

**AN INVESTIGATION OF PRESCHOOL CHILDREN'S
PRIMARY LITERACY SKILLS**

A Dissertation by

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DEDICATION

To my parents, Marianne and Gerson Kelman,
who would have been so proud

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ABSTRACT

The purpose of this study was to determine if age and/or gender differences in the performances of typically developing preschool children on a measure of primary literacy skills (phonological awareness and alphabetic knowledge) were significant. A second purpose was to ascertain which primary literacy skills can be completed most successfully at specific age intervals. An additional purpose was to determine which predictor variables accounted for significant variance in performance on the primary literacy skills measure. Participants for this study were 91 typically developing preschool children ranging in age from 3 years 0 months to 5 years 11 months. Primary literacy skills, print concepts, and receptive vocabulary were assessed. Information about home literacy experiences were obtained by caregiver questionnaire.

Differences in performance of primary literacy skills (measuring both phonological awareness and alphabetic knowledge) were significant for age but not for gender, with older children performing better than younger children. Differences in performance on phonological awareness tasks were also significant for age but not for gender. Differences in performance on alphabetic knowledge tasks were significant for age and also for gender, with girls outperforming boys. Primary literacy tasks completed most successfully by children at each of six 6-month age intervals were identified, with rhyme detection the only task that was completed successfully at all age levels. Results of a stepwise multiple regression analysis indicated that out of seven predictor variables (age, gender, receptive vocabulary, print concept skills, mother's education level, father's education level, and/or home literacy experiences), print concept skills accounted for the

greatest amount of variance in children's performance on primary literacy tasks. Father's education level, receptive vocabulary, and age accounted for a small but significant additional variance.

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LIST OF ACRONYMS

ACRONYM	FULL NAME
ANOVA	Analysis of Variance
APLS	Assessment of Primary Literacy Skills
ASHA	American Speech-Language-Hearing Association
PPVT-III	Peabody Picture Vocabulary Test-III

CHAPTER I

INTRODUCTION

Literacy is the most important goal of schooling (Moats, 2000). Developing the skills to read and write is a highly complex dynamic process that utilizes all levels of linguistic processing. Without well-developed reading skills, children are at risk for school failure.

Illiteracy in the United States is growing at an alarming rate. A survey by The National Institute for Literacy (2003) found that more than 20 percent of adults in our country read at or below a fifth grade level. Low literacy proficiency limits access to higher paying employment and contributes to an increased percentage of families on welfare (U.S. Department of Education, 1998). In addition, the U.S. Department of Education reports that 7 in 10 prisoners in our nation perform at the lowest two literacy levels and 85% of juvenile offenders are illiterate. Clearly, poor literacy skills negatively impact all aspects of life in a literate culture.

Literacy problems in the United States are widespread, with serious educational consequences. Children whose parents are illiterate are twice as likely as their peers to be illiterate themselves (U.S. Department of Education, 1998). On average, children from low-income families have far fewer literacy and language experiences at home than children of middle- or upper-income families, placing them at a serious educational disadvantage. Research has shown that children who have limited early reading experiences rarely catch up to their peers academically (Torgesen, 1998). Approximately one out of every five school-age children in our country experiences reading failure

(Lyon, 2003). According to the National Institute for Literacy (2003), literacy problems constitute a national health crisis.

The early childhood years – from birth through age 8 – are the most critical for literacy development. In the early literacy period, children rapidly develop important foundational skills to prepare them for future reading and writing. The skill and knowledge base for early literacy includes: (a) receptive and expressive language (e.g., vocabulary), (b) print concepts (e.g., understanding that print reads from left to right on a page), (c) beginning forms of writing (e.g., writing one's name), (d) knowledge of graphemes (e.g., naming letters of the alphabet), (e) grapheme-phoneme correspondence (e.g. knowing that the letter “s” makes the sound /s/), and (f) phonological awareness (e.g., knowing that ‘*cowboy*’ without the ‘*cow*’ is *boy*) (Whitehurst, Zevenbergen, Crone, Schultz, Velting, & Fischel, 1999).

Early literacy skills provide the building blocks for children's subsequent acquisition of higher linguistic abilities, and, ultimately, contribute to the achievement of conventional reading (Ball & Blachman, 1991; Bryant, Maclean, Bradley, & Crossland 1990; Lundberg, Frost, & Petersen, 1988; Justice & Kaderavek, 2004). Preschool children's literacy skills have been shown to have a strong causal influence on the development of later reading achievement (Lonigan, Burgess, & Anthony, 2000; Stahl & Murray, 1994; Wagner & Torgesen, 1987).

Learning to read and write is critical to a child's academic success (International Reading Association and the National Association for the Education of Young Children, 1998; Whitehurst & Lonigan, 1998). Children with low levels of literacy competence are at substantial risk for later reading problems. Those who have weak literacy skills are

inadequately prepared for the rigors of school. They often struggle and experience failure across several domains.

Children who enter school with limited reading skills are at high risk of qualifying for special education services (Lonigan et al., 1999). In addition to their potential academic difficulties, children with poor reading skills are at substantial risk for social, behavioral, and emotional problems. For example, poor school readiness at the beginning of first grade predicts behavioral and emotional problems at the end of the school year (Kellam et al., 1991).

There is much work to be done to break the cycle of illiteracy. A National Research Council report on preventing reading problems in young children (Snow, Burns, & Griffin, 1998) concluded that the majority of reading problems can be prevented by reducing the number of children who enter schools inadequately prepared. Identification of children at risk of reading failure, conducted at a very early age, will have far less educational consequences. According to the National Center for Learning Disabilities (2003), most children have the potential to be successful readers if they enter school sufficiently prepared with early literacy skills.

Defining Primary Literacy Skills

Primary literacy skills are developmental precursors to conventional forms of reading and writing. Both phonological awareness and alphabetic knowledge play a substantial role in literacy acquisition. The development of phonological awareness is a key prerequisite to the acquisition of early reading skills (e.g., Adams, 1990; Mattingly, 1972; Wagner & Torgesen, 1987). Alphabetic knowledge is one of the strongest single

predictors of literacy success (Adams, 1990). Children who develop competencies in these domains experience greater success in learning to read.

Phonological awareness, the conscious ability to perceive and manipulate the sound structure of spoken words (Bradley & Bryant, 1983; Goswami & Bryant, 1990; Liberman & Shankweiler, 1985; Wagner & Torgesen, 1987) is subsumed under the broader category of metalinguistics. (Phonological awareness is also referred to as metaphonological awareness or phonological sensitivity.) Alphabetic knowledge includes the names of letters of the alphabet and the sounds of the letters. These letters and sounds are combined to spell words. Letter-name knowledge and letter-sound knowledge form the foundation of developmental spelling.

Phonological awareness and alphabetic knowledge merge together to form the alphabetic principle, a concept studied extensively by Byrne (1998). The alphabetic principle refers to the concept that ‘the letters that comprise our printed language stand for the individual sounds that comprise our spoken language’ (Byrne, 1998, p.1). This principle forms the foundation upon which all subsequent literacy skills are developed.

Children develop the critical underpinnings for early literacy through frequent and consistent exposure to language, books, and print. Unfortunately, not all families provide their young children with sufficient language and print experiences to prepare them for literacy instruction in school (Jenkins, 1998). It is imperative, therefore, that preschool and kindergarten teachers work effectively to fill in the gap before formal literacy instruction begins.

Statement of the Problem

Although the importance of assessing primary literacy competencies is apparent, few empirical studies have focused on identifying specific developmental milestones. For example, numerous investigators have assessed phonological awareness abilities in young children; however, there has been considerable variability in how the skills are measured and interpreted. More needs to be learned about the acquisition of specific phonological awareness skills and the emergence of alphabetic knowledge.

Many of the tasks used to measure phonological awareness are at varying levels of difficulty. Some are performed easily by preschoolers, whereas others are considerably more challenging for this age group. The tasks have different cognitive or linguistic requirements, suggesting that phonological awareness (specifically phonemic awareness) is not a unitary ability and tasks are not equivalent (Stanovich, Cunningham, & Cramer, 1984; Yopp, 1988).

The majority of research in phonological awareness and alphabetic knowledge has been with school-age children, largely from kindergarten through elementary school. These studies generally do not address questions concerning the age at which specific skills develop. For example, a small number of researchers have investigated phonological awareness in preschool children; however, due to the lack of continuity in tasks and measures, normative data for age of acquisition is inconsistent and unreliable.

In addition, little is known about how primary literacy skills relate to other factors of early literacy development. Whitehurst and Lonigan (2003) consider print knowledge (e.g., a child's understanding of books, printed letters, and words) to be an essential skill

for learning to read and write. The relationship between print knowledge and primary literacy skills needs to be explored more thoroughly.

Statement of Purpose

The current study was designed to address these issues regarding primary literacy skills (i.e., phonological awareness and alphabetic knowledge) in preschool children. The purpose of the study was to determine if age and/or gender differences in the performances of preschool children on measures of primary literacy skills were significant. Also, the study explored which primary literacy tasks can be completed most successfully by preschool children at specific ages. In addition, other factors that may contribute to early literacy development (print concepts, receptive vocabulary, parents' education, gender, age, and home literacy experiences) were assessed to determine their correlation with primary literacy performance.

CHAPTER II

REVIEW OF THE LITERATURE

This chapter begins with an overview of research in primary literacy skills. Studies in phonological awareness are summarized, followed by a review of current developmental data. Research in alphabetic knowledge is presented. Variables related to primary literacy (print concepts, parental educational level, age, gender, and home literacy experiences) are discussed.

Studies in Primary Literacy

Phonological Awareness

Most investigations of phonological awareness skills have been completed since the early 1970s. There is an extremely rich field of empirical research spanning several decades that examines phonological awareness and, in particular, its relationship to reading acquisition. Data have been gathered from correlational studies and training studies. The majority of research has focused on children as they begin formal schooling (i.e., kindergarten age and older). A small percentage of studies have investigated phonological awareness abilities in preschool children. An overview of influential studies that examine phonological awareness skills in children 3 to 6 years of age, along with their unique contributions, is essential to the understanding of phonological awareness.

Early Seminal Studies

During the 1960s and 1970s, several investigators began to study the ability of young children to analyze the spoken word into syllables or phonemes (Bruce, 1964; Elkonin, 1963; Liberman, Shankweiler, Fischer, & Carter, 1974). These studies formed

the foundation for research in phonological awareness. Many of the tasks created in the early studies were used or modified in future investigations.

Liberman et al. (1974) were instrumental in developing a tapping task to measure children's abilities to segment spoken words into syllables and phonemes. Children between the ages of 4 and 6 years tapped a wooden dowel on the table to indicate the number of segments (syllables or phonemes) heard in words spoken by the examiner. Results from this study revealed a developmental hierarchy in the performance of these language analysis tasks. Approximately half of the 4-year-olds could segment words into syllables, but none could segment into phonemes. The "tapping" task has been used widely since this seminal study.

A model for training young children to segment words into phonemes was developed by Elkonin (1963). Elkonin and his colleagues taught 5- and 6-year-old children to pronounce words slowly and to push a counter into a square as each sound in the word was produced. It was found that children had higher success rates for phoneme segmentation tasks when using the visual aid. Many investigators have since incorporated the Elkonin model in their research (e.g., Blachman, Ball, Black, & Tangel, 1994).

Bruce (1964), one of the early investigators, used an elision (i.e., deletion) task to test children ranging in age from 5 ½ to 7 ½ years. In this task, the examiner pronounced a word such as "fan" and asked the child to produce the word that would result if the first or last sound was eliminated. Results indicated that children below the age of 7 years were unable to perform the task. Since Bruce's study, the elision task has been replicated and adapted to many other bodies of research in phonological awareness (e.g., Rosner & Simon, 1971).

Landmark Longitudinal Studies

Some investigators initiated longitudinal studies during the 1980s and 1990s to examine phonological awareness over a several year age span. These longitudinal studies made a substantial contribution to the knowledge base of phonological awareness. In a landmark study in England, Bradley and Bryant (1983, 1985) established a causal relationship between the phoneme awareness (measured by a sound categorization “oddity” task) of approximately 400 four- and five-year-olds and the reading and spelling achievement of the same children 3 years later. The study also demonstrated the benefit of combining phonological awareness instruction (at the phoneme level) with explicit letter-sound instruction. Bradley and Bryant were instrumental in obtaining evidence that phonological awareness skills are precursors to reading.

Although Bradley and Bryant established that the benefit of phoneme awareness training is increased by connecting the sound segments in words to their corresponding letter symbols, there were limitations to the study. Bradley and Bryant did not include a letter-training-only group, making it difficult to determine whether the combination of sound categorization and letter training or the letter training itself made the difference.

Ball and Blachman (1991) conducted a study in which 90 non-reading kindergarten children were randomly assigned to a treatment group for instruction in phoneme awareness with letter names and letter sounds, or to a control group. Children received instruction in groups four times a week for seven weeks. After the intervention, children who received phoneme awareness training with the sound-symbols connections (i.e., letter sound and letter name) significantly outperformed both control groups in phoneme awareness and beginning reading and spelling. The findings from the Ball and

Blachman study were influential in demonstrating that phoneme awareness training, especially when it includes instruction in grapheme-phoneme correspondence, can play an important role in early reading and spelling acquisition for pre-readers.

A large-scale study in Denmark (Lundberg, Frost, & Petersen, 1988) examined the effectiveness of an 8-month long program that trained 235 kindergarten children in phonological awareness skills prior to formal reading instruction. This study, unlike that of Bradley and Bryant, focused on groups of children rather than individuals. The training program was designed to expose children to the phonological structure of language through metalinguistic games and activities with no reference to letters, text, or print, allowing for the specificity of training effects. According to Lundberg et al., the program had no significant effect on functional linguistic skills (i.e., comprehension of oral instructions or vocabulary) or the learning of letter names; however, it did affect metalinguistic skills (e.g., small but significant effects on rhyming tasks and word and syllable manipulation). Effects were dramatic for phoneme segmentation. The study demonstrated that phonemic awareness can be developed outside the context of the alphabetic writing system, although explicit instruction is necessary. In addition, it was also demonstrated that phonological awareness in kindergarten can make a significant difference in subsequent reading and spelling acquisition.

A 15-month longitudinal study in England by Maclean, Bryant, and Bradley (1988) assessed children's knowledge of nursery rhymes and their phonological skills, with emphasis on detection and production of rhyme and alliteration. Sixty-six children, whose average age was 3 years and 3 months when selected, demonstrated a robust relationship between knowledge of nursery rhymes and the development of phonological

skills, strongly predicting their later success in early reading ability. Maclean et al. were the first to show that children as young as 3 years of age were able to analyze sounds in words.

Yopp (1988) administered 10 different tasks of phonological awareness to a group of 96 kindergarten children to determine the reliability and relative difficulty of each measure. In addition, Yopp assessed task validity through correlation with a reading (pseudoword) decoding task. Results of this study revealed rhyming to be the least challenging task and phoneme deletion to be the most difficult for children in kindergarten. A factor analysis by Yopp revealed two skills that influenced test performance: a simple phonemic awareness factor that required one cognitive operation observed in segmentation, blending, sound isolation, and phoneme counting tasks, and a compound phonemic awareness factor, requiring multi-step cognitive operations in phoneme deletion and word-to-word matching.

Treatment Studies

Research in phonological awareness has also been conducted through treatment studies. In most of these studies, children have demonstrated growth in phonological awareness skills, indicating that phonological awareness is a teachable skill that children are capable of learning. These findings provide educators with great promise for children who are at risk for reading difficulties.

When evaluating a treatment study, the content of the intervention program must be scrutinized. For example, the phonological intervention program may include a variety of different methods and procedures to teach a specific skill. Further, one study may include integration of letter-sound knowledge (e.g., Gillon, 2005) while another may

focus on explicit phonological awareness tasks without direct teaching in letter knowledge (e.g., Nancollis, Lawrie, & Dodd, 2005). The model of service delivery must also be taken into consideration. Intervention programs may take place in a large group classroom setting (e.g., Nancollis et al., 2005; Blachman et al., 1994) or in a small group or individual session (e.g., Gillon, 2005). These conditions can have a substantial impact on the outcome of the study.

In a training study by Cunningham (1990), two groups of kindergarten and first-grade children were given different forms of phonemic awareness intervention. The “skill and drill” group received training in phoneme segmentation and blending. The “metalevel” group received similar training with additional explicit support to apply segmentation and blending in reading. A control group listened to stories and discussed them with a teacher. Cunningham found significant transfer of both types of training to reading performance in kindergarten, but only effects for the explicit training in first grade. The trained group made more progress with reading than the control group and the “metalevel” training had more effect than “skill and drill,” emphasizing the important link between phonemic awareness and reading.

An experimental study in Australia by Byrne and Fielding-Barnsley (1991) demonstrated that the phonological awareness task of sound categorization (referred to as *phoneme identity*) can be successfully taught to 4-year-old children. The experimental group of 64 preschoolers received phonological awareness training referred to as “Sound Foundations” for 12 weeks, while the 62 controls were exposed to story reading and semantic categorization activities. Results revealed that those trained in phonological awareness outperformed the controls on both trained and untrained sounds. In addition,

the experimental group outperformed the control group on letter knowledge, providing evidence that combining phonological awareness instruction with exposure to letters is useful for acquiring the alphabetic principle (Sodoro, Allinder, & Rankin-Erikson, 2002).

Byrne and Fielding-Barnsley (1993) conducted a 1-year follow-up of the children from their original study. It was found that children who completed preschool with higher levels of phonological awareness performed significantly better after kindergarten on all phoneme and literacy measures. A 2- and 3-year follow-up by Byrne and Fielding-Barnsley (1995) found continued superior performance of the children from the experimental condition in decoding and reading comprehension. Results of these studies affirm other research demonstrating that children who begin elementary school with a solid foundation in phonological awareness perform at higher levels on a variety of literacy tasks later in schooling. These studies also reveal the benefit of an effective early training program in phonological awareness.

Many of the previous training studies conducted their intervention outside the regular classroom using specially trained individuals (see e.g., Ball & Blachman, 1991; Bradley & Bryant, 1983, 1985; Byrne & Fielding-Barnsley, 1991; Cunningham, 1990). The question arose whether the instructional strategies in these studies would be as effective if they were presented within the classroom setting by the regular teacher. Blachman et al. (1994) conducted a kindergarten training study in which the teachers and their teacher assistants were trained to implement a phoneme awareness intervention program in the classroom. Four inner-city schools participated for eleven weeks with 84 treatment children and 75 controls. At the end of the 11 weeks, all children were assessed in measures of phoneme segmentation, letter name and letter sound knowledge, reading

and invented spelling. The children who had participated in the phonological awareness intervention significantly outperformed the control children on all measures, confirming and extending the results of previous research that training in phoneme awareness has a positive effect on early reading skills and developmental spelling. One of the most meaningful outcomes from this study was that the activities were provided effectively to groups of children in the regular classroom setting by kindergarten teachers and their assistants.

Lonigan, Burgess, Anthony, and Barker (1998) examined phonological sensitivity in 356 children from the ages of two to five years, across different levels of linguistic complexity. Six tasks of phonological sensitivity were administered. Results of the study indicate that lower levels of phonological sensitivity (i.e., syllables) are developmental precursors to higher levels of phonological sensitivity (i.e., phonemes). In addition, the results suggest that phonological sensitivity can be reliably assessed in preschool children.

A study by Anthony, Lonigan, Driscoll, Phillips, and Burgess (2003) examined the order of acquisition of phonological sensitivity skills in preschool and kindergarten children. Four levels of linguistic complexity (words, syllables, onsets and rime, and phonemes) across four levels of task complexity (blending detection, elision detection, blending, and elision) were assessed in 947 children, ages 2 to 5 years. The pattern that emerged suggested that children acquire various phonological sensitivity skills in overlapping stages rather than temporally discrete stages, indicating that mastery of earlier emerging skills is not essential for achieving moderate competence of a subsequent skill. Anthony et al. termed this pattern a “quasi-parallel” progression, as

children appeared to become aware of multiple levels of word structure simultaneously. The study revealed a clear sequence in which children become sensitive to different linguistic units: mastery of word-level skills generally occurred before mastery of syllable-level skills; syllable-level skills prior to onset/rime level skills, and onset/rime level skills before phoneme level skills. Measures to assess print concepts and literacy experience were not included in this study.

Overall, experimental research and treatment studies have yielded positive effects, demonstrating that phonological awareness can be successfully enhanced through training measures in young children. After intervention, children in the training groups usually outperformed the control children on most measures of phonological awareness. Children with low phonological awareness skills demonstrated improved reading performance after intervention was provided (e.g., Ball & Blachman, 1991; Bradley & Bryant, 1985; Byrne & Fielding-Barnsley, 1991; Cunningham, 1990). Programs that combined training in phonological awareness with explicit letter-sound training had more powerful outcomes (e.g., Ball & Blachman, 1991; Bradley & Bryant, 1985). It was suggested that linguistic complexity plays a role in the developmental learning of the phonological awareness construct (e.g., Anthony et al., 2003).

Phonological Awareness Tasks

A wide variety of tasks have been used to measure phonological awareness skills. Many investigators have developed their own set of tasks to measure the construct of phonological awareness. There is substantial diversity and little standardization within individual phonological awareness tasks. Terms used for the same task are variable.

Stimuli used in one study are not replicated in other studies. These factors have created a lack of continuity and much confusion among researchers and practitioners.

McBride-Chang (1995) identified the following three essential components shared by virtually all phonological awareness assessment tasks (p.180):

1. The participant is asked to listen to one or more orally presented words or nonsense words and repeat the stimulus so the tester can ensure that it was correctly perceived.
2. The participant is asked to perform a task with a set of stimuli. A young child may be given three words (e.g., *fish, fin, cap*) and asked to select the one that does not belong (e.g., Bradley & Bryant, 1985).
3. The participant is asked to respond to the given stimulus. Responses may be obtained verbally, by pointing, or with pencil and paper (written).

Successful completion of a phonological awareness task requires prerequisite skills of general cognitive ability, memory, and speech perception (McBride-Chang, 1995). First, individuals must be able to reason well enough to think about the task presented and act upon it (general cognitive ability). Past studies (e.g., Wagner, Torgesen, Laughon, Simmons, & Rashotte, 1993) have found general cognitive ability to correlate substantially with phonological processing tasks. Second, memory skills are required so that the stimulus is remembered long enough for an operation to be performed on it (McBride-Chang, 1995). Several researchers (e.g., Bradley & Bryant, 1985; Wagner et al., 1993) have recognized that short-term memory is essential in all phonological awareness tasks. Finally, speech perception is necessary so that the stimulus can be perceived and manipulated adequately. Studies by Hurford (1990) and Manis, McBride-

Chang, Seidenberg, Doi, and Custodio (1993) have shown an association between speech perception and various phonological processing skills in children.

There are several different tasks that can be assessed for phonological awareness. Adams (1990) divides phonological awareness tasks into four main categories: rhyming, blending, segmentation, and manipulation. The rhyming tasks include knowledge of nursery rhymes (e.g., Maclean et al., 1988) and identification of the non-rhyming word from a series of three or four words as in the sound categorization task of Bradley and Bryant (1983) (e.g., locating the “odd word out” in the sequence *cat, pat, fan* as “fan”). For the sound blending tasks, the examiner pronounces a series of phonemes in isolation and asks the child to put them together to form a word (e.g., “c-a-t” blends to produce *cat* as in the study by Perfetti, Beck, Bell, & Hughes, 1988). The syllable and phoneme segmentation tasks require the child to tap, count out, or identify syllables and/or phonemes within words (e.g., the child taps three times to indicate three phonemes in the word *cat*) as demonstrated by Liberman et al. (1974). The purpose of the segmentation tasks is to determine if the child can decompose a syllable into its component phonemes, a necessary precursor to being able to decode. The phoneme manipulation tasks involve the child deleting, adding, substituting, or transposing phonemes within words as in the consonant deletion task by Stahl and Murray (1994) where the child is instructed to “Say *meat*. Now say it again, but don’t say /m/.” In general, performance on phoneme manipulation tasks has yielded strong correlations with reading achievement (Lundberg, Olofsson, & Wall, 1980; Rosner & Simon, 1971). Manipulation tasks are considered a higher level phonological awareness skill.

Within these tasks, variability can occur by linguistic unit, position of the linguistic unit within the word, and whether the target is a real word or pseudoword (Stahl & Murray, 1994; Wagner et al., 1993). The three linguistic units most commonly used (Goswami & Bryant, 1990; Høien, Lundberg, Stanovich, & Bjaalid, 1995; Stanovich, 1992; Treiman & Zukowski, 1991) are:

Syllabic (the awareness of syllables in words)

pea - nut re - frig - er - a - tor

Intra-syllabic (the awareness of onset and rime)

c - at m - ilk dr - um

Phonemic (the awareness of individual sounds in words)

d - o - g r - o - ck - e - t

As demonstrated by these studies, considerable variability exists in how phonological awareness skills are measured and interpreted. The use of such an extensive array of tasks and ways to measure them has made interpretation and comparison of research findings very challenging.

Acquisition of Phonological Awareness Skills

It appears from the research that the acquisition of phonological awareness develops gradually into more and more sophisticated task complexity (International Reading Association, 1998); however, some suggest there is diversity rather than uniformity of developmental paths among children. According to several researchers, phonological awareness skills emerge gradually along a developmental continuum or hierarchical model of word structure (Adams, 1990; Ball, 1993; Stanovich, 1992). There is evidence (Goswami & Bryant, 1990; Liberman, 1973; Treiman, 1985; Treiman &

Zukowski, 1996) that the development of phonological awareness proceeds from lower levels of linguistic complexity (i.e., “large” units/words and syllables) to higher levels of linguistic complexity (i.e., “smaller” units/phonemes). In other words, investigators have found that children learn to manipulate words before syllables, syllables before onsets and rimes, and onsets and rimes before phonemes, thus achieving syllabic awareness earlier than phoneme awareness and awareness of intrasyllabic units (i.e., onset-rime) prior to awareness of phonemes (Bowey, 1994; Fox & Routh, 1975; Liberman et al., 1974; Lonigan et al., 1998; Treiman, 1992). “...few or no children, for example, should be able to blend phonemes before they can blend words, syllables, or onsets and rimes” (Anthony, 2001, p. 21). In this paradigm, a skill is learned and completely mastered prior to learning a subsequent phonological skill. Mastery is necessary in one skill before moving on to the next. According to Goswami (2002), this sequence appears to be language universal.

Support for a developmental conceptualization of phonological awareness has accumulated from several comprehensive studies (Schatschneider, Francis, Foorman, & Fletcher, 1999; Stahl & Murray, 1994; Wagner et al., 1997). For example, Schatschneider et al. examined phonological awareness skills of 945 children from kindergarten through second grade and found evidence for this unidimensional construct. Stahl and Murray evaluated phonological awareness and early literacy skills in 113 children from kindergarten and first grade and determined that linguistic complexity was a significant factor.

Experiences with environmental print (e.g., store-front signs), television programs that enhance a child’s understanding of words, letters, and sounds of language, exposure

to shared book reading, and linguistic games all contribute to the acquisition of some component of phonological awareness. Children acquire phonological skills and literacy-related knowledge in a variety of ways. Rather than a single developmental path, Christensen (1997) argued that the data indicate divergent paths due to varied literacy experiences. Although there is support for the proposed developmental sequence in that many children demonstrate knowledge consistent with the described “stage-like” pattern, others do not appear to follow this path.

Anthony et al. (2003) investigated the order of acquisition of phonological sensitivity skills among children in preschool and kindergarten. They found children may indeed acquire phonological sensitivity in discreet, sequential stages, supporting the theory of a hierarchical model of phonological sensitivity as proposed by Adams (1990) and Goswami and Bryant (1990). They also identified a developmental pattern of overlapping stages and a quasi-parallel acquisition of skills. In this model, more than one skill is learned simultaneously. Only a moderate amount of skill mastery is necessary at one stage (e.g., syllable awareness) prior to learning the skill at the next stage (e.g., onset-rime awareness). For example, as a child improves on one phonological sensitivity skill, he/she may also improve on others.

Most of the studies that examined phonological awareness skills did so with school-age children. Only a limited number of studies have explored phonological awareness skills in the preschool-age population. Despite the immense interest by researchers in this area, knowledge of normally developing 3-, 4-, and 5-year-old children’s phonological awareness continues to be somewhat fragmentary.

Early researchers believed that many of the familiar techniques for investigating phonological awareness (except for rhyming) were far too difficult for preschool-age children (Bruce, 1964; Maclean et al., 1988; Bryant, Bradley, Maclean, & Crossland, 1989). Specifically, there appears to be agreement that tasks involving detection of single phonemes are usually too complex for children who have not yet learned to read (Bruce, 1964; Bryant & Goswami, 1987; Catts, 1991; Fox & Routh, 1976; Liberman et al., 1974; Walley, Smith, & Jusczyk, 1986).

More recent studies have demonstrated phonological awareness skills in preschool-aged children. For example, Lonigan et al. (1998) found it possible to measure some level of phonological sensitivity in children as young as 2 years of age. Burt, Holm, & Dodd (1999) studied normally developing preschool-age children and concluded that they can demonstrate awareness of onset and rime and segment words into syllables. These results confirm findings of previous research (Fox & Routh, 1975; Treiman & Zukowski, 1991) and support the contention that syllable awareness occurs early in the hierarchy of phonological awareness learning.

Results from Lonigan et al. (1998) revealed evidence that a number of 2- and 3-year-old children demonstrated some phonological sensitivity at various levels of complexity. Approximately one fourth of the 2-year-olds and slightly more than one third of the 3-year-olds performed above chance levels on one of the rhyming tasks. In addition, a moderate percentage of the 2- and 3-year-olds were able to carry out some blending and elision items, including some at the nonword syllable and phoneme level.

Chaney (1992), Fox and Routh (1975), Lonigan et al. (1998) and Maclean et al. (1987) detected word sensitivity in 2- and 3-year-old children. These studies also found

sensitivity to syllables, onsets, and rimes in many 3- and 4-year-olds. Some form of phoneme sensitivity was identified in 4- and 5-year-old children in studies by Bryant et al. (1989; 1990), Fox and Routh (1975, 1976), and Lonigan et al. (1998). Fox and Routh (1975) asked 50 children (10 at each age from 3-7 years) to segment sentences into words, words into syllables, and syllables into phonemes. They found that some of the 3-year-old children could segment syllables into phonemes and also that all segmenting abilities increased with age.

Stahl and Murray (1994) identified a clear hierarchy among three tasks – blending, deletion, and partial segmentation. Partial segmentation (i.e., phoneme isolation) was found to almost always be present in children who could blend and delete phonemes; therefore, it appears to be the first task mastered and a necessary condition for further treatment of other manipulations.

The preschool children in the study by Burt et al. (1999) had not yet developed an awareness of individual phonemes. Other studies support the hypothesis that typical preschool children have not developed awareness for individual phonemes (e.g., Bryant et al., 1989; Morais, 1991; Treiman & Zukowski, 1991; Tunmer & Hoover, 1992). Results of a study by Liberman et al. (1974) revealed that preschool children were unable to isolate phonemic segments (e.g., they could not identify three separate sounds in the word *pat*). Fox and Routh (1976) found 4-year-olds could not produce “just a little bit of *man*,” and Rosner and Simon (1971) established that preschool children were unable to complete a phoneme manipulation task that required them to “say *pat* without the /p/.”

An awareness of the phonological structure of speech develops gradually over the preschool years for most children (Snow et al., 1998). The first signs of awareness are

when children monitor and correct speech errors and “play” with sounds (e.g., pancakes become silly “cancakes”), both of which have been observed in 2- and 3-year-olds in naturalistic conversational settings. Children of preschool age are drawn to the sounds of speech through books geared toward rhyming and alliteration for this age group (Bryant et al., 1990). Chaney (1992) found that 91% of the 3- and 4-year olds in their study could judge whether a “Martian” puppet said English words correctly, 37% engaged in sound play, and 26% could reliably identify rhyming words. Identifying the initial consonant in words was accomplished by only 14% of the children.

According to Bryant et al. (1990), children usually find phoneme detection tasks too difficult until they reach school age and begin to read. It is suggested that children must attain some minimal threshold of cognitive development before they can grasp and refer to abstract concepts of word, syllable, or phoneme (Fowler, 1991). By the end of first grade, most children are able to count phonemes and segment phonemes (Blachman, 1994). Performance on tasks that require phoneme awareness provides a window on the nature of the phonological representation a child possesses (Fowler, 1991; Hulme, et al., 2002). The ability to perform well on a task such as phoneme deletion is dependent upon well-established phonological representations.

Burt et al. (1999) concluded that typically developing preschool children are able to: (a) produce consistent phonological representations; (b) imitate non-words; (c) produce lexical items in imitation, naming and connected speech with low variation and high accuracy; (d) segment words into syllables; (e) demonstrate awareness of rime; (f) demonstrate awareness of onset. Typically developing preschool children have not developed an awareness of phonemes.

Alphabetic Knowledge

Knowledge of the alphabet at school entry is recognized as a powerful predictor of future reading achievement (Adams, 1990; Byrne et al., 1997; Muter, Hulme, Snowling, & Taylor, 1998; Stevenson & Newman, 1986). Pre-readers' letter knowledge was found to be strongly correlated with the development of phonological awareness (Burgess & Lonigan 1998; Stahl & Murray, 1994; Wagner, 1997), first grade reading skills (Bond & Dykstra, 1967; Chall, 1967), and later reading achievement (Badian, 2000).

Alphabetic knowledge includes letter-name knowledge, letter-sound knowledge and invented spelling. Letter-name knowledge has been found to be a stronger predictor of reading success than letter-sound knowledge (e.g., Burgess & Lonigan, 1998; Share, Jorm, MacLean, & Matthews, 1984; Wagner, Torgesen, & Rashotte, 1994). Most letter-name knowledge tasks are modeled after the letter-identification subtest from the *Concepts about Print* test (Clay, 1979) where children are shown individual letters (i.e., graphemes) and asked to name them.

Letter-sound associations allow children to decode printed words and construct the spellings of words (Bourassa & Treiman, 2001). For a letter-sound knowledge task, children may listen to production of a sound (i.e., phoneme) and either name the sound the letter makes (Anthony et al., 2002; Burgess, 2002) or point to the letter representing the sound (Byrne & Fielding-Barnsley, 1993). Invented spelling is assessed by having children spell words from dictation (Blachman et al., 1994; Gilbertson & Bramlett, 1998; Lombardino, Bedford, Fortier, Carter, & Brandi, 1997; Swank & Catts, 1994).

The alphabetic principle, the realization that letters represent speech sounds, is the basis for the code used in reading and writing (Justice, 2006; Snowling, 2006). Speech sounds are “mapped” onto letters through letter-sound correspondences (Ehri, 1991; Frith, 1985). Children apply the alphabetic principle by combining their knowledge of print (print awareness and alphabetic knowledge) and sound (phonological awareness). In the early acquisition of the alphabetic code, children produce many errors because they do not fully utilize all alphabetic and phonetic information when decoding and spelling (Ehri, 1991; Justice, 2006). Learning all the rules of the alphabetic principle is a developmental process that takes many years to acquire.

Several researchers have suggested that there is a strong and reciprocal relationship between phonological awareness and the alphabetic principle (e.g., Burgess & Lonigan, 1998; Stanovich, 1994; Wagner et al., 1993). In preschool children, phonological awareness appears to develop simultaneously with letter-sound knowledge, fueling mastery of the alphabetic principle (Treiman, 2000).

Literacy Development and Other Factors

Many factors play a role in the acquisition of literacy. Several variables related to primary literacy skills are discussed below.

Print Concepts

Print knowledge, an umbrella term that describes children’s early understanding about print, develops gradually long before formal reading begins. Print knowledge includes concepts about print and alphabetic knowledge. There is wide variability in the achievement of milestones for print knowledge, though most kindergarten children have some understanding of how print works and what it does (e.g., Adams, 1990). A

sampling of print knowledge skills include reading signs in the environment, naming letters of the alphabet, pretending to “read” books, using terms specific to print and writing (e.g., *read, letter*), tracking print from left to right, and identifying spaces between words (Justice & Ezell, 2001; Snow et al., 1998; van Kleeck, 2006). It has not been determined if one behavior is more important than others, or whether behaviors follow a specified developmental order. However, most researchers agree that an interest in print and recognition of the functional aspects of print (e.g., that print carries meaning) are early print knowledge accomplishments (Justice & Ezell, 2004; Morrow, 1997). Other skills in print knowledge gradually develop from these baseline behaviors.

Print concepts, the understanding of the rules governing how print is used and organized across various genres (Justice, 2006), is strongly related to later literacy achievement. Although environmental print plays an important role in the development of print concepts, few studies have included assessment of this genre. Three studies (Anthony et al., 2002; Brennan & Ireson, 1997; Burgess, 2002) have assessed knowledge of the mechanics of print (e.g., asking questions such as “Where is the front of the book?”) and environmental context (e.g., recognition of commonly occurring logos). These studies, patterned after Clay (1979), demonstrate the importance of this domain. Further research in print concepts is warranted.

Parent Education Level

There is considerable evidence that parent education level is associated with environmental experiences of children (e.g., Hart & Risley, 1995). Parental education history is linked to attitudes toward education and knowledge about child development (e.g., Brody & Flor, 1998).

Much of the research regarding parent education level is exclusively measured by maternal educational level. Early research found maternal and paternal education levels to be highly correlated (Entwisle & Astone, 1994) and many low-income children live in mother-only families (Hernandez, 1997). Therefore, many studies chose to use maternal education level as the measure of parental education.

Age

In a study by Foy and Mann (2003), age was significantly correlated with phoneme awareness, rhyme awareness, vocabulary, letter knowledge, naming speed, and articulation; however, age did not correlate with any home literacy measures. A relationship between age and phonological awareness tasks was found in a study of preschool children conducted by Lonigan et al. (1998). Scores for rhyme oddity, alliteration oddity, blending, and elision correlated with children's ages.

Overall, many studies have reported that as children increase in age, there is an increase in performance on phonological awareness tasks. As children age, their underlying phonological representations develop (Fowler, 1991). This early lexical development sets the stage for phonological awareness.

Vocabulary

Children's receptive vocabulary plays an influential role in phonological awareness. For example, Metsala (1999) found a relationship between the size of a child's receptive vocabulary and performance on phonological awareness tasks. In addition, Foy and Mann (2001) found vocabulary to be a primary associate of phoneme awareness.

Receptive vocabulary has also been linked to shared reading experiences in preschool children (Senechal, LeFevre, Hudson, & Lawson, 1996) and in kindergartners (Jordan, Snow, & Porche, 2000). Shared book reading provides ample opportunities to learn new vocabulary words, thus contributing to reading success.

Gender

In the literature, gender has been reported to influence literacy development in some studies and not in others. Girls performed slightly better than boys in verbal skills and linguistic functions in studies by Halpern (1986) and Winitz (1969). Dodd, Holm, Zhu Hua, and Crosby (2003) found girls over 4 years of age scored better than boys on speech production measures. According to statistics from the U.S. Department of Education (2001), reading skills were slightly higher for girls than boys at school entry. For example, 70% of girls could name letters as compared to 62% of boys, and 32% of girls were successful identifying grapheme-phoneme correspondences, as compared to 26% of boys.

Gender has not been a factor in some studies. Lonigan et al. (1998) found no differences between girls and boys in overall performance on phonological awareness tasks. In a meta-analysis of more than 170 studies, Hyde and Lynn (1988) found gender only accounted for 1% of the variance in language acquisition (although girls performed better than boys in speech production). In addition, gender was not found to be influential in a study led by Nancollis, Lawrie, and Dodd (2005) where syllable and rhyme awareness were examined 2 years post intervention. These studies highlight varying influences of gender in primary literacy skills. Further research is needed to explore the affect of gender more thoroughly.

Home Literacy Experiences

The home environment is a source for literacy experiences in which children interact with adults in reading and writing situations, explore print on their own, and observe adults modeling literate behaviors such as reading the newspaper (Senechal et al., 1998). The home environment sets the stage for development of oral and written language. Hart and Risley (1995) found language exposure and vocabulary growth varied considerably between children in different home environments (e.g., professional, blue-collar, and welfare families).

During the preschool years, the home literacy environment has a multifaceted influence on the development of phonological awareness. Foy and Mann (2003) found that home literacy experiences contributed to the development of vocabulary, letter knowledge, and speech discrimination abilities.

Children encounter a variety of experiences related to literacy in the home environment. Some experiences are informal or implicit whereas others may be formal or explicit. Further research needs to be conducted to determine the specific role home literacy experiences has on later literacy success.

Research Questions

The primary purpose of this study was to determine if age and/or gender differences in the performances of typically developing preschool children on a measure of primary literacy skills (phonological awareness and alphabet knowledge) were significant. The second purpose was to ascertain which primary literacy tasks can be completed most successfully at specific age intervals. An additional purpose was to determine which predictor variables (age, gender, receptive vocabulary, print concept

skills, parent's educational level, and home literacy experience) accounted for significant variance in performance on the primary literacy skills measure. The research questions are as follows:

1. Are differences in performance on primary literacy skills among preschool children significant: (a) across six age groups (3:0-3:5 [years:months]; 3:6-3:11; 4:0-4:5; 4:6-4:11; 5:0-5:5; 5:5-5:11) and (b) between boys and girls?
2. Which primary literacy tasks can be completed most successfully by typically developing children at each of six 6-month age intervals?
3. Which of the following variables accounted for significant variance in predicting the primary literacy skills of phonological awareness and alphabetic knowledge: (a) age, (b) gender, (c) receptive vocabulary, (d) print concept skills, (e) mother's education level, (f) father's education level, and/or (g) home literacy experiences?

CHAPTER III

METHOD

The primary purpose of this study was to determine if age and/or gender differences in the performances of typically developing preschool children on a measure of primary literacy skills (phonological awareness and alphabetic knowledge) were significant. A second purpose was to ascertain which primary literacy tasks can be completed most successfully at specific age intervals. An additional purpose was to establish which predictor variables (age, gender, receptive vocabulary, print concept skills, mother's education level, father's education level, and home literacy experiences) accounted for significant variance in performance on the primary literacy measures. Information regarding participants, procedures, assessment tasks, and data collection are provided in this chapter.

Participants

The participants for this study were 91 typically developing preschool children living in and around Wichita, Kansas. Ninety-eight children participated in preliminary assessment procedures. Seven of these did not pass the phonological screening procedures and were eliminated from the study. Participants ranged in age from 3:0 (years:months) to 5:11 and attended a preschool or day care center program. For analysis purposes, the children were divided into six 6-month age groupings (groupings in years:months: 3:0 – 3:5, 3:6 – 3:11, 4:0 – 4:5, 4:5 – 4:11, 5:0 – 5:5, 5:6 – 5:11). The number of children per group and the number of boys and girls per group are provided in Table 3.1. None of the participants had been identified as having a speech/language delay

or disorder. The seven children who failed the phonological screening procedure were referred for further speech/language evaluation.

Table 3.1 Numbers of children in each group

	3:0 – 3:5	3:6 – 3:11	4:0 – 4:5	4:6 – 4:11	5:0 – 5:5	5:6 – 5:11
Boys	4	8	5	15	5	2
Girls	4	8	14	11	9	6
TOTAL	8	16	19	26	14	8

English was the primary language for all children in the study. Of the 91 children, 85 were European American, 4 were African-American, and 2 were Hispanic.

Information about socio-economic status, obtained from the directors of the preschool and/or day care programs, was reported to be low or middle class.

Procedures

Preliminary

Authorization was obtained from parents/caregivers through a signed informed consent form (see Appendix A). The consent form provided information to the caregivers regarding the purposes of the study. In addition to the consent form, caregivers were asked to complete a survey (see Appendix B) with questions regarding their child's literacy history and environment.

Directors from five preschool/day care programs agreed to have the study conducted at their centers. The investigator discussed the purposes of the study, the caregiver consent process, and testing procedures. Testing was conducted during the time children were in the preschool or day care center, with the exception of three children who were tested in their homes.

The participants were tested individually in a room in the preschool or day care center building or in the main living area at home. Testing for each child took place over

one or two days. Two students from the Department of Communication Sciences and Disorders at Wichita State University and one licensed speech-language pathologist assisted with administration of preliminary portions of the testing battery. Preliminary testing required all participants to: (a) pass a pure-tone hearing screening procedure at 25 decibels for 500, 1000, 2000, and 4000 Hz, (b) score no lower than 1.5 standard deviations below the mean on the Peabody Picture Vocabulary Test-III (PPVT-III) (Dunn & Dunn, 1997), and (c) receive no more than two affirmative responses (excluding liquids) on the summary of performance portion of the preschool phonological screening form from the Hodson Assessment of Phonological Patterns – Third Edition (HAPP-3) (Hodson, 2004). Administration and scoring procedures for the hearing screening, the PPVT-III (Dunn & Dunn, 1997), and the HAPP-3 Screening (Hodson, 2004) were reviewed and demonstrated by the investigator for fidelity purposes (see Appendix C and Appendix D respectively for administration instructions).

Data Collection

Data collection consisted of the Assessment of Primary Literacy Skills (APLS, Hodson, 2005), and Assessment of Print Concepts (see *Criterion Variables* for complete description). The investigator administered the APLS and the print concepts instrument. The standard score from the PPVT-III was used for one research question.

Assessment Tasks

The assessment tasks for the criteria and predictor variables are described in detail in this section. Standardized measures were administered according to instructions in the respective manuals. Administration, scoring, and reliability information are provided for

each task. Table 3.2 provides an overview of the preliminary and assessment tasks and what they measure.

Table 3.2 Summary of Assessment Tasks

TASK	WHAT IS ASSESSED
• Pure tone hearing screening	gross measure of hearing acuity*
• Peabody Picture Vocabulary Test-III	receptive vocabulary
• Hodson Assessment of Phonological Patterns-3 Screening	speech sound production*
• Assessment of Primary Literacy Skills	phonological awareness and alphabetic knowledge
• Assessment of Print Concepts	print concept knowledge
• Caregiver survey	literacy experience

* Used for eligibility only

Criterion Variables

Phonological Awareness Skills and Alphabetic Principle Knowledge

The Assessment of Primary Literacy Skills (APLS; Hodson, 2005) was used to measure phonological awareness and alphabetic principle knowledge of preschool children. At the time of this study, no published test of phonological awareness and alphabetic print knowledge for preschool children was available. The APLS is a result of extensive clinical research at the Wichita State University Speech-Language-Hearing Clinic.

Administration and Scoring. The APLS was administered to obtain measures of early literacy skills. Tasks were presented orally. Testing time was 15-20 minutes per child. The APLS consists of three parts: phonological awareness (word and syllable level and rhyming), alphabetic principle knowledge, and phonemic awareness (phoneme level) (see Appendix E for an example of each task). Part I, phonological awareness, included the following tasks: (a) syllable/word-segmentation/counting, (b) rhyme detection/categorization, (c) syllable/word blending/synthesis, (d) syllable/word

manipulation (deletion, substitution, and transposition), and (e) rhyme supply/generation. The phonological awareness tasks (except for rhyme supply/generation) included one practice item and four test items for each task, some incorporating small colored cubes and/or photographs of objects or people. One point was obtained for each correct item. Rhyme supply/generation required the child to “tell as many words as you can that rhyme with *cat*.” Real words and nonsense words that rhymed with the target word were accepted. One point was obtained for each rhyming word. Part II, alphabetic principle knowledge, included the following tasks to assess grapheme-phoneme correspondence and spelling: (a) letter names and sounds, and (b) developmental/invented spelling. Part III evaluated phonemic awareness for the following tasks: (a) initial consonant categorization (alliteration/onset), (b) blending/synthesis, (c) phoneme segmentation/counting, (d) final consonant categorization, and (e) phoneme manipulation (deletion, substitution, and transposition). All tasks were administered except for phoneme manipulation. It was determined from the pilot study that children’s answers were reduced to guessing on this task; therefore, it was considered an invalid measure for the purposes of this study.

The APLS was scored according to the procedures stated on the test form. Each item was scored as correct or incorrect except for the developmental/invented spelling portion. The spelling task was scored as follows: (a) one point for the correct number of letters, (b) one point for each phoneme-grapheme match (including grapheme-phoneme substitutions such as k for c), and (c) five points if spelled correctly. A numeric score was derived for Parts I, II, and III and a total score for all three parts was obtained.

Predictor Variables

Receptive Vocabulary

The PPVT-III (Dunn & Dunn, 1997) Form IIIA was administered as an overall measure of each participant's receptive vocabulary ability. The PPVT-III is an individually administered norm-referenced instrument that examines listening comprehension for the spoken word in Standard English.

Administration and Scoring. The PPVT-III was administered according to the general testing guidelines described in the examiner's manual. Prior to testing, participants were instructed to look at four pictures in a quadrant format and point to the one named by the examiner. Participants identified the picture representing the word named until a ceiling was reached. According to the testing guidelines, a ceiling is reached when there are eight or more errors in a set of 12 items. A raw score was obtained by subtracting errors from the ceiling. The raw score was converted to a standard score for statistical analysis.

Reliability. Four types of reliability were computed for the PPVT-III (alpha reliability coefficients, split-half reliability coefficients, alternate-forms reliability coefficients, and test-retest reliability). Reliability coefficients reported for standard score equivalents ranged from .90 for children age 3:0 to 3:5 (N = 100; SEM = 4.7) to .93 for children age 5:0 to 5:11 (N = 100; SEM = 4.0). High internal consistency was reported for the participants age range (e.g., from alpha = .93; odd/even corrected .91 for 3 year olds to alpha = .95; odd/even corrected .94 for children 5:6 years of age). Test-retest reliability was noted as .92 for the age range in this study.

Print Concept Skills

Twenty questions related to print concepts were developed by the investigator, based on Clay (1979) and Whitehurst and Lonigan (2003) (see Appendix F). Responses to the questions assisted in determining each participant's overall understanding and experiences with print.

Administration and Scoring. The children's book *The Wide-Mouthed Frog* (Faulkner, 1996) was used to assess print concept skills. The participants were asked to demonstrate their knowledge of print concepts in four general areas: (1) book orientation (e.g., "Show me where the story starts."), (2) directional rules and the concept that print, not picture, carries the message (e.g., "Which way do I read?" and "The name of the book is *The Wide Mouthed-Frog*. Where does it say that?"), (3) distinguishing between letters, words, and numbers (e.g., "Point to a word."), and (4) identifying punctuation (e.g., responds by saying "question mark" when asked "What is this?"). Each correct answer earned a point for a total of 20 possible points.

Literacy Experience

A survey containing 20 questions regarding children's exposure to print was given to caregivers to complete. Caregivers were asked questions about book experiences at home (e.g., "How many times a week does someone read to the child?"). Some questions were specific to the family's history and literacy practices (e.g., caregiver's highest level of education; "What reading materials are in the home?"). Four questions were included as foils (e.g., "At what age did your child begin walking?").

Administration and Scoring. Caregivers were asked to complete the survey when they signed the consent form for testing. Surveys were returned to the investigator prior

to the onset of testing. Responses were coded with numeric values for analysis purposes (e.g., parent education levels were coded for highest level completed: less than high school = 1, high school graduate or GED = 2, some college or technical school = 3, bachelor's degree = 4, and graduate degree = 5).

Data Analysis

SPSS 11.5 was used for all statistical analyses. Factorial ANOVAs were conducted to determine differences in performance on primary literacy tasks across age groups and gender. A stepwise multiple regression analysis was used to examine the variance of each of the following predictor variables: (a) age, (b) gender, (c) receptive vocabulary, (d) print concept skills, (e) mother's education level, (f) father's education level, and (f) home literacy experiences.

CHAPTER IV

RESULTS

The purpose of this research was to determine if age and/or gender differences in the performances of typically developing preschool children on a measure of primary literacy skills (phonological awareness and alphabetic knowledge) were significant. A second purpose was to ascertain which primary literacy tasks can be completed most successfully by specific age groups. An additional purpose was to determine which predictor variables (age, gender, receptive vocabulary, print concept skills, mother's education level, father's education level, and home literacy experiences) accounted for significant variance in performance on the primary literacy measures. Three research questions addressed these matters.

Age and/or Gender Differences

The first research question was: Are differences in performance on primary literacy tasks among preschool children significant (a) across six age groups from 3:0 – 5:11 [years:months] and (b) between boys and girls? A factorial analysis of variance (ANOVA) was used to analyze the differences.

Primary Literacy Skills

A total score for primary literacy skills (Parts I, II, and III on the APLS) was used for the first analysis. The first ANOVA included age and gender as the independent variables and the total score for primary literacy skills as the dependent variable. The differences were significant for age ($F(5,79) = 4.89, p < .01, \text{partial } \eta^2 = .24, \text{MSE} = 1733.10$), but not for gender ($F(1,79) = 2.40, p > .05, \text{partial } \eta^2 = .03, \text{MSE} = 850.13$). The interaction of age and gender was not significant ($F(5,79) = .39, p > .05, \text{partial } \eta^2 =$

.02, $MSE = 138.82$). Post-hoc testing (Tukey HSD) was conducted to evaluate differences among the means for age groups. Differences were significant for primary literacy skills between both 3-year and both 5-year age groups and between the younger 4-year group (4:0-4:5) and the older 5-year (5:6-5:11) (see Table 4.1).

Table 4.1 Primary Literacy Tasks: Differences between Age Groups

6 mo Age Groupings (A) years:months	6 mo Age Groupings (B) years:months	Differences Between Groups (A-B)	p
3:0-3:5	5:0-5:5	26.83	.002
3:0-3:5	5:6-5:11	39.38	.001
3:6-3:11	5:0-5:5	21.66	.028
3:6-3:11	5:6-5:11	34.19	.001
4:0-4:5	5:6-5:11	26.01	.019

The primary literacy skills were then divided into phonological awareness (Parts I and III of the APLS), and alphabetic knowledge (Part II of APLS) for further analyses. An ANOVA was conducted for each.

Phonological Awareness Skills

The second factorial ANOVA was conducted with age and gender as the independent variables and phonological awareness (Parts I and III) as the dependent variable. The differences were significant for age ($F(5,79) = 6.04, p < .01$, partial $\eta^2 = .28, MSE = 650.23$), but not for gender ($F(1, 79) = .35, p > .05$, partial $\eta^2 = .004, MSE = 37.80$). The interaction of age and gender was not significant ($F(5, 79) = .71, p > .05$, partial $\eta^2 = .04, MSE = 75.86$). Results from post-hoc testing (Tukey HSD) indicated differences were significant between the younger 3-year group and children in the older 4-year group and both groups of 5-year-olds (see Table 4.2). In addition, differences were

significant between the older 3-year group and the older 5-year group and also between the younger 4-year group and the older 5-year group.

Table 4.2 Phonological Awareness: Differences between Age Groups

6 mo Age Groupings (A) years:months	6 mo Age Groupings (B) years:months	Difference Between Groups (A-B)	<i>p</i>
3:0-3:5	4:6-4:11	14.38	.012
3:0-3:5	5:0-5:5	18.64	.002
3:0-3:5	5:6-5:11	26.00	.000
3:6-3:11	5:6-5:11	18.31	.001
4:0-4:5	5:6-5:11	15.18	.010

Alphabetic Knowledge Skills

The third ANOVA was conducted with age and gender as the independent variables and alphabetic knowledge (Part II) as the dependent variable. The differences were significant for age ($F(5,79) = 3.30, p < .01, \text{partial } \eta^2 = .17, \text{MSE} = 330.15$) and gender ($F(1,79) = 5.83, p < .05, \text{partial } \eta^2 = .07, \text{MSE} = 582.94$). Girls outperformed boys on the alphabetic knowledge measures (girls mean total = 14.2; boys mean total = 8.3). The interaction of age and gender was not significant ($F(5,79) = .46, p > .05, \text{partial } \eta^2 = .03, \text{MSE} = 46.19$). Results from post-hoc testing (Tukey HSD) indicated differences were significant between the younger 3-year group and the older 5-year group and also between the older 3-year group and the both groups of 5-year-olds and also the older 4-year group (see Table 4.3).

Table 4.3 Alphabetic Knowledge: Differences between Age Groups

6 mo Age Groupings (A) years:months	6 mo Age Groupings (B) years:months	Differences Between Groups (A-B)	<i>p</i>
3:0-3:5	5:5-5:11	14.63	.049
3:6-3:11	4:6-4:11	9.93	.029
3:6-3:11	5:0-5:5	10.70	.050
3:6-3:11	5:6-5:11	17.12	.002

Descriptive Statistics for Primary Literacy Skills

Descriptive statistics (including means and standard deviations) for the primary literacy, phonological awareness, and alphabetic knowledge tasks are provided in Table 4.4. Overall, means for the older age groups (e.g., 5:0-5:5 and 5:6-5:11) were higher compared to those of the younger age groups (e.g., 3:0-3:5 and 3:6-3:11). Each succeeding group achieved higher means than the preceding one, with the exception of the 3:6-3:11 age group for Alphabetic Knowledge.

Table 4.4 Means and Standard Deviations for Primary Literacy Skills for Six Age Groups

Age Grouping [years:months] (N)*	Primary Literacy** Mean (SD)	Phono. Awareness Mean (SD)	Alphabetic Knowledge Mean (SD)
3:0-3:5 (8)	7.4 (8.1)	.50 (1.1)	6.9 (7.5)
3:6-3:11 (16)	12.6 (12.3)	8.19 (9.5)	4.4 (5.7)
4:0-4:5 (19)	20.7 (19.9)	11.3 (10.9)	9.4 (10.5)
4:6-4:11 (26)	29.1 (20.4)	14.9 (11.2)	14.3 (10.2)
5:0-5:5 (14)	34.2 (20.7)	19.1 (11.0)	15.1 (12.5)
5:6-5:11 (8)	46.8 (22.5)	26.5 (10.0)	21.5 (12.0)

*N = number of children per group

** Primary Literacy = Phonological Awareness + Alphabetic Knowledge

Performances by Age Groups for Primary Literacy Tasks

The second research question was: Which primary literacy tasks can be completed most successfully by typically developing children at each of six 6-month age intervals? This question was investigated through frequency tables and descriptive statistics.

The primary literacy tasks of phonological awareness and alphabetic knowledge were analyzed separately. The phonological awareness tasks consisted of syllable/word segmentation, rhyme detection, rhyme supply/generation, syllable blending/synthesis, syllable/word manipulation (deletion, substitution, and transposition), initial consonant categorization, phoneme blending/synthesis, phoneme segmentation, and final consonant

categorization. The alphabetic knowledge tasks consisted of letter naming, specifying letter sounds, and developmental/invented spelling. See Appendix E for an example of each phonological awareness and alphabetic knowledge task.

Performances for the primary literacy task are provided in Tables 4.5 and 4.6. Phonological awareness and alphabetic knowledge results are displayed separately.

Performance on Phonological Awareness Tasks

Only one of the eight younger 3-year-olds (3:0-3:5 years:months) was able to perform Rhyme Detection (see Table 4.5). No other phonological awareness task received a score for the younger 3-year-olds except Syllable/Word Blending (which may have been a result of guessing). The score for Rhyme Detection improved with each succeeding age group but still had some errors for the 5-year-olds (Mean of 3.5 correct out of possible 4).

The older 3-year-olds performed best on Syllable/Word Blending and Syllable/Word Deletion (in addition to Rhyme Detection, with all receiving a Mean of 1.4. None of the other means for this group were above 1.0.

The younger 4-year-olds also experienced some success on Syllable/Word Blending (1.6) and Syllable/Word Deletion (1.9) as well as Rhyme Detection (1.6). In addition, they obtained a mean of 1.5 on Syllable/Word Substitutions. The older 4-year group, who also performed best on these same four tasks, obtained slightly higher means.

The highest means for the two groups of 5-year-olds occurred for Syllable/Word Deletion (3.0 and 3.6). Performances for these 5-year groups also were better than for the younger groups for Rhyme Detection (2.3 and 3.5), Syllable/Word Blending (2.8 and 2.9), and Syllable/Word Substitutions (1.9 and 2.8). These 5-year-olds also demonstrated

skills for Initial Consonant Categorization (2.5 and 3.3) and for Syllable/Word Segmentation (2.0 and 3.0). In addition, the older 5-year group performed well on the Syllable/Word Transposition task (3.1). None of the children in this study demonstrated much success for Rhyme Supply or for phoneme level tasks (e.g., Phoneme Segmentation) except for Initial Consonant Categorization by the 5-year-olds.

Table 4.5 Performance on Phonological Awareness Tasks for Six Age Groups

	3:0-3:5	3:6-3:11	4:0-4:5	4:6-4:11	5:0-5:5	5:6-5:11
# of children	8	16	19	26	14	8
	Mean(SD)	Mean(SD)	Mean(SD)	Mean(SD)	Mean(SD)	Mean(SD)
Rhyme detection	.38 (1.1)	1.4 (1.8)	1.6 (1.7)	2.0 (1.7)	2.3 (1.6)	3.5 (1.1)
Syll/word segment	.00 (.00)	.94 (1.5)	.84 (1.3)	1.3 (1.6)	2.0 (1.6)	3.0 (1.6)
Syll/word blend/synth	.13 (.35)	1.4 (1.8)	1.6 (1.7)	2.5 (1.6)	2.8 (1.5)	2.9 (1.8)
Syll/word deletion	.00 (.00)	1.4 (1.8)	1.9 (1.9)	2.2 (1.7)	3.0 (1.6)	3.6 (.74)
Syll/word sub	.00 (.00)	.75 (1.4)	1.5 (1.7)	1.8 (1.6)	1.9 (1.7)	2.8 (1.8)
Syll/word trans	.00 (.00)	.43 (1.0)	1.1 (1.5)	1.2 (1.5)	1.6 (1.6)	3.1 (1.1)
Rhyme supply	.00 (.00)	.94 (1.7)	1.0 (1.4)	1.3 (2.3)	.92 (1.1)	1.1 (1.7)
Initial cons categ	.00 (.00)	.75 (1.3)	1.0 (1.4)	1.2 (1.7)	2.5 (1.5)	3.3 (1.5)
Phoneme blend/synth	.00 (.00)	.00 (.00)	.26 (.93)	.30 (1.1)	.79 (1.4)	1.0 (1.9)
Phoneme seg	.00 (.00)	.19 (.75)	.21 (.53)	.46 (.94)	.64 (1.2)	1.1 (1.1)
Final cons categ	.00 (.00)	.06 (.25)	.16 (.50)	.54 (1.3)	.64 (1.3)	1.0 (1.9)

* 4 points possible per task per child

Performance on Alphabetic Knowledge Tasks

The 3-year-olds (3:0-3:5 and 3:6-3:11) performed best for letter names, though scores were low (means of 4.0 and 3.0 respectively, out of 10) (see Table 4.6).

Interestingly the younger 3-year olds in this study outperformed the older group (4.0 vs. 3.0). The ability to spell simple three letter words for the developmental spelling task was not demonstrated by the 3-year-olds.

The 4-year-olds (4:0-4:5 and 4:6-4:11) also scored highest in their knowledge of letter names. The older 4-year-olds (4:6-4:11) did experience some success specifying sounds of letters (4.4 out of 10).

The 5-year-olds (5:0-5:5 and 5:6-5:11) were strongest in letter names. Both groups of 5-year-olds demonstrated strength in letter sounds and developmental spelling, though the older 5-year-olds scored higher.

Children in all of the age groups were more successful naming letters than specifying the sounds of letters. Letter sounds were most successful from the older 4-year age group on. Developmental spelling was most successful in the oldest age group (6.0 out of a possible 20 points). No child performed all of the alphabetic knowledge tasks correctly.

Table 4.6 Performance for Alphabetic Knowledge for Six Age Groups

	3:0-3:5	3:6-3:11	4:0-4:5	4:6-4:11	5:0-5:5	5:6-5:11
	Mean(SD)	Mean(SD)	Mean(SD)	Mean(SD)	Mean(SD)	Mean(SD)
Letter names	4.0 (4.2)	3.0 (3.7)	5.4 (4.1)	7.5 (3.5)	7.0 (3.5)	8.6 (3.5)
Letter sounds	2.9 (3.4)	1.1 (2.3)	2.5 (3.6)	4.2 (3.5)	4.4 (4.5)	6.9 (3.6)
Spelling	.00 (.00)	.00 (.00)	1.5 (4.8)	2.6 (4.9)	3.6 (6.1)	6.0 (8.0)

*10 points possible for Letter Names and Letter Sounds; 20 points possible for Spelling

Factors Predicting Primary Literacy Skills

The third research question was: Which of the following variables (age, gender, receptive vocabulary, print concept skills, mother's education level, father's education

level, and/or home literacy experiences) accounted for significant variance in predicting primary literacy skills? A stepwise multiple regression analysis was used to determine which variables predicted the primary literacy performances (phonological awareness and alphabetic knowledge).

Four predictor variables emerged in the following order as a result of this regression model: (1) print concepts, (2) father’s education level, (3) age, and (4) receptive vocabulary. Print concepts entered first, accounting for 58% of the variance ($F = 115.20, p < .001$). Father’s education level entered second, accounting for an additional 4% of the variance ($F = 7.40, p < .008$). Age entered third, accounting for an additional 2% of the variance ($F = 4.84, p < .031$). Receptive vocabulary entered last, accounting for 2% of the variance ($F = 4.57, p < .036$). Total prediction measures accounted for 66% of the variance of the criterion variable primary literacy skills (see Table 4.7).

Table 4.7 Regression Analysis Results

Variable	R Square Change	b Weight	F	p
Print concepts	.58	4.45	115.20	.001
Father’s Educ.	.04	3.70	7.40	.008
Age	.02	.51	4.84	.031
Vocabulary	.02	.33	4.57	.036

The correlation matrix (Table 4.8) presents each correlation and associated levels of significance. The strongest correlations were in phonological awareness, alphabetic knowledge, and print concepts.

Table 4.8 Correlation Matrix for Variables

	1	2	3	4	5	6	7	8	9	10
1. Phonological Awareness	--	.72**	.10	.54**	.47**	.75**	.21*	.31**	.16	.29**
2. Alphabetic Knowledge		--	.21*	.43**	.44**	.68**	.28**	.48**	.27*	.37**
3. Gender			--	.07	.10	.11	.02	-.01	-.06	-.10
4. Age Groupings (6 months)				--	-.01	.61**	-.07	-.08	-.05	.35**
5. Vocabulary					--	.46**	.15	.36**	.23*	.24*
6. Print Concepts						--	.24*	.28**	.22*	.35**
7. Mother's Ed. Level							--	.60**	.16	-.03
8. Father's Ed. Level								--	.30**	-.03
9. Visit Library or Bookstore									--	-.06
10. Read Labels or Signs										--

*p < .05, **p < .01

Summary

Results of the ANOVAs revealed that differences in performance of primary literacy skills were significant for age groups. Differences in alphabetic knowledge were found to be significant for gender as well as age. The only phonological awareness task in which children in all age groups demonstrated success was rhyme detection. The older 5-

year-olds (5:6-5:11) scored higher than any other group on all tasks, but no 5-year-olds could perform all tasks. Tasks performed at younger ages continued to be performed with higher scores at older ages. Results of stepwise multiple regression analysis indicated that the variable accounting for the largest amount of variance for primary literacy skills was print concepts. Father's education, age, and receptive vocabulary accounted for small, but significant variance for primary literacy skills.

CHAPTER V

DISCUSSION

The purpose of this study was to determine if age and/or gender differences in the performances of typically developing preschool children on a measure of primary literacy skills (phonological awareness and alphabetic knowledge) were significant. A second purpose was to ascertain which primary literacy tasks can be completed most successfully at specific age groups. In addition, the study was also designed to determine which predictor variables (age, gender, receptive vocabulary, print concept skills, mother's education, father's education, and/or home literacy experience) accounted for significant variance in performance on the primary literacy measures.

Data were collected from 91 typically developing preschool children, ranging in age from 3:0 (years:months) to 5:11. Children were divided into six 6-month age groupings (groupings in years: months): 3:0–3:5, 3:6–3:11, 4:0–4:5, 4:6–4:11, 5:0–5:5, 5:6–5:11.

This chapter provides a summary and discussion of the findings for each research question. Educational implications, limitations of the study, and future research needs are discussed as well.

Age and/or Gender Differences

Summary

The first research question was designed to investigate if age and/or gender differences in the performances of preschool children on a measure of primary literacy skills (phonological awareness and alphabetic knowledge) were significant. A factorial ANOVA revealed differences in primary literacy skills (phonological awareness and

alphabetic knowledge) were significant among age groups but not gender. When considered separately, differences in phonological awareness skills were also significant among age groups. Differences in alphabetic knowledge were significant for age and also for gender, with girls outperforming boys. Across all measures of primary literacy skills older children were more capable than younger children.

Discussion

Theories of cognitive development (e.g., Piaget, 1963; Vygotsky, 1986), though different in their approaches, are in agreement that children experience progressive changes in thinking as they age. According to Fowler (1991), children must reach a particular level of cognitive development before they can comprehend abstract concepts of word, syllable, or phoneme. Yopp (1988) found that when children perform phonological tasks at the syllable level they are using a single-step cognitive function. Complex tasks involving phonemes such as phoneme deletion require more multi-step cognitive operations. The findings of the current study are consistent with theories that children's primary literacy skills improve as they age.

The findings of this study are also consistent with previous research by Lonigan et al. (1998) and Snow et al. (1998). Lonigan and colleagues demonstrated a gradual improvement in abilities for phonological awareness skills in children from 2–5 years of age. Lonigan et al. found considerable instability in the performance of 2- and 3- year-olds; however, as age increased, responses became more consistent and reliable. Research by Snow and colleagues revealed that awareness of phonological structure develops gradually over the preschool years.

In this study differences in alphabetic knowledge were significant not only for age, but also for gender, with girls outperforming boys. The mean score for girls was 14.2 (out of a possible 40), whereas the mean score for boys was 8.3. This finding is consistent with previous research statistics from the U.S. Department of Education (2001), indicating that girls perform marginally better than boys on letter naming and letter-sound tasks at 5 years of age. Burt, Holm, and Dodd (1999) studied 4-year-old British children however, and found no difference in the performance of boys and girls. A more recent study by Dodd and Carr (2003) found that gender did not affect the acquisition of letter-sound knowledge when it was measured after 1 year of literacy instruction.

Performances by Age Groups for Primary Literacy Tasks

Summary

The second research question focused on determining which primary literacy tasks can be successfully completed by typically developing children at each of six 6-month age intervals. The only phonological awareness task that children in all age groups demonstrated success for was rhyme detection. No other phonological awareness tasks were performed successfully by the young 3-year-olds. The older 3-year-olds scored highest on two syllable/word tasks in addition to rhyme detection. The 4-year-olds performed best on rhyme detection and three syllable/word tasks. The 5-year-olds were strongest in rhyme detection, five syllable/word tasks, and one task at the phoneme level. The older 5-year-olds scored higher than any other group on all tasks, but no 5-year-olds could successfully complete all tasks. Older children received higher scores on tasks that were performed by both younger and older children.

Discussion

Some early researchers believed that preschool children could not successfully perform phonological awareness tasks (e.g., Bruce, 1964). More recent studies (Burt et al., 1999, Fox & Routh, 1975, Goswami & Bryant, 1990; Treiman & Zukowski, 1991) have shown that preschool children are able to perform some phonological awareness tasks on a hierarchical scale - proceeding from early awareness of larger units (the syllable) to later awareness of smaller units (the phoneme). Research by Lonigan et al. (1998) also found syllable development to be a precursor to phonemic skills in preschool children.

Goswami (2002) asserted that a language-universal sequence exists in the development of phonological awareness: first, awareness of syllables; then, onset and rime; and last, phonemic awareness. Syllable awareness is usually present by age 3 years and onset-rime awareness by age 4. These are demonstrated prior to literacy acquisition. Awareness of phonemes develops later, as a consequence of learning to read and write. The current study confirms this general progression, or hierarchy, of skill development.

Research by Anthony et al. (2003) found children acquire phonological awareness skills in overlapping stages rather than temporally discreet stages, so that mastery of one skill is not necessary before attempting another skill. These findings were demonstrated in the present study. As noted in Table 4.5, children from all age groups except for the youngest 3-year-olds demonstrated rudimentary knowledge of phonemic tasks even though complete mastery of syllable level tasks had not occurred. In this study, a clear path of progression for the development of children's phonological awareness was found. Table 5.1 illustrates the phonological awareness tasks for which children had the highest

scores, by age grouping. The scores of the children for each of these tasks do not reflect mastery, simply their best performances.

Table 5.1 Highest Scores for Phonological Awareness Tasks by Age Grouping

	3:0-3:5	3:6-3:11	4:0-4:5	4:6-4:11	5:0-5:5	5:6-5:11
Rhyme detection	X	X	X	X	X	X
Syl/word blending		X	X	X	X	X
Syl/word deletion		X	X	X	X	X
Syl/word substitution			X	X	X	X
Syl/word segmentation					X	X
Syl/word transposition					X	X
Initial cons. categorization					X	X

Rhyming was assessed through tasks of rhyme detection and rhyme generation/supply. Children from every age grouping in this study demonstrated some ability to perform rhyme detection through a rhyme oddity task. Rhyme generation/supply, assessed by having the child name as many words as possible that rhyme with a particular word, was demonstrated by very few children overall. These results support findings by Adams (1990) that judgment of rhyme is considerably easier than rhyme supply for preschool children.

Some controversy exists in the literature regarding the limited long-term effects of phonological awareness instruction. For example, a study of 4-year-olds by Nancollis et al. (2005) found that phonological awareness tasks focused at the syllable and rhyme level had limited long-term effects 2 years later. In contrast, a study by Gillon (2005) found 3- and 4-year-olds continued to be successful with phonological awareness skills at

6 years of age. The discrepancy in results may have been due to differences in the content of their programs. However, the data from the current study supports Gillon's theory that children maintain the phonological awareness skills they are taught. As seen in Table 5.1, once children acquired a specific skill they appeared to maintain it at older ages.

In this study children were not able to perform the syllable/word segmentation task with more than 50% accuracy (2 out of 4 items) until 5 years of age. In previous research by Burt, Holm, and Dodd (1999), 4-year-olds demonstrated acquisition of syllable segmentation. According to Muter (2006), children as young as 3 or 4 years of age are able to demonstrate skills of syllable segmentation. In the current study, syllable/word segmentation was the first primary literacy skill tested. Although up to two practice items were provided, perhaps children required more time to acclimate to the expectations of the task.

This study's findings are consistent with those of Muter (2006), who found that phonological awareness tasks vary substantially in difficulty. Muter found children as young as 3 and 4 years of age able to demonstrate some aspects of rhyming, syllable blending, and syllable segmentation. According to Muter, skills such as deletion of phonemes do not emerge until later in development and typically rely on children being exposed to printed material (i.e., alphabet letters and book reading). Results of the current study are in agreement with these previous findings.

It is anticipated that results from this study may yield evidence on theoretical questions about the nature of primary literacy skills that are essential foundations for learning to read and spell. Knowledge of the age of acquisition of specific primary literacy skills will be useful to educators and parents working with young children,

helping them to become more knowledgeable in selecting and implementing appropriate early literacy activities and interventions. The identification of key factors that relate to primary literacy skills will optimize success in learning to read.

A more accurate measure for identification of children at risk for reading failure could be developed from the data in primary literacy acquisition. Children found to be below age level expectations for primary literacy skills could receive intervention services and participate in educational opportunities to enhance their early literacy abilities, thus avoiding or reducing the risk of later reading difficulties. Understanding the way in which primary literacy skills develop during the preschool years will help speech-language pathologists and early childhood educators more effectively recognize and prevent literacy problems in this population.

Factors Predicting Primary Literacy Skills

Summary

The third research question was designed to investigate which of the following variables (age, gender, receptive vocabulary, print concept skills, mother's education level, father's education level, and/or home literacy experiences) accounted for significant variance in predicting primary literacy skills. Results of stepwise multiple regression analysis indicated that of the seven predictor variables, print concepts accounted for the greatest amount of variance on the primary literacy measures. Father's education, age, and receptive vocabulary accounted for small, but significant variance. Gender, mother's education level, and home literacy experiences were not significant predictors for this study.

Discussion

Of the seven predictor variables identified in this study, print concepts strongly correlated with primary literacy skills, far more than any other variable (58% of the variance). The developing awareness of print concept skills prepares children to grasp key concepts, such as phonological awareness and alphabetic knowledge that are critical to learning to read. The findings of the current study are consistent with the assertion of Whitehurst and Lonigan (2003) that a child must have a firm foundation in print knowledge (understanding of books, printed letters and words), emergent writing (use of print in a meaningful way), and phonological awareness (structure independent of meaning) to achieve success in learning to read.

The importance of the high correlation between print concepts and primary literacy skills should not be understated. Children can gain experience with print concept skills well before they are ready to identify letters of the alphabet or perform phonological awareness tasks. Print concept skills appear to set the stage for future literacy learning.

In this study, parental education level was entered as two separate variables (one for mother, one for father). Father's education level was found to be predictive for primary literacy skills (4% of the variance). Mother's education level, though not predictive, resulted in a slightly higher mean (3.7) than father's education level (3.4). The average parent in this study had some college experience. In previous studies (e.g., Catts, Fey, Zhang, & Tomblin, 2001; Hart & Risley, 1995), only maternal education was entered as a variable and found to be predictive; paternal education was not tested.

Age accounted for 2% of the variance, indicating a small but significant correlation with primary literacy skills. It was expected that age would be predictive because as children age their skill levels increase. These results are in agreement with those pertaining to age differences in the first research question.

In studies by Chaney (1992) and Metsala (1999), vocabulary was found to be a predictor of phonological awareness. Silven et al. (2002) found a correlation between vocabulary development and phonological awareness. According to Stanovich (2000), a reciprocal relationship exists between vocabulary and reading. In the present study, a small but significant percentage of the variance (2%) was accounted for by vocabulary skills.

Educational Implications

Phonemic awareness and alphabetic knowledge have been identified as the two best predictors of how well children will learn to read during the first 2 years of school (Share, Jorm, Maclean & Matthews, 1984). For example, preschool children's awareness of speech sounds that correspond to individual letters has been shown to account for nearly 50% of the variance in their reading proficiency by the end of first grade (Blachman, 1991; Stanovich, 1986; Wagner et al., 1994). Adams (1990), Share et al. (1984), and Stanovich (1986) found that a child's level of phonemic awareness and print knowledge on entering school are the strongest determinants of success or failure in learning to read. A longitudinal study by Wagner et al. (1997) found kindergarten and first-grade letter knowledge related significantly to measures of phonological sensitivity 1 and 2 years later. Similarly, findings from Burgess and Lonigan (1998) revealed

preschool children's letter knowledge was a unique predictor of growth of phonological sensitivity across one year.

The findings of research are often slow to be incorporated in the practices of public and private schools. Although teachers are becoming increasingly aware of the benefits of incorporating phonological awareness programs in their curriculum, this emphasis has been concentrated more in kindergarten and first grade, rather than in preschool where children appear to reap the greatest benefits (Bus & Van Ijzendoorn, 1999). The results of the current study can provide preschool teachers with a starting point for teaching phonological awareness and alphabetic knowledge skills. For example, an emphasis on syllable and word level phonological awareness skills (e.g., blending, deletion, and substitution) would begin instruction in preschoolers' zone of proximal development (Vygotsky, 1978).

The high correlation between print concepts and primary literacy skills found in this study also has important educational implications. Print concepts form the building blocks for other reading skills such as decoding (Tunmer, Herriman, & Nesdale, 1988). These concepts can be introduced from infancy with exposure to books and pictures. A greater emphasis on print concepts in preschool programs would prepare young children to acquire higher level primary literacy skills more rapidly.

In addition, primary literacy skills are a critical part of speech-language pathology practice (ASHA, 2001) because of the direct link between the development of phonological awareness and the acquisition of reading and spelling (Stanovich, 2000). Phonological awareness is also a fundamental aspect of oral language development (Rvachew, 2006). When a child determines the number of syllables in a word or deletes a

sound in a word, the child must access underlying phonological representations. Difficulty accessing these underlying representations is a core deficit for many children with dyslexia, speech-sound disorders, and specific language impairment (Snowling, Bishop, & Stothard, 2000). Understanding primary literacy skill development during the preschool period may help to more effectively facilitate oral language development during this period and prevent literacy problems later in life.

Limitations of the Study

The present study provides interesting evidence about the role of age and skill acquisition in the development of primary literacy skills. It also indicates that children's understanding of print concepts may be a more important predictor of primary literacy skill development than has commonly been thought. The limitations of the current study however, must be acknowledged. Although this study included 91 participants, a small number of children were in the youngest and oldest groups. Additional studies involving larger numbers of participants per group most likely would allow more confidence about generalizing this study's findings to the broader population.

This study was conducted in 5 different preschool/day care centers. The influence of curriculum, teaching style, and the surrounding environment were not evaluated. These factors may have contributed to differences in results.

The participants in this study were limited in diversity and socioeconomic status. The majority of the children were European American. Socioeconomic status ranged from low to middle class, although more of the children were middle class.

Future Research

The findings of this study suggest a number of areas for future research. Additional studies of primary literacy tasks would help to confirm and clarify this study's findings concerning the performance levels attained by children of specific ages. Educators and speech-language pathologists would benefit from normative guidelines regarding acquisition of specific primary literacy skills, especially standardized measures.

More research focusing on primary literacy development among preschoolers is needed. Many studies have been conducted with children in kindergarten and early primary grades. It would be valuable to undertake longitudinal studies to see how performances of preschool students correlate with reading performances in first and second grades.

Further study of the role of print concepts in the development of primary literacy is needed. Explicit exposure of children to print concepts does not appear to be integrated effectively into preschool instruction and probably will not be until additional research raises its visibility and appreciation of its importance.

A follow up of preschool children's literacy acquisition in kindergarten and first grade is necessary to determine the effects of early primary literacy experiences. Positive outcomes will assist educators in planning and implementation of appropriate preschool curricula.

Other literacy-related tasks (e.g., home literacy practices) need to be assessed more extensively and with culturally diverse populations. Addressing tasks that have a significant relationship to primary literacy skills for specific cultures may contribute to future reading success.

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APPENDIXES

APPENDIX A

Informed Consent Form

PURPOSE: Your child is invited to participate in a study of early literacy skills in preschool children. I hope to learn about when specific early literacy skills develop and what factors enhance the development.

PARTICIPANT SELECTION: Your child was selected as a possible participant in this study because your child is in the preschool age range and would represent what typical children can do at that age.

EXPLANATION OF PROCEDURES: If you decide to have your child participate, s/he will be asked to complete a series of tasks that measures what s/he already knows about books, the alphabet, and words. Your child will initially be seen for a hearing screening, a vocabulary test, and a speech sound screening. Then your child will participate in several tasks related to early reading and writing skills (e.g., rhyming, naming letters of the alphabet). The tasks will be presented to your child in a fun, non-testing type situation. Your child may be seen for two sessions, approximately 20 minutes each. The sessions will be arranged at a time that is convenient for your child and his/her teacher. You will not be charged for this testing.

DISCOMFORT/RISKS: There are no known risks or discomforts associated with this study. Participation is completely voluntary.

BENEFITS: I hope to gain information regarding the development of literacy skills. A better understanding of how children typically develop literacy skills will help in early identification of children at risk for later reading and writing difficulties in school.

CONFIDENTIALITY: Any information obtained in this study in which your child can be identified will remain confidential and will be disclosed only with your permission.

REFUSAL/WITHDRAWAL: Participation in this study is entirely voluntary. If you agree to allow your child to participate in this study, you are free to withdraw him/her from the study at any time without penalty. Your child can also withdraw himself/herself at any time without penalty. Your decision whether or not to participate will not affect your future relations with Wichita State University.

CONTACT: If you have questions about this research, you can contact the Department of Communication Sciences and Disorders, Dr. Barbara Hodson, 978-6342, or Dr. Kathy Strattman, 978-6356, or leave a message for Margot Kelman CSD Doctoral Student, 978-3240. If you have questions pertaining to your rights as a research participant, or about research-related injury, you can contact the Office of Research Administration at Wichita State University, Wichita, KS, 67260-0007, telephone (316) 978-3285.

Your child is under no obligation to participate in this study. Your signature indicates that you have read the information provided above and have voluntarily decided to participate. You will be given a copy of this consent form to keep.

_____ Name of Subject	_____ Date
_____ Signature of Legal Guardian	_____ Date
_____ Witness Signature	_____ Date

APPENDIX B

Child's Name: _____ Child's Date of Birth: _____

Caregiver Survey

Information from parents/caregivers is very important. I would appreciate it if you would take a few minutes to answer the following questions. There are no right or wrong answers! Please select the answer that best portrays your child and family. Your answers will be kept confidential. Thank you for your cooperation.

Name of Person Completing Survey: _____

Relationship to Child: _____

1. What is the primary language in your home? English Other _____
Does your child speak any other language? _____

2. Do you have a computer in your home? Yes No

3. Parent Educational History (Please check highest level of education)

EDUCATION	MOTHER	FATHER
Less than high school		
High school or GED		
Some college or technical school		
Bachelor's degree		
Graduate degree		

4. Mother's occupation: _____

Father's occupation: _____

5. How old was your child when you first began reading to him or her?

- a) younger than 6 months
- b) 6-12 months
- c) 12 - 24 months
- d) 2 - 3 years
- e) 3 years or older
- f) do not read

6. How many hours a week do you or another person besides you read to your child?

- a) not at all
- b) less than one hour
- c) 1 - 3 hours per week
- d) 4 or more hours per week

7. Approximately how many children's books does your child have?

- a) 1 - 10
- b) 11 - 20
- c) 21 - 30
- d) more than 30

8. At what age did your child begin walking on his or her own?
 a) before 12 months of age b) between 12 – 18 months of age
 c) between 18 – 24 months of age d) after 24 months of age

9. How often does your child visit the public library or a bookstore?
 a) not at all b) a few times a year
 c) once per month d) 2 – 4 times per month
 e) more than 4 times per month

10. What are your child’s favorite?
 books _____
 toys _____
 activities _____
 foods _____

11. Does your child ever notice labels, signs, or store names and try to “read” them?
 a) never b) rarely
 c) sometimes d) frequently

If yes, give example(s): _____

12. What type of books does your child like most? (Please circle all that apply)
 not interested in books
 story books
 ABC books or counting books (no story)
 books with single words and pictures
 chapter books
 books that provide facts about a place or object
 other _____

13. What kind of reading materials do you have in your home? (Circle all that apply)
 newspapers
 magazines
 catalogs
 reference books (dictionary, atlas)
 children’s picture or story books
 fiction books (novels)
 non-fiction books
 other _____

**THANK YOU VERY MUCH FOR COMPLETING THIS SURVEY! PLEASE
 RETURN IT TO YOUR CHILD’S TEACHER IN THE ENVELOPE PROVIDED**

APPENDIX C

PPVT-III

Administration Instructions

Prior to testing, calculate the child's chronological age by subtracting the child's date of birth from the date of testing.

Training

Spend a brief time establishing rapport with the child. Then begin with Training Plate A (at the beginning of the Testkit Form A). Say: **I have some pictures to show you.** Show Training Plate A and say: **See all the pictures on this page.** Point to each of the four pictures on Plate A. Then say: **I will say something; then I want you to put your finger on the picture of what I have said. Let's try one. Put your finger on *ball*.**

If correct, say: **Good! Let's try another one. Put your finger on *dog*.** If the child responds correctly without help by pointing to the dog in quadrant 4, say: **Good!** Continue with Training Item B on the next page.

If the child responds incorrectly, demonstrate the correct response by pointing to the ball and saying: **You tried but this is ball. Now try again. Put your finger on *ball*.** Help as necessary until the child makes a correct response. Then say: **Good! Let's try another one. Put your finger on *dog*.**

If the child continues to have difficulty establishing the correct pointing response, continue training with the words *banana* (3) and *spoon* (1) before moving on to Training Plate B.

Introducing the Test Items

Once the training rule has been met, say the following before presenting the Start Item: **Now I am going to show you some pictures. On each page I will say something about a picture and you will put your finger on the best picture of it. When we get further along, you may not be sure which one to point to, but I want you to look carefully at all the pictures and choose the one you think is right. From now on I can't tell you if you are right or not.**

Begin testing with the start item, which is the first item in the appropriate set of test items that correlates with the child's chronological age. Say: **Put your finger on _____.** You may say: **You are working hard** or other encouraging words, but do not give contingencies for responding. You may repeat a word if asked or if the child appears hesitant. You may also encourage them to guess.

Scoring

Write the number of the picture the child points to next to the word on the Performance Record. Use DK for Don't Know or NR for No Response. Establish the basal and ceiling.

Total the number of errors in each set. Calculate the raw score by recording the ceiling item and subtracting from it the total number of errors.

Basal: The *Basal Set Rule* is one or no errors in a set. Establish the basal set first. Then test forward by sets until a ceiling set is obtained.

Ceiling: The *Ceiling Set Rule* is eight or more errors in a set. Complete a set even if you have reached eight errors.

APPENDIX D

HAPP-3

Administration Instructions

Take the 11 screening objects out of the box and place them on the table. Say: “**Choose a toy and say its name. Then put it in the box.**” For item 12, (after all the objects have been named), point to your nose and ask, “**What is this?**”

As the child names the objects, transcribe the child’s speech deviations in Section 2, Record of Phonological Deviations, of the Preschool Screening Record Form. Slash omitted phonemes, write substitutions above the target phoneme, and write diacritics for phonetic changes beneath the target phonemes.

Scoring

Specify omissions and three types of Consonant Category Deficiencies. Slash all omitted consonants in the appropriate Consonant Omissions columns and also Consonant Category Deficiencies columns.

Substitutions from the same Consonant Categories (e.g., /s/ for /z/) are not scored as deficiencies. Substitutions from a different Consonant Category are written above the target in the appropriate Consonant Category Deficiencies columns.

Any other phonological deviations (e.g., Backing) are documented in the last column.

Total each column. The totals for each column are used to answer the questions at the bottom of the page to determine if the child qualifies for this study.

APPENDIX E

EXAMPLES OF PRIMARY LITERACY SKILLS

Phonological Awareness Tasks

- a. **Syllable/Word Segmentation/Counting:** Identification of the number of syllables in a word (“Say *cowboy*. How many parts are in *cowboy*?”)
- b. **Rhyme Detection:** Select from three pictures the two that rhyme or the one that does not rhyme (Show pictures of *rock*, *clock*, and *dress*. Ask child “Which word is different/does not rhyme? or “Which two words sound the same at the end?”)
- c. **Syllable/Word Blending/Synthesis:** Put parts of words (e.g., syllables) together to make a new word (“Say each part after I say it, pop (pause) corn.”)
- d. **Syllable/Word Manipulation**
 - Deletion:** Leave off part of a word (“Say rainbow. Now take away *bow*. What is left?”)
 - Syllable/Word Substitution:** Replace a syllable of a word to generate a new word (“Say *football*. Now change *foot* to *base*. What is the new word?”)
 - Syllable/Word Transposition:** Switch two words around to make a new word (“Say *house* (pause) *bird*. Now switch the words and make a new word. What is the new word?”)
- e. **Rhyme Supply/Generation:** (“Tell me as many words as you can that rhyme with *cat*.”)

Alphabetic Principle Knowledge

- a. **Letter Names & Sounds:** 10 letters, each on a separate card (upper and lower case) (“What is the name of this letter?” and “What sound does it make?”)
- b. **Developmental/Invented Spelling:** Write 4 words

Phonemic Awareness Tasks

- a. **Initial Consonant Categorization:** Identify two pictures that start with the same initial consonant (“Which two words *box*, *boat*, *gum* start with the same sound?”)
- b. **Phoneme Blending/Synthesis:** Put phonemes together to make a word. (“Sh ee pp makes *sheep*.”)
- c. **Phoneme Segmentation:** Count phonemes (“How many sounds are in *hat*?”)
- d. **Final Consonant Categorization:** Identify two pictures that end the same way. (*Boot*, *gum*, and *hat* presented)

