empathetic. Tirado and Saldaña (2016) found that young readers with ASD encountered more challenges when striving to produce inferences from a text that was read when it contained content that was related to emotions as compared to physical content alone. These researchers found that children with ASD were accurate in identifying the main characters' emotions 43% of the time, as compared to typically developing peers who were correct an average of 81%. Research suggests that children with autism also develop empathy skills differently than neuro-typical peers (McIntyre et al., 2017).

Reading Comprehension and Autism

When retelling stories, children with ASD appear to have a relative strength in their ability to recall discrete story events. Where they seem to struggle, however, is with organizing those discrete story events to understand the gist or main idea of a story (Diehl et al., 2006; McIntyre et al., 2017). This ability to synthesize many parts of a plot or smaller pieces of information and form a general understanding form a central coherent understanding of narratives or texts appears more challenging for children with autism (Frith, 2018). This lack of

piecing information together to create a general understanding can impact a child with autism in many areas of learning. In fact, Solari et al. (2017) confirmed that "underachievement in one specific literacy domain, reading comprehension, is one of the most frequent and pernicious domains of academic learning impairment displayed by students with ASD" (p. 8).

While neuro-typical students tend to look for an underlying meaning in their environment and the world around them, students with ASD may rely on concrete assumptions and predictions (Diehl et al., 2006). Jolliffe and Baron-Cohen (1999) found that individuals with ASD generally process a story with a specific, local focus rather than global focus. For example, a little boy reads a story about forts, and uses his background knowledge of his blanket forts. He is confused when reading about the Spanish Fort in St Augustine, thinking that all forts are made of blankets. Similarly, McIntyre et al. (2017) found that children with ASD displayed significant problems when attempting to generating global coherence in order to understand text at the gist level. Individuals with ASD may attend to details, or even single words, instead of a general understanding what is read (Nation, 1999; Randi et al., 2010). Norbury and Nation (2011) reported factors impacting reading comprehension for students with ASD may be the length of the connected text, challenges with monitoring and reviewing passages to make connections, and a superficial connection with the text. For example, a student is given a long passage with little background knowledge, as gets lost in the text, not understanding what has been read. These researchers also suggested that children diagnosed with ASD may have difficulty suppressing information that is irrelevant to understanding meaning due in part to a tendency to perseverate or hyper focus on one part of the text which could limit their understanding of the overall meaning within the text.

Researchers have also suggested that when children with autism perseverate on one particular piece of a story, it leads to false assumptions about the overall story plot. These false assumptions are impacted by a misunderstanding of complex vocabulary meanings, and an inability to utilize background schema, resulting in peculiar analyses of ambiguous texts (Wahlberg & Magliano, 2004). For example, a child sees in a text that someone was tied up on the phone and could not answer the door. The child imagines that someone is literally tied up and is sitting on a phone, leaving the child confused. In addition, children with ASD tend to have restricted or fixated interests, which can limit exposure to a variety of topics across contexts. Restricted or fixated interests can also cause more literal, less flexible comprehension of character dialog within stories (McIntyre et al., 2017).

Text Structure

Children with ASD tend to struggle with comprehending narrative text (Randi et al., 2010). This could be because narrative texts are more complex because they include a plot, climax, and characters with emotions. This form of text requires the reader to think deeper and make connections with the characters in the text (Randi et al., 2010). When children with ASD strive to retell a narrative, they often list events from the end of a story, rather than including the beginning or middle of a story (Diehl et al., 2006). Children with higher functioning autism also tend to overuse quoting story events from rote memory, rather than utilizing story structure frameworks to aid in memory retention (Williams et al., 2006). An understanding of the way narrative story structures work is vital to acquiring greater reading comprehension skills as it mirrors real life experiences. In addition, Diehl et al. (2006), suggested that the ability to comprehend and produce narratives at a young age predicts increased success in comprehending more complex text. The inability to understand narrative text may be an indicator of autistic

tendencies (Diehl et al., 2006). Children with ASD may need additional instruction on how to utilize the structure of the text as a scaffold to increase comprehension skills. The inability to understand story structures not only impacts a child with ASD when reading, but also when working to write a narrative that is logical, cohesive and succinct (Diehl et al., 2006).

Inferencing

Inferencing is the ability to understand an implied message in any form of communication. It is the ability to go beyond the surface level to create an understanding of implied meaning that is often unwritten and unspoken (Elleman, 2017). Inferencing requires multiple skills that include the ability to suppress irrelevant information, use background knowledge, working memory, and executive function skills to name a few (Elleman, 2017). Writers construct written discourse with the expectation that readers will be able to understand the meaning with clues provided in the text or the reader's background knowledge. Therefore, inferencing includes the ability to integrate information while reading in order to create a general underlying understanding of what the writer is implying (Elleman, 2017). The ability to infer is central in language and is a vital prerequisite skill to reading with understanding of depth and comprehension (Elleman, 2017).

Students who find the ability to infer challenging are impacted in many ways. These students typically have more difficulty in determining centralized themes, author's point of view and/or analyzing the actions and sequences of events with characters in a narrative, making progress in understanding written discourse more arduous. Students who must toil to use inferencing skills when reading can also be impacted academically such as having higher risks of failing high stakes tests, not being promoted to the next grade, or even failing to graduate from high school (Hall, 2016).

Inferencing and ASD

Lucas and Norbury (2015) found that children with ASD have an increased risk with inferencing than neuro-typical students within the same age range. Similarly, Grimm et al. (2017) found that children with ASD performed significantly worse than typically developing peers, or other peers who were noted as poor at comprehending when tasked with answering inferential questions. Researchers have also suggested that when it comes to inferencing skills, children with ASD seem to have trouble with suppressing distracting or irrelevant information (Norbury & Nation, 2011). These researchers further described that many children with ASD tend to perseverate on a specific item or topic in a text, rather than look at the overall meaning. For example, when reading a text about prehistoric animals, a student with ASD may hyper focus on one species, thus limiting a more global understanding of the purpose of the text.

Lucas and Norbury (2015), posited that one of the predictors of children's success with making inferences is general verbal skill ability. This research seems to agree with an earlier study that reported the foundation for reading comprehension for those with ASD is oral language competence (Norbury & Nation, 2011). They noted that children with ASD demonstrate a relative strength in responding to factual questions but are more challenged when asked to make inferences, possibly resulting from the disparity of communication skills.

Another aspect that seems to affect the student with ASD's inferencing skills is that many labor to understand the feelings of characters in a story. Tirado and Saldaña (2016) found that when students with ASD were asked to answer a question about the emotional status of a character in a story, their performance was poor. For example, children with ASD may understand that Johnny won the game. However, these children find it much more challenging to make fundamental inferences about Johnny and then express them to the listener such as *why*

Johnny won the game, *how* Johnny felt when he won the game, or *what* may have impacted Johnny to win said game (Diehl et al., 2006).

Still another aspect that may delay an individual with ASD's ability to infer is challenges with a metacognitive skill called Theory of Mind. Theory of mind is the ability to make inferences about the intentions or emotions of others; a skillset linked to language ability. Randi et al. (2010) suggested that an absence of Theory of Mind with students with ASD compounds delays in their ability to infer.

Autism and Early Literacy Development

Research has revealed that many children who have been diagnosed with ASD struggle with the ability to answer questions involving inferencing yet are able to answer factual questions regarding the same context or story (Diehl et al., 2006). In addition, regardless of the placement on the autism spectrum, children diagnosed with ASD often demonstrate strong skills in word recognition yet experience significant delays in reading comprehension (Nation et al., 2006; Randi et al., 2010).

Furthermore, Johnson and Rakison (2006) revealed that preschool aged children diagnosed with autism showed significant delays in the area of *concept formation* as they performed at the level of infants in the area of comprehension, rather than typically developing children equal to their preschool age (Randi et al., 2010). Randi et al. (2010) found that children identified with autism spectrum disorder were not able to place things in categories when they were asked to complete a task that required abstract thinking, such as sorting based on certain "features of animate and inanimate objects" (p. 894).

Parents' Perceptions

Increasingly researchers are looking to understand parents' perceptions. Geelhand et al. (2019) probed parents' perceptions of the severity of autism symptoms between boys and girls. Gray et al. (2021) and Sproston et al. (2017) explored parents' views on educational services for daughters with ASD. Another study examined more than 300 parents' reports of ASD symptoms in their previously diagnosed boys or girls (Sutherland et al., 2017). While parents rated few differences between the girls and boys with ASD in terms of their repetitive behaviors, limited interests, communication and social strengths, Sutherland et al. (2017) noted one distinction—parents reported daughters, not sons, as attempting to mask/camouflage difficulties. Given the disparity of diagnosis rates and the academic and social struggles that accompany ASD and the insight parents might lend, researchers are seeking to understand development and literacy trajectories for girls with ASD (Grimm et al., 2017; Loomes et al., 2017).

Statement of the Problem

Autism is being diagnosed more frequently, yet there continues to be a gap in diagnosis between genders (Loomes et al., 2017). Many girls who are diagnosed with ASD are either diagnosed later or never at all (Milner et al., 2019). Compounding the process of identification and implementation of support, scant research focuses or includes a meaningful sample of girls with autism (Tint & Weis, 2018). This lack of research limits educators,' parents,' professionals,' and students' abilities to access needed educational and family services understanding and support. There is also a lack of understanding of how girls who have ASD process literacy skills such as inferencing and comprehension skills (McIntyre et al., 2017).

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APPENDIX B

Consent/Institutional Review Board Approval Letter

Memorandum

To: Becky Lundwall
Department: BYU - FHSS - Psychology
From: Sandee Aina, MPA, HRPP Associate Director
Wayne Larsen, MAcc, IRB Administrator
Bob Ridge, PhD, IRB Chair
Date: December 04, 2020
IRB#: F2020-082
Title: Unseen, But in Plain Sight: Identifying Developmental Patterns of Females with Symptoms of Autism Spectrum Disorder

Brigham Young University's IRB has reviewed the amendment submitted on 12/4/2020. The IRB determined that the amendment does not increase risks to the research subject and the aims of the study remain as originally approved. The amendment has been approved.

The approval of this protocol expires on 10/22/2021. All conditions for continued approval period remain in effect. Any modifications to the approved protocol must be submitted, reviewed and approved by the IRB before modifications are incorporated in the study.

APPENDIX C

Individual Interview Protocol

The purpose of this interview is to examine your experiences with your daughter's developmental history.

Protocols:

a. Remember to welcome the participant
b. Remember to thank the participant
c. Ask Interview Questions

Amended Interview Questions:

1. Please share with me what you remember about your daughter's development in reading comprehension?

   Possible Probes:

   - Please speak specifically about what you remember about your daughter's development with reading comprehension.
   - What can you say about your daughter's understanding of the books she read when she first started reading?
   - Share with us about your daughter's inferring skills when reading books.
   - Share with us about your daughter's ability to have empathy for the characters in books she read (if any).
   - What can you tell us about your daughter's understanding of the author's purpose of books she read?
   - Share with us your perceived strengths or weaknesses with reading comprehension.

APPENDIX D

Coding Worksheet

Sample Worksheet for Cross Case Analysis Literacy Development, Reading Onset

Literacy Development: (Reading onset)

Participant PFAS-0001

- Yes, uhum, she is super intelligent. And so she knew all her ABCs, and could recognize them by the time she was eighteen months old. And she knew, I worked with her, with little words like “cat,” “dog,” “bat,” by the time she was like three or four, and she could read.
- She knew all her ABCs and could recognize them by the time she was eighteen months old. I worked with her, little words like “cat,” “dog,” “bat,” probably by the time she was like three or four, she read. Reading has never been a problem for her.

Participant PFAS-0002

- Even though she was reading by age three - she doesn’t feel confident with it unless she can do it really, really well. So she would read all the time. In fact, we have, there was sleep issues when she’d just sit there and read for hours
- She would get very, very hyper focused then read a lot.
- “Well we had to set things up where if she would write on her paper and if it didn’t look just right she’d have to go get another paper and start over. So we’d set up rules with the teacher. She couldn’t have more than 2 papers. Like that was the limit.”
- It just sort of happened. I mean, like she would always talk about letters, a lot... But I didn’t really think it was strange ‘til we were at a playgroup, when she was three. They had sidewalk chalk. And I remember that she was writing everybody’s name in the family. So she’d write Grandma [Name], Grandpa [Name], my brother’s name, my sis-, you know, my sister-in-law’s name. You know, all spelled out perfectly and all the other moms were like, ‘What are you doing to teacher her this?’ And I’m like, ‘Literally nothing! I mean we read books to her, but I haven’t really taught her anything! It just sorta, happened!

Participant PFAS-0003

- She’s always loved to read, and reading came easy to her
- I mean, she was in the GT (gifted and talented) program in elementary school
- She has always wanted to achieve and do more than what was expected of her

Participant PFAS-0004.

- Oh, she was very high up there in reading. I mean cause, I would read to her, you know at like, I mean I'd read her every, you know when she was a little baby, toddler, read stories every night. Um, she seemed to, you know develop that, fairly quickly.
- She was four years old. And that's all she, she wanted to do was read. She just loved reading, and we'd buy books and go to the library and, I always felt like she excelled at that
- She read very well. It just seemed to Um, first, I think, you know, when you're first beginning, she would just try to sound all of the words, so I think comprehension always kind of came a lot later
- Um, she was already reading at like, you know, four years old

Participant PFAS-0005

- She read her first book at age four. She, um, she was able to read the Magic Tree House um, chapter books. I don't know if you know what those are, they're about a second-grade level, when she was five. Um, she comprehended easily. At eight she was reading everything. She had read all the Harry Potters by the time she was eight.
- She spoke full sentences at uh, one and a half. They were sentences like "Down, go." They were, they weren't completely correct, but they were linked words with, I'm a, I'm an English teacher. They were linked words with subjects and predicates.
- She was creating language. She learned quickly and easily.
- She, um, she was able to read the Magic Tree House um, chapter books. I don't know if you know what those are, they're about a second-grade level, when she was five.
- She, at age four she was spelling, she was doing decoding, spelling things out
- So, she was definitely decoding at age four. She was reading chapter books at age five
- Five, she was reading second grade level books...No, she wasn't making the inferences, she was understanding the content.

Participant PFAS-0006

- She was a good reader. She started early.
- Her favorite one was this cat series. I think she stuck with the genre. She read almost every book in the series. And there were a lot of books in that series. Um, I think that she, I don't think she liked to branch out as much but stuck to one genre.

Participant PFAS-0007

- So, when she started kindergarten, she didn't know all her letters, but she didn't go to preschool, so she caught up and became a voracious reader.

- She started kindergarten about a month after she turned five. She was on the younger end, umm, she didn't know any letters. I mean I taught her to write her name and that was all. One of the moms, who was a teacher's aide said to me one day, 'I don't know why your daughter is in the lowest reading group —the other kid's in that reading group are the naughty boys' and I said 'What!? She's in the lowest reading group?' She's like 'Yeah, it's your daughter and the three little naughty boys.' Come to find out they [Kindergarten students in the class] were supposed to get on and do this little reading thing clicking on stuff [on the computer] and my daughter would just sit there. It was not interesting to her. She'd kinda look at the screen, and then she might click on something, and then she'd twiddle her hair and doo duh doo like that. It was just not engaging there was no teacher involvement and so she wouldn't finish the exercise. That's how it was decided and she stayed in that lowest reading group!! I thought 'Well holy cow!! No wonder!! She's not—this is not working at all for her.' So we started over, she got an awesome teacher, and within two months she was in the top reading group, She's reading, umm—I mean it just clicked—[snaps]. It was just—it's like amazing—as soon as she was given instruction – she read.

- Reading. She spent so much time reading in school in lieu of social opportunities. Most kids in school can't get enough of their friends. She just didn't spend a lot of time with friends. She occupied herself with books.

Participant PFAS-0008

- At a young age she was very bright. And she went to preschool and um, they were ready to get her out of there early because they thought she was pretty bright.
- We would lay in bed reading at night, and I, I, I could never decipher whether she could read or she memorized the story. But we would take turns reading and she would do well.
- I think she was advanced. Uh, in the top, you know, ninetieth percentiles, in all of her standardized tests as far as reading goes.

Participant PFAS-0009

- She was always ahead and excelled at reading. She picked it up very fast, she was always reading, um, multiple grades ahead of where she was supposed to be.

Participant PFAS-0010

- She was a great reader. I would read Dr. Suess books for her and she memorized them. She couldn't, she would think she was reading them, but she didn't know the words,

she would, she memorized them. She couldn't read in the back without knowing what the first words were.

- They recommended her for the gifted program. And the day she took the test I picked her up from school and I was like, 'what, how was school' and she said 'um, well we took this test,' and I was like 'oh' and she was like 'I read at a twelfth grade level,' and I am like 'how do you know that?' and she said 'I looked on the test and I could have gone further, but we ran out of time so.

Participant PFAS-0011.

- So, she knew what rice was, she knew what dogs were, you know what I mean? She could, she knew all of those words.
- I remember going to a restaurant, she picked up the menu, held it up to me and pointed out to the word and said "rice." And she read, she read the word rice, rice. She didn't say I want rice, she just said rice. I said, "oh you want rice?" she just said "yes," "okay." What are you, you are four and you can read?
- She did have trouble with words with multiple meanings.
- She learned to read before she could talk really. I mean, so, as near as I can tell. I never remember teaching her anything about blending words, blending sounds, decoding, any of that kind of stuff. She just read.

Participant PFAS-0012

- She excelled at reading. She learned fast and was above grade level, all the way, that was her thing. Reading.
- How old was she when she started reading? (P): [oh] kindergarten/first grade. Yeah. We never struggled with that.
- It just seemed like she could suddenly read anything. Anything we or the teachers put in front of her to read she could read. Yeah.

Participant PFAS-0013

- Um, she was always a good reader. Always, again, always got the answers. But again, she was paranoid to get the wrong ones, but she, she, she liked to read."
- She wrote some dramatic stories about dating relationships and a boyfriend that, that uh dies. She wrote a really an awesome murder mystery...mostly true life is what she wrote.

Participant PFAS-0015

- She only read a book if it was a book report and it was a novel that she liked. She eventually in junior high started reading these books that were this big [holding her thumb and index finger about a centimeter apart] that were little, um, stories of girls, you know. But she had no interest in reading beyond.

- Really reading is something she struggled with, all through elementary she was very weak in her reading, and didn't do one speck more than was absolutely required, and, uh, mostly just worked from memory, of what she had to learn.

- Um, she was certainly capable of reading, it was more the, um, she didn't read if she didn't have to, and she's it was hard for her from, I don't know if it was taxing to her or if it was just difficult to comprehend it, do a lot of readings.

- We read stories to her. Sometimes she'd have her book upside down but that was really really early on. I actually read the books out loud to her. And then after that she never needed me again to read to her she was able to do it. She was certainly capable of reading, it was more the, um, words she was unfamiliar with, and um, if I read it to her she *could* understand it, but if she read it to herself, she couldn't. I don't know - that could've just been anxiety, she *couldn't* comprehend. , I don't know if it was taxing to her or if it was just difficult to comprehend it. I remember going to her sixth grade teacher who had a PhD and saying 'I wish I could explain to you that my daughter is able to listen to you and do well enough on your exams, but she's not really learning she's more saying things back to you. She's not reading or anything.' She was able to do that all through school and maintain Bs. And then when she got in college, she couldn't read her college books.

Participant PFAS-00016

- We thought she was, [um,] bright and she caught on quickly,
- When she was young she enjoyed reading and [um,] did a lot of reading on her own. So, uh, I think that was a strength for her.

APPENDIX E

Definitions of Key Terms

1. Autism Spectrum Disorder (ASD) - A group of developmental disabilities that can cause significant social, communication and behavioral challenges

2. Camouflaging – the process of hiding aspects of autism spectrum disorder (ASD) in order to cope or fit in

3. Content Schema – background knowledge related to a specific reading passage

4. Detailed meaning – understanding both global and selective information in text

5. Decoding - the ability to apply your knowledge of letter-sound relationships, including knowledge of letter patterns, to correctly pronounce written words

6. Formal Schema - refers to reader's knowledge towards the language, conventions, and rhetorical structures of different types of text

7. Global meaning - understanding the general meaning of what you are listening to or reading

8. Hyperlexic – ability to figure out how to decode or sound out words very quickly, but not understand or comprehend reading

9. Inferencing in reading – the ability to use what you know to make a guess about what you don't know or reading between the lines. Readers who make inferences use the clues in the text along with their own experiences to help them figure out what is not directly said, making the text personal and memorable.

10. Limited or Restricted interests - strong or intense interests only in specific topics or objects. May appear in individuals with autism spectrum disorder (ASD). People with restricted interests are often experts on the topics or objects they enjoy.

11. Linguistic Comprehension - the process by which lexical (i.e., word) information, sentences, and discourses are interpreted

12. Linguistic Schema - refers to readers' prior linguistic knowledge, including the knowledge about phonetics, grammar and vocabulary as traditionally recognized. Linguistic schema includes understanding lexical (word) units and syntactic structures encountered in texts.

13. Reading Comprehension – the understanding and interpretation of what is read

14. Repetitive Behaviors - repetitive behavior may include arm or hand-flapping, finger-flicking, rocking, jumping, spinning or twirling, head-banging and/or complex body movements. May also be known as stimming or self-stimulating behavior.

15. Schema – schema in reading includes background knowledge or what you already know about the topic of a book before you even pick up the book

16. Selective meaning - understanding specific information in the text

17. Synthesizing a text - the process of pulling together background knowledge, newly learned ideas, connections, inferences and summaries into a complete and original understanding of the text. When students synthesize, they are made aware of how their thinking changes and evolves as they read a text.

18. Word Calling – reading orally with accuracy and fluency. Reading appears rapid, attentive and purposeful. However, reading is without understanding or comprehension.

19. Word level reading - decoding and word identification word by word

20. Word Recognition - the ability of a reader to recognize written words correctly and virtually effortlessly