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*Risk predictors and learning skills in reading and writing  
in Italian pre-school-age children*

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## **Risk predictors and learning skills in reading and writing in Italian pre-school-age children**

### **Summary**

The years from birth through age 5 are a critical time for children's development and learning. Early childhood educators understand that at home and in early childhood education settings, young children learn important skills that can provide them with the cornerstones needed for the development of later academic skills. These patterns of learning in preschool are closely linked to later achievement: children who develop more skills in the preschool years perform better in the primary grades.

The development of early skills appears to be particularly important in the area of literacy. It is estimated that more than a third of all graders (and an even higher percentage of our at-risk students) read so poorly that they cannot complete their schoolwork successfully. Providing young children with the critical precursor skills to reading and writing can offer a path to improving overall achievement (Teale & Sulzby, 1986; Badian, 1988; Tressoldi & Vio, 1996; Whitehurst & Lonigan, 1998; Ehri et al., 2005; Pepi, 2004; Cornoldi & Tressoldi, 2007; Pinto et al., 2009; Puranik & Lonigan, 2011).

The purpose of this research is to identify and discuss areas of emerging evidence on the relationship between early childhood literacy experiences and subsequent reading acquisition. We do not wish to minimize the role of oral language in early literacy development, for it serves as a companion to the development of reading and writing. First, dimensions of literacy knowledge and literacy experiences are discussed, based on data from recent primary studies and reviews of emergent literacy research. Then areas of emerging evidence are

examined for instructional implications for children entering school with diverse literacy experiences (Lonigan et al., 2009 ).

In general, purpose of this study was to examine the correlations between indirect and direct measures of emergent literacy skills. Another the purpose of the present study was to examine the research that correlate emergent literacy skills and risk factors of learning disabilities in children in reading and writing . Although many advances have been made in early identification and intervention for students with reading disabilities, there has been less progress in identifying the elaboration of an effective assessment tool (in the Italian language and the languages transparent and semi-transparent like Italian) or “universal screening” for the early identification of learning disabilities that includes all the variables directly and indirectly involved in the learning of reading and writing (Jiménez, 2010; Lonigan et al., 2011).

Standardized tools that assess learning to read and writing and can be accurate in identifying variables "at risk" of learning disabilities. Because some of these students may have experienced difficulty with reading from the beginning of their school careers, but other students confront reading and writing problems for the first time in primary school.

Appropriate tools have been used for an assessment of all the skills involved in learning to read and write, according to the theoretical model of The National Early Literacy Panel (NELP; see Lonigan, Schatschneider, & Westberg, 2008a).

Furthermore, we have involved the teachers in the early identification , we have showed confirming the literature that have a crucial role in learning processes.

Instead, the present study is a longitudinal study in two phases (two years from 2012 to 2013), in which they were observed variables involved in learning to read and write in children from last year of kindergarten until first year of

primary school. An important role in this research has been given to the influence of socio-cultural context and home literacy experiences or environment which have an important role (Puranik et al., 2010; Jiménez et al., 2009). Some children who have been assessed as "at risk" during the screening of the first phase were included in a specific training.

In general, this research is divided into three main parts and three chapters:

*From emergent literacy to the risk profiles of learning of reading and writing in children (chapters I)*

*Risk factors of learning disabilities in children : a systematic review and international meta-analysis (chapters II)*

*The construction of a risk profile in reading and writing in pre-school-age children (chapters III)*

These three chapters are organized as three separate searches but that are related to each other by the study of the foundations of learning to read and write in typical and atypical development. The study of learning prerequisites of reading and writing as evidenced by the extensive literature throughout the world is crucial because are involved the life span. In particular, this research is characterized by the following *specific* and *general* objectives (**Table 1**) .

<b>GENERAL OBJECTIVE</b>	<b>SPECIFIC OBJECTIVE:</b>
To construct an emergent literacy model for the Italian language. In particular, we want to verify the relevance of the different components involved in the emergent literacy process and the meaning of their relations in pre-school age;	To check how possible differences (gender and socio-cultural level) may affect reading and writing skills;
To analyze the evolution of the individual components of the construct of literacy emerging since pre-school until the end of the first year of school;	To check the predictive value of the observations carried out by teachers, in terms of language comprehension, oral expression and emergent and formalized literacy skills in children;
To check the "predictive relationship" between the components of 'emergent literacy" in preschool children. Check those that have literacy problems in the first year of school (reading and writing) for the construction of a "risk profile";	To check the effectiveness of early treatment aimed at children who have a "risk profile" in the first year of school;

**Table 1:** *specific* and *general* objectives of this research

## Chapter I

### **From emergent literacy to the risk profiles for learning to reading and writing**

Children's reading and writing success throughout elementary school can be predicted from their emergent literacy skills (Lonigan et al., 2000; Pepi, 2004; Lonigan et al., 2011; Wilson, 2007; Evans et al., 2000).

Children arrive in preschool with varying levels of early literacy skills. Depending on where they start, their experiences in the home, and the curriculum being used in their classroom, many children will leave preschool with early literacy skills that put them on a trajectory to transition successfully to learning to read. For some children, however, the support provided by typical classroom practices will not be sufficient for them to acquire these well developed early literacy skills (Sulzby & Teale, 1991; Teale & Sulzby, 1986; Whitehurst & Lonigan, 1998). Although there are effective instructional practices that can support this development, it is unlikely that early childhood educators in most preschool classrooms have sufficient time to provide this level of instruction for all children in their classrooms. Moreover, depending on the population of children served, a majority of children do not need this extra level of instructional support (Lonigan et al., 2011) . Consequently, a means of identifying those children who are either starting from a low level of skills, are not making sufficient gains in these skills to catch up, or both is needed. This identification process is where the assessment of children's early literacy skills fits into an integrated system of identification and intervention (Lonigan et al., 2017) .

A solid foundation in reading and writing is critical for children's future academic, social and learning success. The acquisition of literacy skills develops



along a continuum that begins in the preschool years, prior to formal schooling (Whitehurst & Lonigan, 1998). Emergent literacy skills include oral language, print concepts, alphabet knowledge, and phonological awareness and are normally acquired during responsive interactions with adults, such as in shared book reading or incidental conversations about print in the environment (Lurija, 1978; MacArthur et al., 2010).

Hence, examining individual cases is an important complementary approach to group level analyses, because even though the fit of a multiple predictor model to the population variance in reading may be high, such a result does not necessarily tell us about what is happening at the level of individual with learning disabilities. Clinicians need to know whether the overall fit of a multiple predictor model is good because nearly every individual fits the same multiple predictor model or because subsets of individuals fit different sub-models, all of which are encompassed in the larger multiple predictor model. For example, it could be the case that some individuals' reading skill may be adequately explained by a specific single predictor, while other individuals' reading skill is explained by a different single predictor. There may also be additional individuals that require multiple predictors to explain their reading performance. As long as all the relevant predictors are incorporated into the structural equation model, the overall group level fit to the data will be maximized. However, in this example, the group level results would be misleading, since it would mask the presence of subgroups of individuals, some of whom do not require a multiple deficit model to explain their particular level of reading skill. These different patterns of model fit across individuals, which can only be gleaned when examining individual cases, could potentially define valid subtypes of a disorder or difficulty (or not). In addition, there may be individuals who are not explained by the structural equation model. These individuals, as mentioned previously, can provide an acid test for a theoretical

model of learning disabilities, since the latter is assumed to explain virtually all cases, not just a majority (Lonigan et al., 2012)

### **1.1 Early Literacy knowledge and skills**

Our review of research revealed numerous but complementary definitions of emergent literacy. Researchers agreed that emergent literacy, begins during the period before children receive formal reading instruction, (Stanovich, 1994; Teale & Sulzby, 1987;), and encompasses learning about reading, writing and print prior to schooling (Sulzby & Teale, 1991). It is acquired through informal as well as adult-directed home and school activities, and (d) facilitates acquisition of specific knowledge of reading. Emergent literacy differs from conventional literacy as it examines the range of settings and experiences that support literacy, the role of the child's contributions (i.e., individual construction), and the relation between individual literacy outcomes and the diverse experiences that precede those outcomes. Literacy are all the activities involved in speaking, listening, reading, writing, and appreciating both spoken and written language. Early Literacy Skills, that begin to develop in the preschool years, such as alphabet knowledge, phonological awareness, letter writing, print knowledge, and oral language. Early literacy skills are sometimes called “emergent,” “precursor,” “foundational,” or “predictive” literacy skills to distinguish them from more conventional literacy skills, such as decoding, oral reading, fluency, reading comprehension, writing, and spelling.

Although most preschool-age children cannot read and write in the conventional sense, their attempts at reading and writing show steady development during this stage. Typically, reading and writing research in this developmental period has

focused on discrete skills that are prerequisite to reading and writing, such as letter-sound correspondences and letter naming.

From an emergent literacy perspective, reading and writing develop concurrently and interrelated in young children, fostered by experiences that permit and promote meaningful interaction with oral and written language (Sulzby & Teale, 1991), such as following along in a big book as an adult reads aloud or telling a story through a drawing . Through the concept of emergent literacy, researchers have expanded the purview of research from reading to literacy, based on theories and findings that reading, writing, and oral language develop concurrently and interrelated in literate environments (Sulzby & Teale, 1991). Thus, this contemporary perspective stresses that developmental literacy learning occurs during the first years of a child's life (Mason, 1980) and is crucial to literacy acquisition.

Children begin school with diverse experiences and understandings of print. These experiences and understandings give rise to general literacy-related knowledge, as well as specific print skills and oral language competencies. The research in this field revealed that through exposure to written language (e.g., storybook reading and daily living routines) many children develop an awareness of print, letter naming, and phonemic awareness. Additionally, through exposure to oral language, preschool children develop listening comprehension, vocabulary, and language facility. These initial understandings about print are particularly important considering that children who are behind in their literacy experiences upon entering school become "at risk" in subsequent years . For example, Scarborough (1989) examined the relation of preschool development to later school accomplishment using parental reports about literacy activities in children's homes during their preschool years and assessments of reading achievement. They found that by the time poor readers entered school they had accumulated substantially less experience with books

and reading than those who became better readers. Similarly, Ferreiro and Teberosky (1979) found that children who entered school without understanding the link between their oral language experiences and formal instruction did not advance at the same rate in learning to read and write as children who did make the connection.

The term "emergent" denotes the developmental process of literacy acquisition and recognizes numerous forms of early literacy behavior. While frequently discussed in the research we reviewed, these early literacy behaviors (or areas of knowledge) are characterized by terms that are defined in different ways by different authors. The following definitions of emergent literacy terms represent the most commonly used meanings of those terms, and will facilitate understanding of the review of emergent literacy. However, our focus is on aspects of literacy acquisition that are related to phonological awareness (Jiménez, 2010; 2012). Phonological awareness refers to the ability to detect and manipulate the sounds of language, regardless of whether meaning is associated with these sounds (Wager & Torgesen, 1987). Tasks tapping this ability include matching, blending, deleting, or counting the sounds making up a word (Lonigan et al., 2007). In addition to understanding the phonological structure of language, children must comprehend how print is organized (print knowledge). "First, children learn the conventions of print, such as knowing that text on a page progresses from left to right and top to bottom, which part of the book is the front, and the purpose of punctuation. Second, children learn the alphabet. Stevenson and Newman (1986) found that children who knew the alphabet upon entry to elementary school showed greater reading ability than children who did not know the alphabet. Knowing the basic conventions of print and the alphabet are necessary for reading, but children must be able to make the connection between phonemes and graphemes also" (Wilson, 2007)

## **1.2 Learning and development in the preschool years**

There is now a significant body of research concerning the development of literacy-related skills. Although the acquisition of reading skills was once thought to originate with the start of reading instruction in elementary school, research now supports the idea that learning to read is a continuous developmental process that emerges early in life (Lonigan et al., 2007; Snow, et al., 1998; Whitehurst & Lonigan, 1998). Increasingly, research has focused on early literacy skills in an attempt to identify children who may be at risk for later reading difficulty to eliminate this potential risk before children begin elementary school (e.g., Scarborough, 1989; Whitehurst & Fischel, 2000; Whitehurst & Lonigan, 1998). The term emergent literacy refers to the skills, knowledge, and attitudes that children have about reading and writing before they are formally taught these skills (Sulzby & Teale, 1991; Teale & Sulzby, 1986; Whitehurst & Lonigan, 1998). Children's reading success throughout elementary school can be predicted from their emergent literacy skills (Lonigan, et al., 2000; Lonigan et al., 2007; Spira & Fischel, 2005; Storch & Whitehurst, 2002). Two common risk factors for delays in the development of emergent literacy skills include language impairment and exposure to Italian as a second language. Consequently, speech-language pathologists require information about the literacy skills in children with language impairment who also come from homes where another language.

Pre-kindergartners are substantially different than older children in their language, cognitive, and behavioral skills. Thus, one cannot expect educational success with pre-kindergartners at risk for reading failure, using a simple adaptation of curricula designed for older students. Similarly, preschools and child care centers are vastly different in structure and focus than elementary

schools. Both of these factors necessitate a qualitatively different emergent literacy curriculum and teaching approach, which the current study investigates.

### **1.3 The predictor variables**

Systematic observations of a child's behavior and abilities over time are an important addition to examining the presence of risk indicators and protective factors. Observations may be informal or may follow a standard observation protocol; in either case, they should be conducted multiple times and in varying contexts to increase the reliability and validity of the hypotheses made regarding a child's behavior. In many cases, an extended period of observations will be necessary. Observations should provide a description of the frequency, consistency, and severity of the behaviors causing concerns in relation to contextual demands. The child's family should be involved throughout the entire process. When professionals raise a question about the course of the child's development as a result of systematic observation, they should discuss the findings with the caregivers and family. When indicated, a referral should be made to appropriate professionals for further evaluation and, if warranted, provision of supports and services should be recommended. When a screening, a review of risk indicators and protective factors, and systematic observations suggest that a child is at risk for learning disabilities, professionals should conduct periodic evaluations to ascertain whether development follows expected patterns. The major goal of a comprehensive evaluation is to determine the individual child's specific pattern of abilities and needs and to identify strategies and resources to address learning and behavioral problems as soon as possible. These evaluations should occur across different settings and should consider multiple perspectives offered by caregivers and professionals. An

interdisciplinary approach is especially valuable in obtaining and interpreting evaluation information derived from a variety of sources . Evaluations should focus on developmental norms across domains (e.g., cognition, communication, emergent literacy, motor and sensory abilities, and/or social–emotional adjustment ); however, it is important to recognize that there is a wide range of individual differences, both within and between children, some of which may fall within the “normal” range of expected behaviors. It is essential to identify the predictor variables in children who follow the trajectories of typical development and in children who follow an atypical development. “Children who are at risk for later reading problems have weaker emergent literacy skills than children not at risk for later reading problems “(Lonigan et al., 2000; Storch & Whitehurst, 2002). Several studies examining the predictive validity between emergent literacy skills and later reading skills have found that emergent literacy skills are good indicators of whether a child will have trouble with reading in the early elementary grades . Therefore, it is helpful for teachers to be able to measure accurately these emergent literacy skills to determine who is most at risk for later reading problems and implement interventions geared toward improving emergent literacy skills with these at-risk children” (Wilson, 2009) .

### **1.3.1 Predictors reading and writing**

Emergent literacy researchers have found converging evidence indicating that children enter school with a great deal of skill and knowledge about reading and writing, although perhaps not in a formal or conventional way (e.g., Ferreiro & Teberosky, 1982; Sulzby, 1989; Sulzby & Teale, 1991; Whitehurst & Lonigan, 1998, 2001).

This early knowledge plays a vital role in laying the foundation for later literacy success. Although, research on writing has been scarce compared to research on

reading, findings from investigations have indicated that young children, 3 to 6 years of age, are capable of producing letters of the alphabet (Clay, 1985; Hiebert, 1978, 1981; Mason, 1980), writing their names (Bloodgood, 1999; Hildreth, 1936; Levin & Aram, 2004; Levin & Bus, 2003; Levin, Both-De Vires, Aram, & Bus, 2005; Levin & Ehri, 2009; Saracho, 1990; Stanley & Pershin, 1978), and beginning or invented spelling (Gombert & Fayol, 1992; Smith & Dixon, 1995; Tolchinsky-Landsmann & Levin, 1987).

Whereas these previous investigations have shown that children possess a great deal of skill or knowledge before being able to write conventionally, a question that continues to be debated is how writing develops. Just as children do not begin to talk by speaking in complex utterances, or decode by reading a novel, children do not begin writing in complete sentences. Similar to the development of oral language or reading, the acquisition of writing skill progresses in stages. Some researchers contend that before writing conventionally, children scribble to convey meaning through print (Ferreiro & Teberosky, 1982; Fox & Saracho, 1990; Gombert & Fayol, 1992; Luria, 1978; Saracho, 1990; Tolchinsky-Landsman & Levin, 1985, 1987).

Writing is a difficult task, both for beginning and mature writers. Hence, it is a tremendous accomplishment when young children begin writing. Conventional writing begins with children either writing letters or writing their names. Although we have learned a great deal about the skills that contribute to or lay the foundation for early reading, we know less about the skills that contribute to young children's early writing. A few studies have examined the component skills that contribute to name writing, but no study to date has examined skills that contribute to letter writing. Also among children's early writing endeavors are their attempts to spell single words. The ability to spell words signals a major milestone in children's literacy acquisition. To be able to spell, children need to draw upon and use several emergent literacy skills, which is why



spelling is considered a good reflection of children's understanding and learning of the alphabetic principle and a good predictor of their reading skills (Puranik et al., 2011, 2012; Pinto 2012).

In this study, for the analysis of learning skills of reading and writing have the fundamental role of the socio-cultural context. Analyze the trajectories of learning for children of different socio-cultural contexts helps to study typical and atypical development. Learning is a complex phenomenon that involves several factors, and implies personal characteristics of the children, but also environmental factors.

#### **1.4 The individual differences in learning to read and write: the development of typical and atypical**

Individual differences are the milestones of developmental psychology. Everyone has his individual characteristics that allow to be unique in this process of development and learning, in particular learning language, reading and writing. Reading and writing are two complex processes that start from the first months of a child's life and continue throughout life span. Therefore we can assert that the prerequisites of reading and writing are present in children, it is essential to strengthen them in accordance with individual differences.

Individual differences are fundamental characteristics in children with typical and atypical development. For study the essential processes involved in learning to read and write in typical development and identify developmental processes typical of what developmental psychologists call "typical developmental trajectories." Only through the study the learning of reading and writing in typical development, we can identify the differences with atypical development

and understand the most appropriate strategies to help children who have learning problems.

### **1.5 Learning disabilities in children: risk factors**

Risk indicators and protective factors. A range of environmental, biological, genetic, and prenatal conditions may be associated with adverse developmental outcomes and may be risk indicators (i.e., warning signs) for LD. Also, advances in medical technology have kept an increasing number of fragile children alive, and these children often are at risk for developmental and later educational problems. Such risk indicators, especially when several are present, warrant careful monitoring of a child's development and signal the need to ensure high quality learning opportunities for this population. Children who do not respond adequately to these opportunities may be at increased risk for LD. Furthermore, young children with identified disabilities (e.g., cerebral palsy) also may be at risk for LD. However, risk indicators do not always predict which children will have future learning problems. Risk indicators must be considered within the context of typical developmental expectations. For example, an inability to follow one-step directions is not a risk indicator for a 6-month-old, but is for a 4-year-old, especially in combination with other risk indicators, such as poor fine motor coordination.

Protective factors that reduce risk and foster resilience can buffer children and families from circumstances that place them at risk. Risk indicators interact with protective factors in unique ways for each child. For example, some children with a history of birth complications may exhibit typical developmental patterns and require few if any special services, whereas other children without such histories may struggle to learn and may require formal assessment and

intervention. Likewise, children who may have multiple risk indicators may not demonstrate learning problems if they receive strong culturally and developmentally appropriate early learning experiences.

In summary, risk indicators do not necessarily predict later learning problems or indicate the existence of a disability, particularly when only a single indicator is present. Similarly, protective factors do not rule out the presence of a disability. However, the presence of risk indicators warrants substantial and serious efforts to facilitate early learning success, because many children at risk respond positively to high quality instruction and support. Therefore, children at risk, who may or may not have LD, need to receive carefully planned and responsive services and supports to enhance their opportunities for learning (Coleman et al., 2006).

### **1.5.1 Children are classified as not-at-risk or at-risk readers based on a specific features measured by a specific battery**

Screening tools, which are brief measures that allow snapshots of children's current academic skills, provide reliable and valid information regarding children's skills and also meet financial and time constraints. Thus, using a screening tool to assess children's academic skills in preschool is more practical way to meet the goals of identifying children who are at very high risk, are most in need of targeted instructional activities, or who have not responded to the basic classroom-wide curriculum. Although there have been a few studies concerning the psychometric characteristics of screening-type measures of early literacy skills, these studies have typically reported summaries of the measures' reliability, concurrent validity, or predictive validity. These metrics are useful for determining performance characteristics of the measures and for

demonstrating that they provide measurement of specific domains, but the central question relevant to the value of screening measures relates to the ability to use the measures to make accurate classifications (e.g., correct classification of a child as either at risk or not at risk) (Shauna et al., 2009; Jiménez, 2010) .

Early identification efforts often target kindergarten as the screening window from which to predict reading failure in later years, but screening this early results in many classification errors (Scarborough, 1998). Classification accuracy is improved considerably when screening occurs at the beginning of first grade (e.g., O'Connor & Jenkins, 1999), but even in first grade the accuracy of screening measures has not been ideal. For example, O'Connor and Jenkins reported 0% false negatives and 70% false positives for their briefest battery (35 min.) in fall of first grade, and .01% false negatives and 47% false positives for their longest fall battery (50–65 min.). The improvement in the false positive rate, while still high, comes at the cost of doubling assessment time. Compton, Fuchs, Fuchs, and Bryant (2006), predicting from the beginning of first grade to the end of second grade, identified a promising screening battery that produced 10%–13.6% false negative cases and 17.2%– 17.3% false positive cases, depending on how poor reading was defined at the end of second grade, based on logistic regression results. It is likely that first-grade screening may be more accurate than kindergarten screening, because in first grade children are beginning to exhibit behaviors more proximal to word and connected-text reading (i.e., phonological, phonetic, and orthographic skills) and these behaviors can be reliably measured (Fuchs, Fuchs, & Compton, 2004). An abundance of correlational and experimental evidence demonstrates strong relationships between word reading and phonological awareness (segmentation and blending), sublexical units (letter names, letter sounds, digraphs, rimes), orthography (pseudowords, real words, spellings), and vocabulary. Although most early screening batteries rely on test performance, we included the

perspective that teacher ratings also provide valuable information. For example, children's attention to task- and work-related behaviors predicts achievement and response to intervention (Gijssels, Bosman, & Verhoeven, 2006). The purpose of screening is to determine if additional evaluation is required and in what developmental domains. Screening tools are not intended for diagnosis, placement, and educational planning. Careful consideration of reliability, validity, standardization, cultural and linguistic sensitivity, and relevance of screening instruments and procedures is required for appropriate selection, use, and interpretation.

The identification process includes (1) screening, (2) examination for the presence of risk indicators and protective factors, (3) systematic observations, and, if indicated, (4) a comprehensive evaluation. An effective early identification program must take into account the numerous biological, environmental, and cultural factors that may influence the course of a child's development. Information from the identification process is the basis for making decisions about the need for further services and supports. The purpose of early identification is to determine which children have developmental problems that may be obstacles to learning or that place children at risk. Development in infants, toddlers, and preschoolers is characterized by broad variability in rates and patterns of maturation. For some children, differences and delays in abilities are temporary and are resolved during the normal course of development. For other children, delays may persist in different domains of functioning, necessitating the child's referral for targeted screening and/or comprehensive evaluation. At present, no clear distinction can be made in the early years between the children whose problems may persist from those who will make adequate progress with time. "Therefore, young children who demonstrate difficulties in early development may or may not be at risk for LD; nevertheless, screening, evaluation, enhanced learning opportunities, and possibly

intervention services should be provided. It is not in the child's best interest to “wait and see” or hope that the child will “grow out of” his or her problems. Conversely, it is important to guard against the premature identification of a disability, especially if high quality learning opportunities have not been provided” (National Joint Committee on Learning Disabilities, 2006).

### **1.6 Early identification of learning disabilities: the role of teachers**

The analysis of reading and reading instruction involves four interacting factors: students, tasks, materials, and teachers. It has often been the case that research has not focused on teachers; it has emphasized students, materials, and tasks. Recent developments, have highlighted the need for qualified teachers. Other variables that may be important for prediction of academic achievement include teacher ratings of student behavior. Teacher ratings may add to predictive validity because teachers have intimate knowledge of children’s reading behaviors that may not be captured in discrete measures of accuracy, fluency, or growth. Teacher ratings are efficient in that they do not take any instructional time away from children and can likely be completed in less time than required of individual assessments.

In this study, we have administered Observing Questionnaire IPDA - Early Identification of Learning Difficulties - which has the purpose of a screening given to teachers. Screening carried out by observing the questionnaire is the phase of a more accurate assessment of the state of development of specific skills that are considered "prerequisites" to learning at school, to further implement appropriate rehabilitative and educational.

The questionnaires observations, that used in this study represent the most appropriate instrument for a first screening to identify children 'at risk' of

learning difficulties. It is interesting to note, finally, that the use of these instruments also allows teachers to collect information that is similar to the educational activities that they perform.

The criteria that have guided the selection of this instrument are based on the relevance of the items were essentially two: the prediction experimentally demonstrated (such as elements, according to the main theoretical contributions and research, are better predictors of future school failure) and task analysis (the decomposition of a complex task, such as reading, in the most elementary processes in which is divided, which correspond to the skill prerequisite). The formulation of the items has been realized in such a way as to reduce as much as possible the margins of ambiguity and to allow teachers to use all the information that can collect interacting every day with the children. (Tressoldi & Tretti 2009).

The teachers have a fundamental role in the identification and treatment of learning disabilities. The teachers must be ready to support the development process of children with learning disabilities. “Special education teachers primarily require access to learning resources that can support cognitive process development for children with learning disabilities in a variety of ways to meet individual learning needs. Enabling teachers to have access to multimedia learning resources, which support phonological and reading skills development, allows the teacher to focus more on being a facilitator of learning while working with individual students. At the same time, the development of multimedia technologies for learning disabilities offers new ways in which learning can take place—in schools and at home” (Jiménez, 2013).

## **Chapter II:**

### **Risk factors of learning skills in reading and writing in pre-school-age children: a systematic review and meta-analysis**

The systematic review on which this research is based provided evidence for the International task force on preventive health care to update their guideline regarding screening for predictors of risk of learning disabilities. In this research we highlight three questions covered in the full review that pertain to the effectiveness of screening for predictors of risk of learning disabilities and incidence as well as optimal timing and frequency of screening. The aim is to identify the risk factors in children five years of age for reading and writing difficulties which are the leading cause of child learning disabilities. We performed a systematic review of published literature available in the public domain. We conducted a quality assessment of all eligible studies according to grade criteria and performed a meta-analysis to report the odds ratios for all risk factors identified in these studies.

We selected all studies in the international literature that analyzed risk predictors of learning skills in reading and writing in pre-school-age children. We have included some studies present within the The National Early Literacy Panel (NELP; Lonigan et al., 2008a), but we extended our review and meta-analysis including the variables for which we are strongly linked to the learning of reading and writing in international literature. We gave particular importance to other variables that in children in pre-school age can give learning difficulties to read and write in school-age children. The aim of this chapter to identify the risk factors to learning to read and writing in children under five years of age.



## 2.1 Methodology for the analysis of the literature

We performed a systematic review of published literature available in the public domain. We conducted a quality assessment of all eligible studies according to grade criteria and performed a meta-analysis to report the odds ratios for all risk factors identified in these studies.

In this chapter, is processed a research synthesis on risk factors of learning skills in reading and writing in pre-school-age children. This is not simply to complete a literature review but to engage in a systematic empirical study in which data are collected, analyzed, and evaluated in an objective and systematic way to determine answers to specified research questions. In that sense, a research synthesis is an independent research study in its own right that uses existing studies as the data for its analysis. As independent research studies, research syntheses include selection criteria for identification of relevant research, standards for judging the quality of research, operational definitions, and reliability of methods. If, for a particular intervention and outcome variable, there is a significant average effect across a collection of studies, it is worthwhile to see what can be deduced about the nature of that effect. Toward that end, homogeneity analysis is used to determine whether the variation in individual effects are just normal sampling error or whether they might be the result of how the various research studies were conducted, differences in features of the intervention, or differences in the children themselves. If the homogeneity analysis indicates that the individual study effects are from different distributions, further analysis was warranted to try to find patterns of differences in effects across these studies.

Our initial literature search yielded studies with suitable data (**Figure 1**). After screening of the titles and abstracts and a subsequent full text review against our eligibility criteria, we identified 65 studies with suitable data. The quality of

studies reporting the strength of association between risk factors and learning to read and writing.

## 2.2 Selected studies

We conducted a literature research to identify studies that met the following inclusion criteria: (a) studies that included a specific analysis of learning disabilities indicators associated with risk factor (b) studies that focused on learning disabilities around the reading and writing, and (c) studies published in peer-reviewed journal between 2000 and 2013. To start the search, we examined previously published reviews (e.g., Carter, 2007; Paradies, 2006; Williams & Williams-Morris, 2000) and followed with an extensive literature search using databases that included PsycINFO, MEDLINE (Pubmed), Social Sciences Abstracts. For this search we included the research terms literacy, early literacy, learning of reading and writing , emergent literacy, learning disabilities, predictors of risk of learning disabilities. This search resulted in the identification of number of empirical investigations. The inclusion and exclusion criteria are shown in (**Table 3**).

We next examined the identified studies to ensure that they contained predictors of risk indicators and enough statistical information to calculate an effect size for associations between perceived learning disabilities and predictors of risk. We did not apply any language or publication restrictions. Relevant full-text articles in foreign language were translated to English and other language using Google translator.

The studies on the learning of reading and writing is essential to distinguish between transparent and non-transparent languages , but in this review and meta-analysis, we decided that we wanted to observe risk factors of learning

skills in reading and writing in pre-school-age children in all language (**Table 2**). This is because for us it is important to evaluate any differences between transparent and non-transparent languages.

### 2.3 Analysis of the literature:

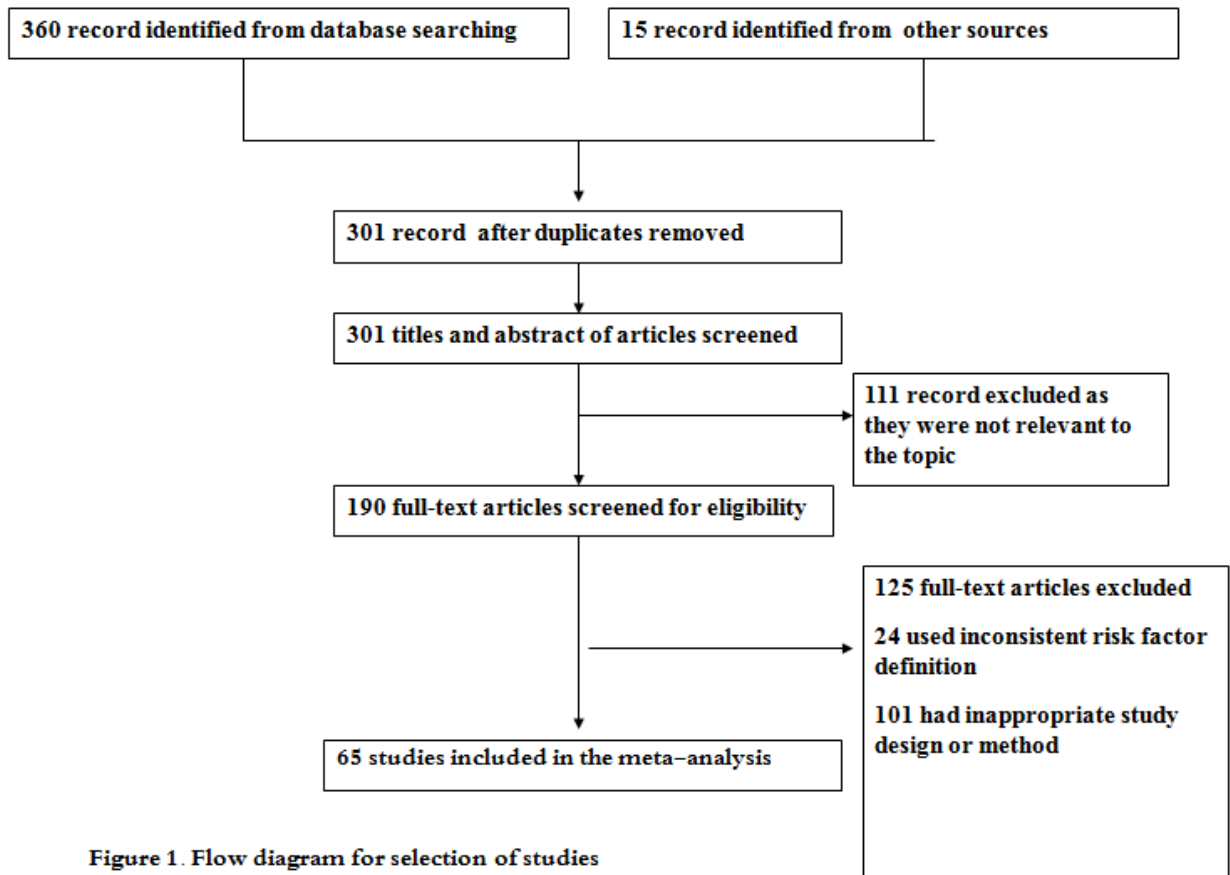


Figure 1. Flow diagram for selection of studies

**Table 2: Risk factors included in the review**

<b>Risk factor</b>	
Language delay	Children with specific expressive language delay
Sex difference	Differences between males and females
Low birth weight	Birth weight <2.5 kg irrespective of gestational age
Lower socio-cultural context	Socio cultural disadvantage
L1 differs from L2	Language spoken by the child in the family context different from the language spoken at school
Anxiety and Depression in Children	Study was to examine the anxiety and depression in children
Phonological sensitivity	Predictors of phonological awareness
Print knowledge	Knowledge, for example, books, newspapers
Alphabet knowledge	Knowledge of letters
Effortful control	Related to attention problem
Ethnicity	Ethnic minorities
Cognitive abilities	Cognitive control measures
Vocabulary	Knowledge of words
Reading and Writing Skill	Ability to read and write
Preschool emotions	Emotion control measures
Maternal education preschool	The relationship with the mother
Teacher-child relationship	The relationship with the teacher

We decided that if there was significant heterogeneity in the data, ie,  $I^2 > 80\%$ , (corresponding to  $P < 0.005$ ), then we would report the meta-estimates from the random effects model. Importantly, we hypothesized that the effects of the risk factors were likely to be different in European countries and not-European countries.

Because of this, we decided to report the results separately for European countries (**Table 4**) and not-European countries (**Table 5**). Inclusions of studies for this review were based on the following selection criteria:

**Table: 3 Criteria for inclusion and exclusion of the reviewed studies**

<b>Inclusion criteria</b>	<b>Exclusion criteria</b>
European and non-European Studies	Case definitions not clearly stated or inconsistently applied
Risk factors defined as stated in <b>Table 2</b>	Inappropriate control population
Studies in children aged within five years	Study designs – surveys or case series
Study designs – randomized control trials or observational studies (case-control or cohort)	Methods for statistical analysis not clearly reported
Studies reporting results using univariate or multivariate analysis	

## 2.4 Results

All studies were coded with regard to the author and publication year, country and title paper, participants, purpose and research variables, and differences in these variables were explored to help explain the variation in ESs (to try to understand why different versions of similar interventions differ in their degree of effectiveness). Calculation of effect sizes and weighted effect sizes. An effect size estimate using the standardized mean difference (Hedges & Olkin, 1985) will be calculated from the published data for every outcome measure reported, corrected for pre-test measures and small sample sizes (Lipsey & Wilson, 2001). Positive effect sizes indicate improvement for the Language delay, Phonological sensitivity, Ethnicity, Reading and Writing Skill, Teacher-child relationship and Preschool emotions (**Table 4 e Table 5**) .

Each effect size will be weighted based on the inverse of its variance. Weighted mean effect sizes and 95% confidence intervals will be calculated (e.g., Carter, 2007; Paradies, 2006; Williams & Williams-Morris, 2000).

We extracted all relevant information from each retained study and assessed the quality of included studies using a modified GRADE scoring system. Briefly, we assessed each article against the GRADE criteria and calculated the overall score for each article. We then calculated the cumulative score for each risk factor after accounting for the included studies .

**Table 4: Meta-estimates for risk factors of learning to reading and writing in children aged within five years in European Countries**

<b>Risk factor</b>	<b>No. of studies included</b>	<b>Meta-estimate (95% CI)</b>	<b>P value from meta analysis</b>	<b>I2 for heterogeneity (%)</b>
Language delay	7	3.6 (0.8-16.3)	<0.005	69.4
Sex difference	9	1.6 (1.6-2.3)	<0.005	47.9
Low birth weight	6	2.2 (1.8-2.7)	<0.005	79.0
Lower socio-cultural context	9	1.9 (1.0-3.7)	<0.005	81.5
L1 differs from L2	6	2.8 (1.0-7.7)	<0.005	0
Anxiety and Depression in Children	5	2.0 (2.0-4.6)	<0.005	69.9
Phonological sensitivity	8	5.6 (2.2-9.7)	<0.005	84.3
Print knowledge	4	1.5 (1.0-2.3)	<0.005	61.4
Alphabet knowledge	7	2.7 (1.0-7.8)	<0.005	69.4
Effortful control	2	1.9 (1.0-3.7)	0.819	0
Ethnicity	3	3.0 (2.0-4.6)	0.582	0
Cognitive abilities	3	2.7 (1.0-7.8)	<0.005	67.2
Vocabulary	8	1.6 (1.6-2.3)	0.188	0
Reading and Writing Skill	11	3.5 (2.1-9.5)	<0.005	79.0
Preschool emotions	2	3.0 (3.6-17.7)	<0.005	61.5
Maternal education preschool	2	1.4 (0.9-2.2)	<0.005	78.5
Teacher-child relationship	2	3.0 (2.0-4.6)	<0.005	67.4



**Table 5: Meta-estimates for risk factors of learning to reading and writing in children aged within five years in not- European Countries**

<b>Risk factor</b>	<b>No. of studies included</b>	<b>Meta-estimate (95% CI)</b>	<b>P value from meta analysis</b>	<b>I2 for heterogeneity (%)</b>
Language delay	7	3.6 (0.8-16.3)	<0.005	69.4
Sex difference	9	1.6 (1.6-2.3)	<0.005	77.9
Low birth weight	6	2.2 (1.8-2.7)	<0.005	79.0
Lower socio-cultural context	9	1.4 (0.9-2.2)	<0.005	71.5
L1 differs from L2	6	2.8 (1.0-7.7)	<0.005	0
Anxiety and Depression in Children	5	3.0 (2.0-4.6)	<0.005	79.9
Phonological sensitivity	8	7.8 (2.2-9.7)	<0.005	91.5
Print knowledge	4	1.5 (1.0-2.3)	<0.005	61.4
Alphabet knowledge	7	2.7 (1.0-7.8)	<0.005	69.4
Effortful control	2	1.9 (1.0-3.7)	<0.005	0
Ethnicity	3	3.0 (2.0-4.6)	0.582	0
Cognitive abilities	3	2.7 (1.0-7.8)	<0.005	80.2
Vocabulary	8	1.6 (1.6-2.3)	0.044	0
Reading and Writing Skill	11	3.5 (2.1-9.5)	<0.005	79.0
Preschool emotions	2	6.0 (3.6-17.7)	<0.005	51.5
Maternal education preschool	2	1.4 (0.9-2.2)	<0.005	67.5
Teacher-child relationship	2	3.0 (2.0-4.6)	<0.005	76.4

## 2.5 Comparison with the National Early Literacy Panel

The National Early Literacy Panel (NELP) looked at studies of early literacy and found that there are many things that parents and preschools can do to improve the literacy development of their young children and that different approaches influence the development of a different pattern of essential skills. In 2002, the NELP was appointed to examine the implications of instructional practices used with children from birth through age 5.

The panel was asked to apply a similar methodological review process to that used by the *Differences Across Study on Risk factors of learning disabilities dimension* elaborated in this chapter to issues of instructional practices for young children so that parents and teachers could better support their emerging literacy skills.

NELP's primary goal was to identify interventions, parenting activities, and instructional practices that promote the development of children's early literacy skills.

This was important because, without such a determination, it would be impossible to ascertain what programs or practices were most effective, because, even in the best of circumstances, most young children develop few conventional literacy skills before starting school. To identify the essential early skills or abilities relevant to later literacy development, the panel searched for published scientific studies that could provide correlational evidence showing the relationship between early skill attainment and later literacy growth in decoding, reading comprehension, or spelling.

These six variables not only correlated with later literacy as shown by data drawn from multiple studies with large numbers of children but also maintained their predictive power even when the role of other variables, such as IQ or socioeconomic status (SES), were accounted for.

These six variables are:

- Alphabet knowledge (AK): knowledge of the names and sounds associated with printed letters
- Phonological awareness (PA): the ability to detect, manipulate, or analyze the auditory aspects of spoken language (including the ability to distinguish or segment words, syllables, or phonemes), independent of meaning
- Rapid automatic naming (RAN) of letters or digits: the ability to rapidly name a sequence of random letters or digits
- RAN of objects or colors: the ability to rapidly name a sequence of repeating random sets of pictures of objects (e.g., "car," "tree," "house," "man") or colors
- Writing or writing name: the ability to write letters in isolation on request or to write one's own name
- Phonological memory: the ability to remember spoken information for a short period of time.
- Six early skills predictive of later literacy achievement
- Alphabet knowledge
- phonological awareness
- Rapid automatic naming of letters or digits
- Rapid automatic naming of objects or colors
- Writing or writing name
- Phonological memory

An additional five early literacy skills were also moderately correlated with at least one measure of later literacy achievement but either did not maintain this predictive power when other important contextual variables were accounted for or have not yet been evaluated by researchers in this way. These five additionally potentially important variables include

- Concepts about print: knowledge of print conventions (e.g., left-right, front-back) and concepts (book cover, author, text)
- Print knowledge: a combination of elements of AK, concepts about print, and early decoding
- Reading readiness: usually a combination of AK, concepts of print, vocabulary, memory, and PA
- Oral language: the ability to produce or comprehend spoken language, including vocabulary and grammar
- Visual processing: the ability to match or discriminate visually presented symbols.

Rather our review and meta-analysis is the first comprehensive attempt to systematically assess the effect of a multitude of possible risk factors of learning to read and write in children aged less than five years in transparent e non transparent language.

We identified, in total, 17 risk factors, which had been reported to be associated with predictor of risk learning to read and writing in the published literature. We observed a consistent significant association between 6 risk factors (Language delay, Phonological sensitivity, Ethnicity, Reading and Writing Skill, Teacher-child relationship and Preschool emotions).

We also observed that other risk factors (Sex difference, Low birth weight, Lower socio-cultural context, Anxiety and Depression in Children, Print knowledge, Alphabet knowledge, Effortful control, Cognitive abilities, Vocabulary, Maternal education preschool) had an inconsistent association with severe Predictor of risk that was not significant (likely risk factors). We further observed that risk factors (Maternal education preschool, Cognitive abilities,) were sporadically reported to be associated with severe Predictor of risk (possible risk factors).

The results in the research on transparent and non-transparent language suggest that phonological awareness plays a crucial role in the learning of reading and writing.

The preschool years are critical for preparing children for future success in reading. It is well documented that children who enter kindergarten with a gap in their foundational reading skills tend to remain behind their typically achieving peers (Bierman et al., 2008; Snow, Burns, & Griffin, 1998). Every year in the school career of children is more difficult and have more learning problems . For these reasons, interest and efforts in defining, measuring, and teaching emergent literacy skills to preschoolers have dramatically increased over the past decade.

More information is needed regarding the early development of phonologic awareness and its relation to literacy abilities. Future plans for this research include comparing children's use of phonologic awareness in single-word spellings and their use of phonologic awareness in creative writings. Studies should continue to investigate the role of phonologic awareness in generating text.

Continued investigation also is needed to determine the effectiveness of different tasks in assessing phonologic awareness. For instance, future studies could compare different tasks and systematically vary components of the task or response requirements. In addition, the links between phonological awareness and morphological awareness, as well as between morphological awareness and literacy development, need to be more fully explored. Most importantly, the practical significance of the existing studies should be tested. There is a great need for intervention studies that demonstrate the efficacy and effectiveness of phonologic awareness instruction and intervention in the early elementary school years.

## 2.6 Conclusion

The overviews and meta-analyses have different strengths but also some limitations. Meta-analysis is a useful method by which a body of empirical research can be evaluated. The aggregation of the results of numerous studies increases the sample size of observations and decreases the standard error of the estimates. Meta-analytic results provide statistical estimates that are less biased than those for individual studies or narrative literature reviews (Cook & Leviton, 1982; Cooper, 1998). Meta-analysis also enables the researcher to analyze the impact of specific variables across studies with considerable precision.

In this meta-analysis, we analyzed the studies gave us a global overview on the predictor variables related to learning to read and write and know all the possible risk factors for these languages transparent and non-transparent orthography.

First, the overall results of the meta-analysis depend on the methodological rigor and the philosophical/theoretical assumptions of the studies included in the meta-analysis (Cooper, 1998; Cooper & Hedges, 1994; Matt & Navarro, 1997).

Our meta-analytic results have exposed a need for studies that go beyond reporting univariate and multivariate and parametric and nonparametric statistics, known, so future results may differ as methodology becomes more refined. Our results cannot speak to theoretical issues, but the field is currently attending to that arena albeit with a heavy emphasis on measurement rather than clinical considerations.

Second, only studies with quantitative findings can be included. Case studies and qualitative research that provide indispensable insights on the topic require a separate systematic review. Often, research in developmental psychology have a lot of qualitative data very interesting.

Qualitative research conducted with established methodological criteria enrich the quantitative research in fact support this because they can refute or confirm

the results. In fact, the limitations that emerge from this review and meta-analysis lead us to claim that qualitative research should be strengthened in developmental psychology. Especially, in the field of learning disabilities in general and in the study of learning of reading and writing in particular.

Third, meta-analyses cannot adequately control for systematic threats to internal or external validity already present in the literature. For instance, systematic selection of easily accessible participants (i.e., children) could potentially misrepresent the nature of the relationship between predictor of risk and learning to read and writing within the different populations present in different research. It is necessary that studies are conducted with inadequate conceptualization or inconsistent procedures. In particular, in recent years, unprecedented attention has been focused on early literacy and in particular on Evidenced-based practices for teaching literacy skills to all young children can also inform literacy initiatives for children with risk of learning disabilities. Develop evidence-based practices from the findings of this research that implement and evaluate the use of evidence based practice guides. Conduct general and specialized technical assistance promoting the adoption and use of evidence-based early literacy learning practices. Many literacy activities can be informal or formal depending on the context and the level of the child's development and participation.

The evidence-based methodology is crucial in all research of Developmental Psychology. All children, with and without risk of learning disabilities, have interests and preferences. Everyday literacy activities provide the specific experiences and opportunities that enhance and expand early literacy learning because of the frequency with which they can occur for children with and without learning disabilities, and the functionality of the learning in a real life context (Spiel, 2009).

## Chapter III

### **The construction a profile for learning to read and writing**

The predictive relations between emergent literacy skills and later reading and writing skills suggest that children's emergent literacy skills can provide an early indicator of their likely outcomes regarding the development of skilled versus problematic reading and writing in the early elementary grades (e.g., Bishop & Adams, 1990; Perfetti et al., 1987; Scarborough, 1989; Stevenson & Newman, 1986; Storch & Whitehurst, 2002; Wagner et al., 1994; Puranik & Lonigan, 2011). It seems reasonable to examine the ability of screening measures to identify children who would be identified as having high risk for later reading and writing problems on the basis of age-appropriate criterion measures of those skills that are both relatively stable over longer periods of time and that provide information about relative degree of risk for later reading and writing problems. Children's reading and writing success throughout elementary school can be predicted from their emergent literacy skills. It is estimated that more than a third of all graders read and so poorly that they cannot complete their schoolwork successfully. Providing young children with the critical precursor skills to reading and writing can offer a path to improving overall achievement. (Teale & Sulzby, 1986; Badian, 1988; Carugati & Gilly, 1993; Tressoldi & Vio, 1996; Whitehurst and Lonigan, 1998; Ehri et al., 2001; Pepi, 2004; Cornoldi & Tressoldi, 2007; Pinto et al., 2009; Puranik & Lonigan, 2011) An important role in this research has been given to the influence of socio-cultural context and home literacy experiences or environment (Farver et al., 2013; Jiménez et al., 2009).



## 3.1

### First study

#### Analysis of the prerequisites of reading and writing

In Italy, in the October 8, 2010 was enacted the law for children with learning disabilities. Subsequently, the researcher that study the learning disabilities met together to write the national guidelines for the assessment and treatment of these problems. In particular, draw up the Consensus Conference (CC) that is published in June 2011. The Consensus Conference is divided into four sections A, B, C, D. In this research we have carried the research around on Section B.

*Summary of the issues discussed in SECTION B:*

- ✓ Identification of “risk factors” for learning disabilities
- ✓ Identification of “risk children” during the preschool
- ✓ Construction of assessment tools that must be accurate in identifying children at risk for learning disabilities
- ✓ These tools must be appropriate in transparent languages
- ✓ If the “early intervention” that can modify reading and writing learning typical and atypical development
- ✓ The role of teachers in early identification of children at risk to learning read and writing

In particular, in the early identification (preschool children) to the problems of learning to read and write. Furthermore, the purpose of this study was to determine the value emergent literacy screening measures, in terms of indices of classification accuracy with respect to children’s emergent literacy skills. Within the logic of current models of early childhood education, identification of children with weak or slow development of these skills would allow a determination of children who are those most at risk of later reading and writing

problems. It's conducted a longitudinal study .The children have been, followed from the last year of primary school (5 years), until the end of first grade (6 years). Appropriate tools have been used for an assessment of all the skills involved in learning to read and write, according to the suggestions provided by The National Early Literacy Panel (NELP; Lonigan et al., 2008a).

### **3.1.1**

#### **Method**

##### *Participants and Procedures*

The research was carried out in 31 schools in four Sicilian town , in particular, Western Sicily (Palermo and Trapani) and Eastern Sicily (Ragusa and Siracusa). We conducted a longitudinal study in two phases to assess reading and writing learning skills of (F1 and F2):

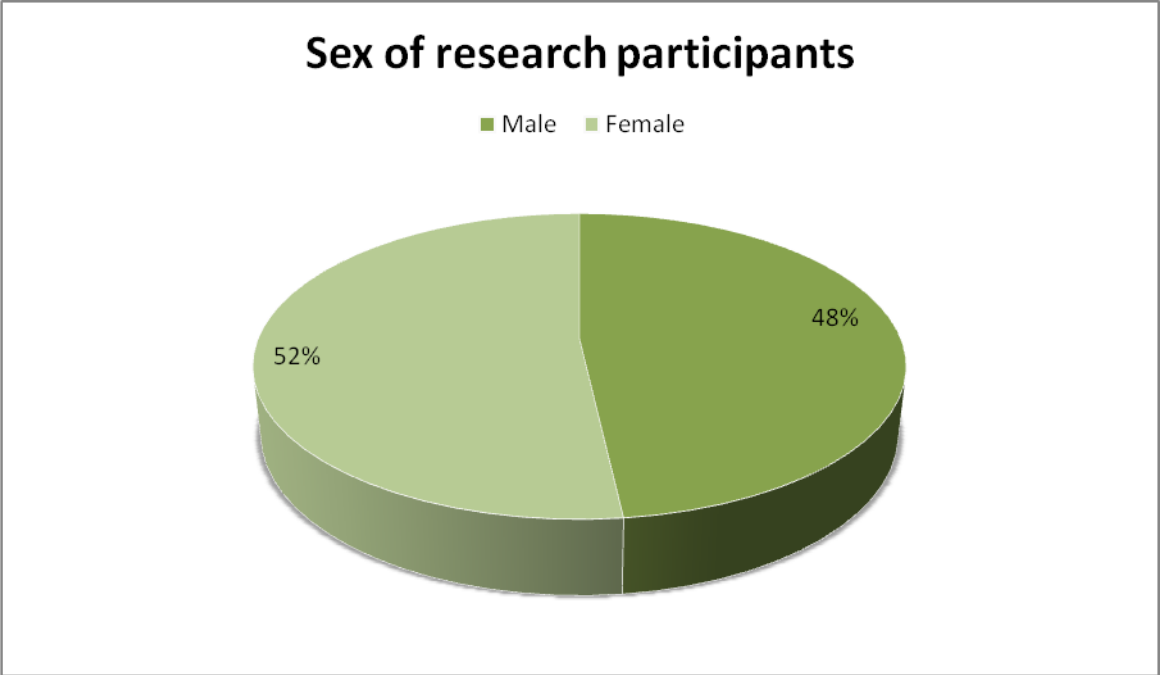
- First phase (T1) of the research has been carried out (January-April 2012). The research participants were 960 children attending the last year of preschool.
- Second phase (T2) of the research has been carried out (January-May 2013). The research participants were 870 children attending the first year of primary school.

Finally, the assessment to reading and writing learning skills has been carried in May / June 2013.

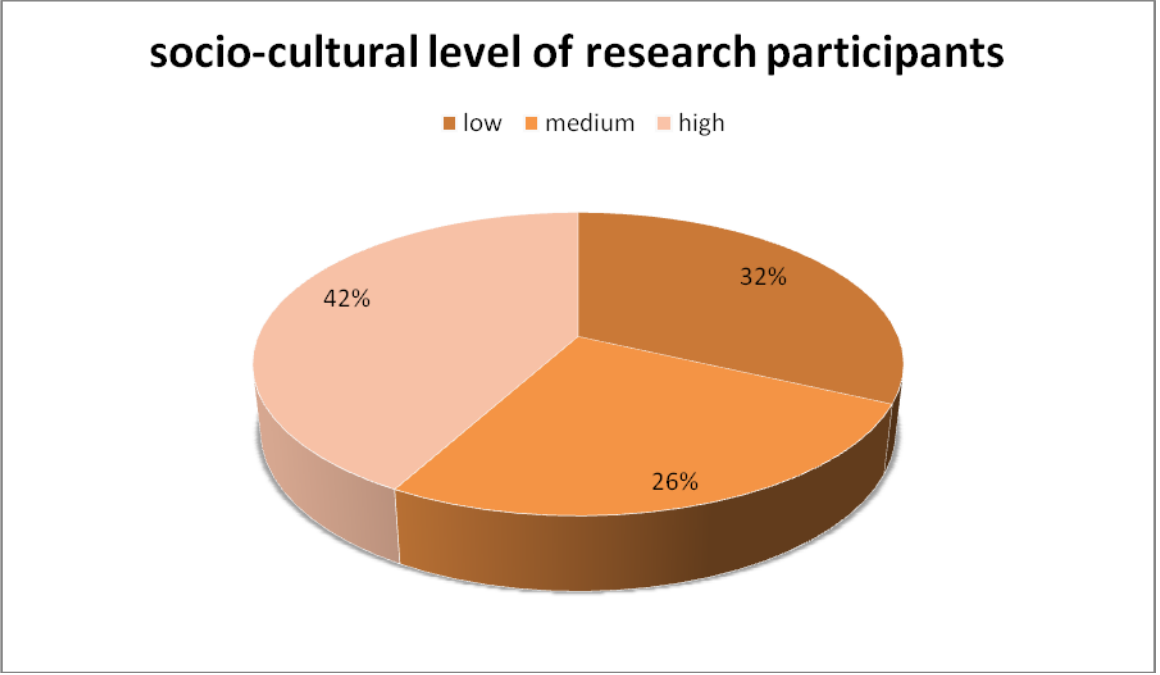
Between the first and the second phase there has been a loss of research participants of 90 (children).

Often, this loss is due to Italian school system does not provide a continuity between kindergarten and primary school.

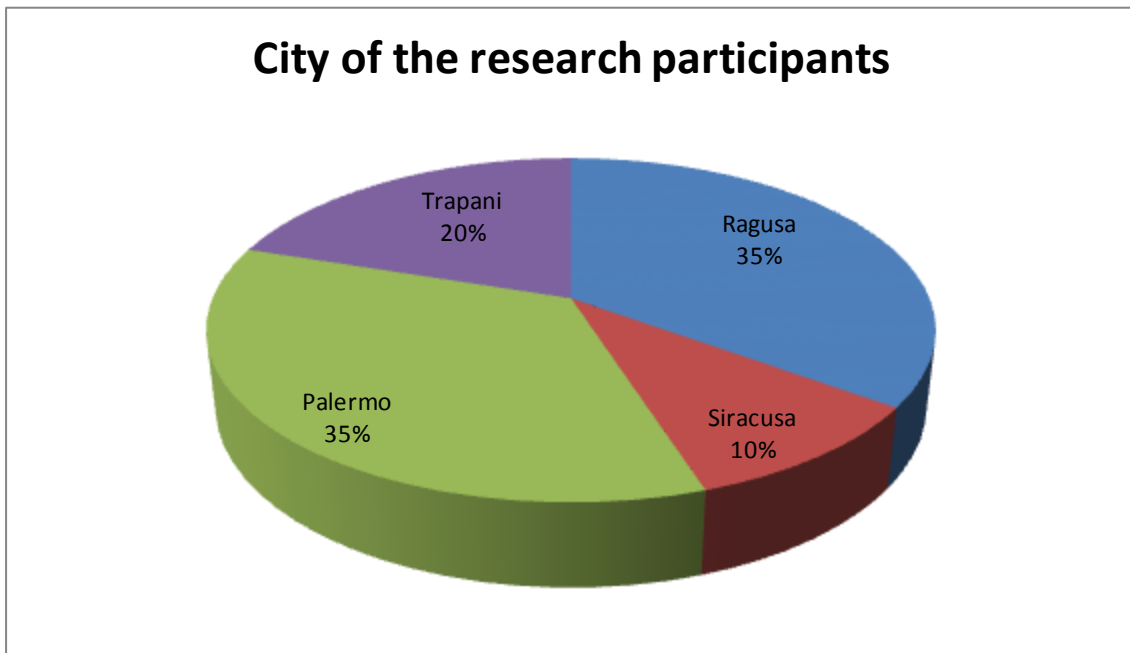
Finally, only 870 children attended in two phases and in assessment of reading and writing learning skills. Children who participated in this research are 422 male and 448 female (M age = 65,22 months; SD = 4,86; age range = 59 – 79 months) . The participants were equally distributed in different socio - cultural contexts (low - medium - high).



**Figure: 2**



**Figure: 3**

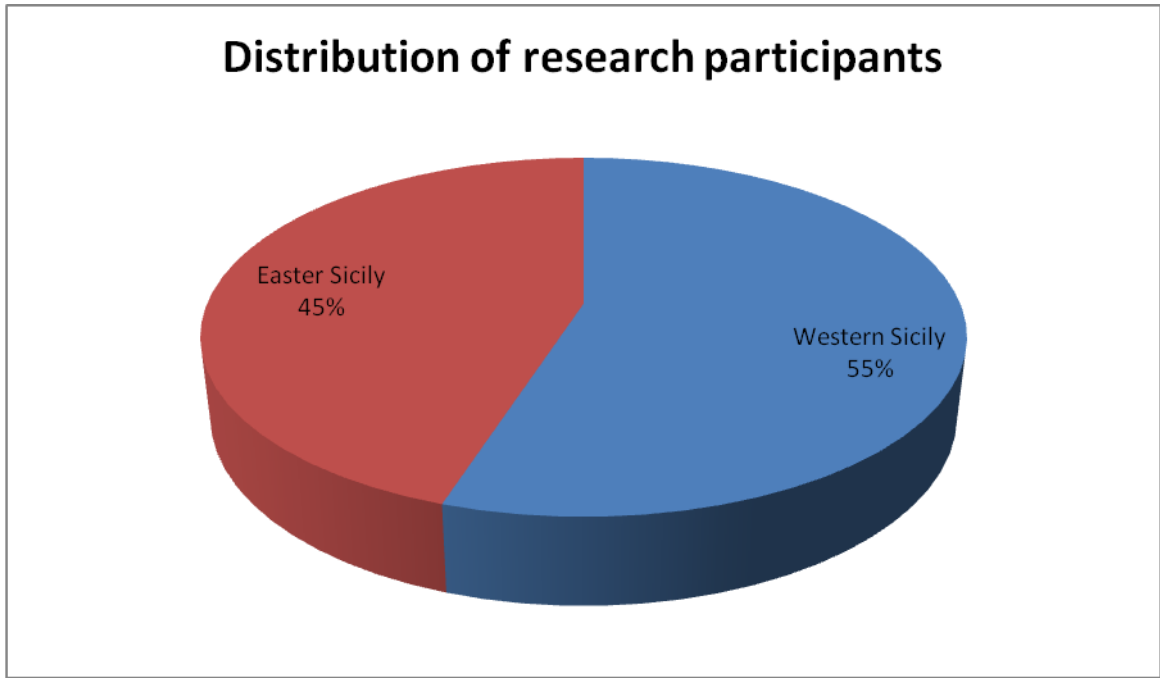


**Figure 4:** the research participants from four Sicilian city:

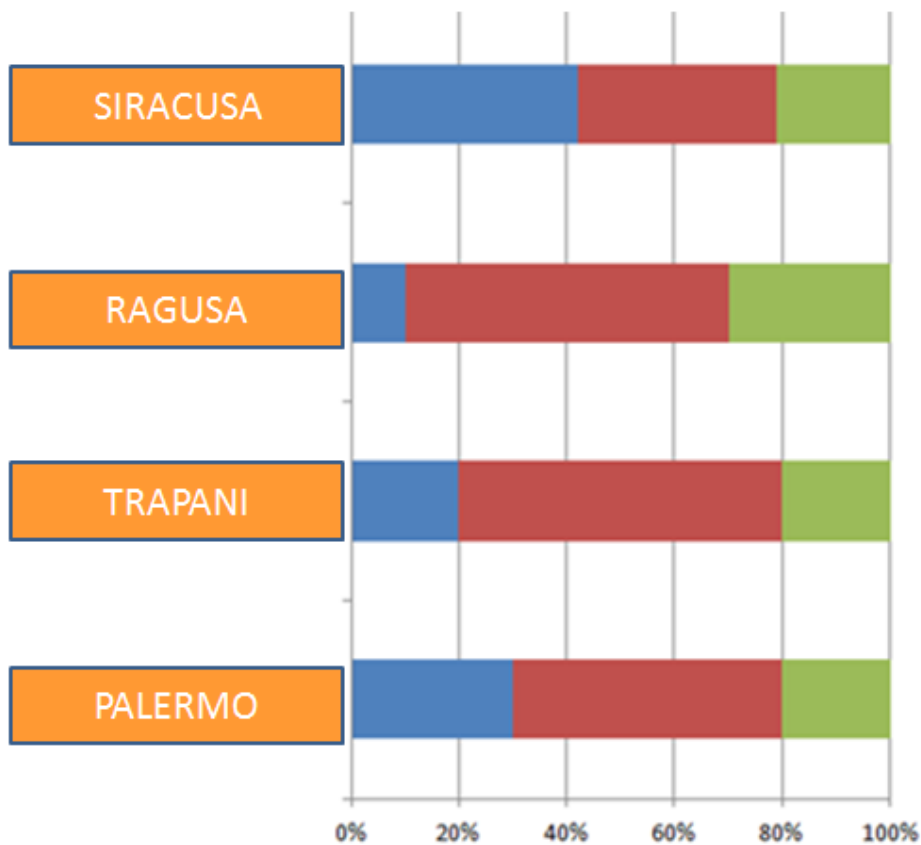
*Western Sicily (Palermo, Trapani)*  
*Eastern Sicily (Ragusa and Siracusa).*



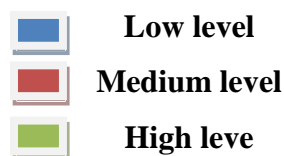
**Figure 5:** City of Sicily, where the research has been carried out



**Figure 6**



**Figure 7:** the subjects were equally distributed between three socio-cultural levels



We conducted a longitudinal study in two phases (F1 and F2). All children were tested individually by trained research assistants at their child care centers or preschools in first phase (T1) and at their school in the second phase (T2).

The assessments were conducted in a quiet room, the first phase (T1) in five sessions that lasted approximately 10 to 15 minutes, and the second phase (T2) in three sessions that lasted approximately 10 to 15 minutes each depending on the child's tolerance level and ability to attend to the task.

First phase (T1) of the research has been carried out (January-March 2012). The research participants were 960 children attending

the last year of preschool. Second phase (T2) of the research has been carried out (January-March 2013). The research participants were 870 children attending the first year of primary school.

The assessment reading and writing has been carried in May / June 2013.

### *Materials*

Only, in the first phase (T1) have been administered *CPM (Raven's Colored Progressive Matrices)* and "*Measurement*" of socio-cultural context.

In addition, we assessed "observation of teachers" for the identification of learning difficulties in reading and writing with a questionnaire (*IPDA*)

### *Nonverbal intelligence: CPM (Raven's Colored Progressive Matrices)*

The Raven's measures general mental ability and offers information about someone's capacity for analyzing and solving problems, abstract reasoning, and the ability to learn. It does this in a non-verbal format that is an especially important feature for an ethnically diverse population. In this research, Raven's Colored Progressive Matrices (Raven, Court, & Raven, 1976), which is a measure of non-verbal reasoning, was adopted for estimating the participants' nonverbal intelligence. As the participants were preschoolers, the short form was used. In each item, a visual matrix with one missing part was presented and the children were asked to select, from six alternatives, the one that best completed the matrix.

Raven's Coloured Progressive Matrices (RCPM) is a standardised test that is commonly used to obtain a non-verbal reasoning score for children. As the RCPM involves the matching of a target to a pattern it is also considered to be a visuo-spatial perception task.

The Raven Progressive Matrices (RPM) tests were designed to assess the ability to form comparisons, deduce relationships, correlates, and reason by analogy (Raven, Raven, & Court, 1996). They are considered an analytic intelligence test which refers to the ability to reason and deal with novelty, without relying on an explicit base of declarative knowledge. This form of intelligence is called fluid intelligence, in contrast to crystallized intelligence which is based on declarative acquired knowledge .

The RCPM comprises 36 items divided into three sets of 12 each (A, Ab and B) in which items are ordered by increasing difficulty. Each item is presented as a colored pattern with a missing portion and 6 options to choose to fill in the missing portion and 6 options to choose to fill in the missing element. Some items call upon the ability to complete a continuing pattern whereas others require perception of the parts of the whole pattern as one gestalt on the basis of spatial relations. Finally, some of them require analogical reasoning. The 36 items were all administered in the order prescribed in the manual with no time limits by master's students in developmental psychology trained in psychological testing

### *Measuremen of socio-cultural context*

During the first phase has been measured the *Socio-cultural status* is a multidimensional construct. Coleman (1988) argued that three types of capital are important in child development. Firstly, financial capital provides the resources to cover basic needs such as food and clothes and can be measured by family income, home ownership, wealth or indirectly through occupational status.



The second of Coleman's capitals, human capital, comprises nonmaterial influences. The main measure used here is parental education as indicated by the highest educational degree attained and/or the highest grade in school completed. Thirdly, social capital takes a broader view of *socio-cultural status*, including the child's neighborhood, social networks and relationships, taking into account. Many ways of assessing *socio-cultural status* have been suggested. Popular measures in current studies are parental education and occupational status of the parents or careers . Most studies, however, mix two or three *socio-cultural status* variables (e.g. Forget-Dubois et al. 2009), while some apply complex assessment procedures of SES (e.g. Sarsour et al. 2010). *socio-cultural status* indices present a composite score of various *socio-cultural status* factors. In this study, two measures indicative of *socio-cultural status* are used: maternal and paternal education status, maternal and paternal work, location of the child's school or nursery and location of the child's home . These constitute measures from all three of Coleman's domains and reflection of human capital, financial capital and social capital. All this information was elicited by means of a parental questionnaire. The research participant on the measurements of this questionnaire were divided into three levels (low - medium - high).

#### *Teacher observation:*

Furthermore, in this phase to assess the teacher observation in identifying the learning skills of reading and writing we used the IPDA.

The IPDA Questionnaire consists of 43 items divided into two main sections. The first concerns the "general skills" regarding the suitability learning in general, the second concerns the "special skills", ie the prerequisites of reading and writing and those of mathematics.

Items which have as their object the general skills are as follows:

item 1-9 behavioral aspects

item 10-11 Motricity

12-14 Understanding linguistic item

item 15-19 Oral Expression

item 20-23 Metacognition

Other items 24-33 cognitive abilities (memory, praxies, orientation)

Those for specific skills are:

item 34-40 Pre-literacy

item 41-43 Pre-mathematics

Behavioral aspects are evaluated: interest or motivation to learn, adapt to the rules and ability to adapt to change, collaboration skills, independence, concentration and temperament.

With regard to the motricity is taken into consideration the quality of the coordination general movements and fine motor. The items that explore the linguistic understanding are centered on the ability to listen and follow conversations, to understand the instructions and words of the teacher.

For oral expression is evaluated the ability to tell a true experience, clarity in expression, richness of vocabulary, the ability to describe vignettes and the morpho-syntactic level of the sentence.

The area related to metacognition (awareness and control over cognitive processes) investigates the ability to use strategies to learn better awareness of not understanding some things, persistence in the task, the ability to understand that thoughts, sounds or other stimuli may disturb the execution of the activity that is taking place.

Other cognitive abilities considered are: the ability to remember verbal and visual content, visual-motor coordination, orientation in space. As specific skills necessary to successfully learning reading and writing (pre-literacy) are

considered metalinguistic skills related to phonological awareness and understanding of the relationship between written and spoken language, discrimination of phonemes and graphemes and the ability to reproduce them in sequence.

The breakdown of items is only descriptive. The instrument should be compared with the overall assessment, without attributing value to the comparison between the individual areas.

With regard to the prerequisites of mathematics (pre-math), the questionnaire refers to the ability to associate small numbers, the respective quantity, to compare different quantities and of be able to do little reasoning based on adding and removing.

To make it easier the reading and analysis of the responses, it was decided that all the items are assertions expressed in a positive form.

The IPDA is completed by the teachers of the children attending the last year of kindergarten. For each child is required that the questionnaire is completed by a single person, which is, however, allowed to consult with others in case of uncertainty on the answers to give. The instructions preceding the Questionnaire, the teacher is asked to take careful vision, watching the kids for at least a week before answering, and then to consider each item independently of all others.

It is important to follow the directions suggested, because only a correct use of the test to be able to take valid conclusions from it.

The period of observation of children, in particular, allows the teacher more security in the answers, but also to program some activities to evaluate ad hoc behaviors and skills that has not been able to observe before. In this regard, some examples of activities have been described within the same item, others can easily be thought by the teacher.

At compile time, the teacher is asked to give an assessment of the statements made in the item using a scale with four levels that correspond to the following responses:

- 1) not at all / never
- 2) little / sometimes
- 3) enough / most of the time
- 4) much / always.

Depending on the item responses are based on an assessment of the possession of a certain skill or require a judgment about the frequency with which it appears a certain behavior. When there are uncertainties about the answers to give, we suggest you also consider the comparison between children on the resolution of any doubts. In completing the questionnaire is important to remember that this is not to arrive at an evaluative judgment global and unchangeable on the child. The scores must be attributed objectively considering the behavior of the child at the time of observation and not its performance or potential.

It ' is important not to give scores that overestimate a child. This, in fact, mean to deprive him of the possibility of an intervention to strengthen timely manner.

Is therefore appropriate to:

- Restrict the use of the score "4" to cases in which the observed behaviors show that the child completely mastered the skills described in item (in relation to age)
- In situations of uncertainty between two possible scores always choose the lowest score.

For the compilation has been prepared a piece of notation collective in when the instrument is applied to the entire class. There is a space to indicate some information (name, sex, age in months) of the child , as well as what to annotation.

*Furthermore, for the First phase (pre-school) and Second phase (primary school) of this research we used the following tests that are constructed with increasing difficulty:*

*Wechsler scale of intelligence (WPPSI) and (WISC) Verbal Tasks*

*For the first phase*

The Wechsler Preschool and Primary Scale of Intelligence (WPPSI) is an intelligence test designed for children ages 2 years 6 months to 7 years 3 months developed by David Wechsler in 1967

The Wechsler Preschool and Primary Scale of Intelligence consist of 14 subtests. They are designated as one of three types: core, supplemental, or optional. The core subtests are required for the computation of the Verbal, Performance, and Full Scale IQ. The supplemental subtests provide additional information about cognitive abilities or can be used as replacement for inappropriate subtests. The optional subtests provide additional information about cognitive functioning but cannot be used as replacements for core subtests.

*For the second phase*

The Wechsler Intelligence Scale for Children (WISC), developed by David Wechsler, is an individually administered intelligence test for children between the ages of 6 and 16 inclusive that can be completed without reading or writing. The WISC takes 65–80 minutes to administer and generates an IQ score which represents a child's general cognitive ability.

The WISC-IV generates a Full Scale IQ (FSIQ) which represents overall cognitive ability, the four other composite scores are Verbal Comprehension index (VCI), Perceptual Reasoning Index (PRI), Processing Speed Index (PSI) and Working Memory Index (WMI). We use the VCI's subtests follows:

*In this research we use both tests (WPPSI) and (WISC), the following tasks only: Information task, Vocabulary task*

**For Environmental Print :**

**Information task**

Information - for Picture Items, the child responds to a question by choosing a picture from four response options. For Verbal Items, the child answers questions that address a broad range of general knowledge topics.

**For Concepts about Print:**

**Vocabulary task**

Vocabulary - examinee is asked to define a provided word. Vocabulary - for Picture Items, the child names pictures that are displayed in a stimulus book. For Verbal Items, the child gives definitions for words that the examiner reads aloud.

However, a sufficient number of subtests need to be completed to report upon an area of ability. The selection of tasks will vary according to each specific situation.

Tasks	Ability Measured	Description of Task
-------	------------------	---------------------

Information	Crystallised intelligence, long-term memory, and the ability to retain and retrieve knowledge from school and the environment	The child responds to a question either by pointing or verbally. Where no verbal response is required, the child responds by choosing a picture from four response choices.
Vocabulary	Word knowledge, verbal concept formation, fund of knowledge, learning ability, long-term	Children are either shown a picture or told a word. For picture items the child names the

*For Reading and writing skills (Grapheme Knowledge, Alphabet Knowledge, Visual Processing, Pseudowords, Print Knowledge, Phonological Memory, Phonological Awareness, Decoding) : PRCR - 2 Tests*

The tests of the battery PRCR -2 ( Cornoldi , Miato , Molin and Poli , 1992; 2010) , constitute an updated and standardized tests PRCR designed and presented by Cornoldi , Miato , Molin and Poli ( 1985) , in the framework of a program for the prevention skills of reading and writing. This measuring instrument is based on a model that integrates cognitive skills and general specific prerequisites , which are the basis of learning to read and write ( Struiksmas , 1980). The " prerequisites " are cognitive abilities , each referring to a specific area of expertise, that the subject needs so that learning is accomplished successfully . The ability to " prerequisite " measured from the battery can be distinguished:

a) " general prerequisites " (or base ) to reading and writing, such as perception , language , memory , which are underlying most of the cognitive abilities of the child and , therefore, the sum of those ability " cross " , partly contained in all the tests of the battery;

b ) " specific prerequisites " , ie those components of the general skills of base that are related particularly to reading and writing, such as , for example, the ability to discriminate between a grapheme other , the recognition of individual signs within a grapheme , the serial work from left to right (ie, eye movements during reading tasks ) , phonemic awareness ( melt and segmenting syllables and phonemes ) and so on. The basic assumption is that the child comes to reading and writing when he is in possession of these skills , that is, when he reached the " reading readiness " ( ability to learn to read and write ) ( Teale & Sulzby 1986 , Badian , 1988; Pinto , 1993; Lonigan & Whitehurst , 1998; Pepi , 2004). As part of a preventive intervention in kindergarten , the battery , enabled through the identification of children " at risk" of a subsequent disorder / difficulty of learning to read , and schedule a training early , through the ' identification of areas in deficit

#### *For Oral Comprehension :TOR*

TOR which is standardized on 1700 Italian children aged between 3 and 8 years), and it measures listening text comprehension without involving language-production skills. The choice of this instrument is the need to investigate whether the understanding of children with DS is easier for individual messages or text (stories). The test is similar to the reading comprehension test in terms of story structure, types of questions (that is, literal and inferential) and type of task (that is, multiple choice), and it was chosen in order to have a parallel measure of listening and reading comprehension. The standardized tests, such as those used in this study have obvious limitations in the assessment of language skills, since the criteria for administration are rigid



and make little motivation and fluctuating attention and, above all, do not get large enough samples of spontaneous speech can be representative of the actual language and communication skills of individuals. Only a more complex analysis that takes into account all aspects of language processing (such as prosodic comprehension) may allow you to simultaneously evaluate the operation of different cognitive processes such as language skills of the subject, his ability to access the storage memory, and attentional resources to their to understand and describe the emotional aspects.

*Writing skills (from Pinto, 2009) :*

This task measures children's knowledge on concepts as words, words boundaries, word morphology, directionality of print and their functioning in written language.

Each child was asked to "write as he/she knows" and to "tell what he/she wrote following with the finger" three different sets of items were given by the experimenter. Each answer given by the children was tape recorded and a transcript was produced for analyses by two independent judges. Data coding was conducted according to the coding system adapted by Accorti Gamannossi and Bartoli (2005).

– Conceptual knowledge on orthographic notation

- Would you try to write down the words you know?
- Would you like to draw an apple? Now would you try to write down the name of what you drew?

For each item, the child's performance was valued with scores ranging from 0 to 2 as follows: drawing (score 0), use of forms similar to letters (score 1), use of

sequences of letters (score 2); the mean score of the two items was then considered.

– Conceptual knowledge on orthographic variation of sound quantity

- Would you like to write down the longest word you know? And now the shortest word you know?
- Would you like to write rainbow (arcobaleno in Italian) and king (re in Italian)?

For each item, the child's performance was valued with scores ranging from 0 to 2 as follows: drawing (score 0), sequences of letter of the same length (score 1), sequences of letters of different length (score 2); the mean score of the two items was then considered.

– Conceptual knowledge on orthographic variation of phonemic units

- Would you like to draw a boy (bambinO in Italian) and a girl (bambinA in Italian)?

Now would you try to write down the name of what you drew?

- The picture of a cat is shown to the child, then he/she is asked “Would you try to write down cat (gattO in Italian)?” Then the picture of three cats is shown to the child and he/she is asked “Would you try to write down cats (gattI in Italian)?” For each item, the child's performance was valued with scores ranging from 0 to 2 as follows: drawing (score 0), no variation of the final sign (score 1), variation of the final sign (score 2); the mean score of the two items was then considered. Agreement between the judges: 98%; cases of disagreement were resolved through discussion (Pinto et al., 2009).

***At the end of the first year of primary school (May / June 2013) we assessed the level of reading and writing of the children with two test.***

*For “reading level” was assessed by a standard reading achievement test widely used for Italian children:*

*MT Reading Test (Cornoldi and Colpo, 1998), one story only :*

*”IL BRUCO ED I GERANI”*

*MT Reading Comprehension Test (Cornoldi and Colpo, 1998), one story only :*

*“LA FIABA DELL SCOIATTOLO”*

*For the “writing level” was assessed by a standard reading achievement test widely used for Italian children:*

*Battery for the Assessment of Writing and Orthographic Competence (Tressoldi and Cornoldi, 1991), in particular , two subtest: “dictation” and “writing names of figures “*

***Through these tools, the variables that we have observed in this research as prerequisites of learning to read and write are:***

**Socio-Cultural Status:** Information about the socio - cultural context (low - medium - high).

**Teacher observation:** A variable evaluated through a screening carried out by teacher, the questionnaire is the phase of a more accurate assessment of the state of development of specific skills that are considered "prerequisites" to learning to read and writing at school.

**Environmental Print.** The print of everyday life, such as the letters, numbers, shapes, and colors found in logos and signs for products and stores

**Concepts about Print.** The knowledge of print conventions and concepts

**Alphabet Knowledge.** Knowing the names and sounds associated with printed letters

**Grapheme Knowledge :** A letter of the alphabet, a mark of punctuation, or any other individual symbol in a writing system. Adjective: graphemic. The grapheme has been described as the "smallest contrastive linguistic unit which may bring about a change of meaning"

**Print Knowledge.** A skill reflecting a combination of elements of alphabet knowledge, concepts about print, and early decoding.

**Visual Processing.** The ability to match or discriminate visually presented symbols.

**Pseudowords.** A pseudoword is a unit of speech or text that appears to be an actual word in a certain language (at least superficially), while in fact it has no meaning in the lexicon. It is a kind of non-lexical vocable.

**Phoneme.** The smallest unit of sound that changes the meanings of spoken words. In particular :

**Phonological Awareness.** The ability to detect, manipulate, or analyze the auditory aspects of spoken language (including the ability to distinguish or segment words, syllables, or phonemes) independent of meaning.

**Phonological Memory.** The ability to remember spoken information for a short period of time.

**Decoding** The ability to apply knowledge of letter-sound relationships, including knowledge of letter patterns, to correctly pronounce written words.

**Oral Comprehension.** The ability to understand and gain meaning from text.

**Writing Skills:** Children's knowledge of the functions and conventions of print (referred to in the literature as print concepts, print awareness, or print knowledge) appears to be related to the development of both emergent and conventional literacy skills, including spelling.



**TABLE 6: MODEL FOR LEARNING TO READ AND WRITE IN ITALIAN LANGUAGE** (variables that influence the analysis of the prerequisites of the learning skills of reading and writing)

### **3.2 Result : Identification variables for learning to reading and writing in Italian language**

## *Result*

The statistical packages we use are: SPSS 20 and Mplus 6.1. The first set of analyses focused on change over the Time 1 and Time 2 (T1 and T2) in test whether the children showed differences with respect to the dimensions assessed on both time-point. A multivariate analysis of variance (MANOVA) with repeated measures (T1 and T2) was conducted for the following all reading and writing measures shown in the model (**TABLE 6**).

Results showed a significant F(Wilks' criterion) (16, 14) = 155.69,  $p < .001$ , for the time effect within- Subjects between time 1 and time 2.

In particular, Pseudoword, Environmental print, Concept about print, Phonological awareness, Phonological\_memory, Writing\_skills in the children demonstrated progress between Time 1 and Time 2 on the reading-measure.

A follow-up univariate analyses of variance (ANOVA) revealed that the differences between Time 1 and Time 2 on the in measures of reading and writing significant differences in: Pseudoword,  $F(7, 14) = 310.60$ ,  $p < .001$ , Environmental print  $F(7, 14) = 376.1$ ,  $p < .001$ , Concept about print  $F(7, 14) = 62.54$ ,  $p < .001$ , Phonological awareness  $F(7, 14) = 44.07$ ,  $p < .01$ . Phonological\_memory  $F(7, 14) = 12.02$ ,  $p < .01$ , Writing\_skills  $F(7, 14) = 20.5$ ,  $p < .01$ . Pseudoword and Environmental print demonstrated progress between time 1 and time 2 on the reading and writing measure.

Subsequently, the analysis of the groups, or cluster analysis, allows us to reduce the number of data, combining the six variables in a group (cluster) according to a certain "similarity" or "closeness". I used to form factors the Principal Axis Factoring. We have verified that two factor are enough, because explained 64.23% of variance and have better eigenvalues equal to 1. We use

Extraction Method : Principal Axis Factoring because When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

<b>Table 7: Pattern Matrix<sup>a</sup></b>		
	<b>Factor</b>	
	<b>1</b>	<b>2</b>
Environmental_Print	<b>.881</b>	.138
Concepts about_Print	<b>.744</b>	.197
Writing_skills	<b>.733</b>	-.227
<b>Pseudoword</b>	<b>.102</b>	<b>.185</b>
Phonological_Memory	.140	<b>.455</b>
Phonological_Awareness	-.172	<b>.890</b>

Pseudoword not saturated in the the two factors then we take into consideration separately, while Environmental Print, Concepts about Print, Writing skills are part of the First Factor 1, while Phonological Memory, Phonological Awareness are part of the Second.

We have identified the number of clusters and trajectories for each of the three factors (1 and 2) and pseudowords (3 factor).

In the factor 1 and 2 (**Figure 8 and 9**) there are important changes over time. In the pseudoword there are changes which affect a few people, for this reason we can't accept it as a good factor. The clusters that we accept are related to factor 1 and 2. These data show that for the 1 and 2 factor changes over time are relevant show that the time is relevant both in the one factor that factor of two. It is important that the changes of the first factor are not correlated with

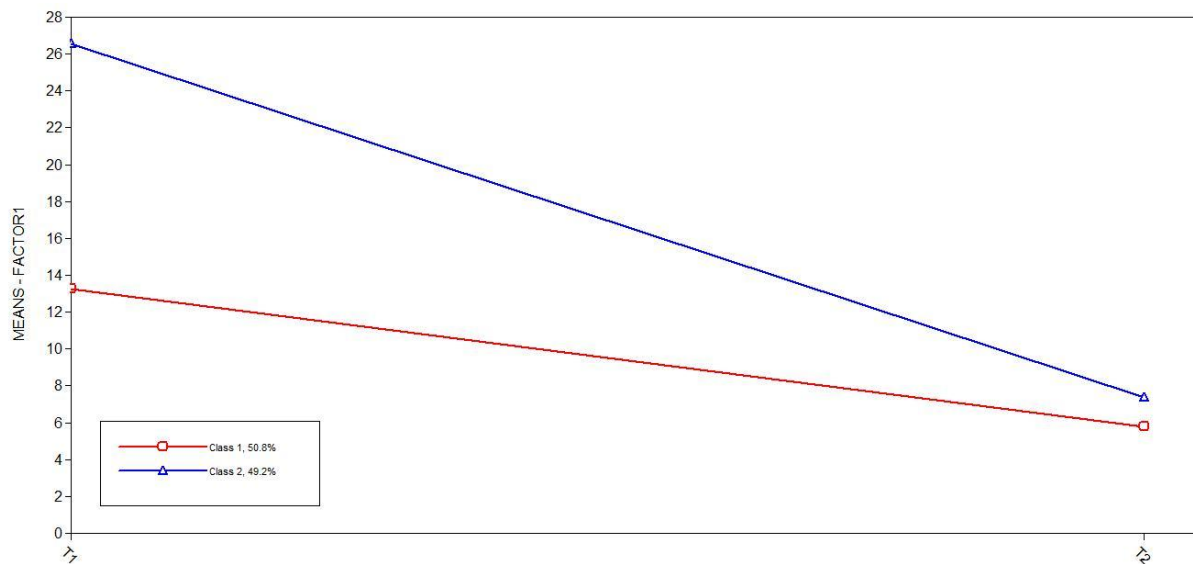


the second, while the changes of the first factor with the changes of the third factor (Pseudoword) are very highly correlated with the first factor.

**Factor 1 = Environmental Print, Concepts about Print, Writing skills**

**Change over time of the first factor (1)**

N° CLUSTERS	BIC	LRT
2	939.659	< .05
3	942.535	> .05



**Figure: 8**

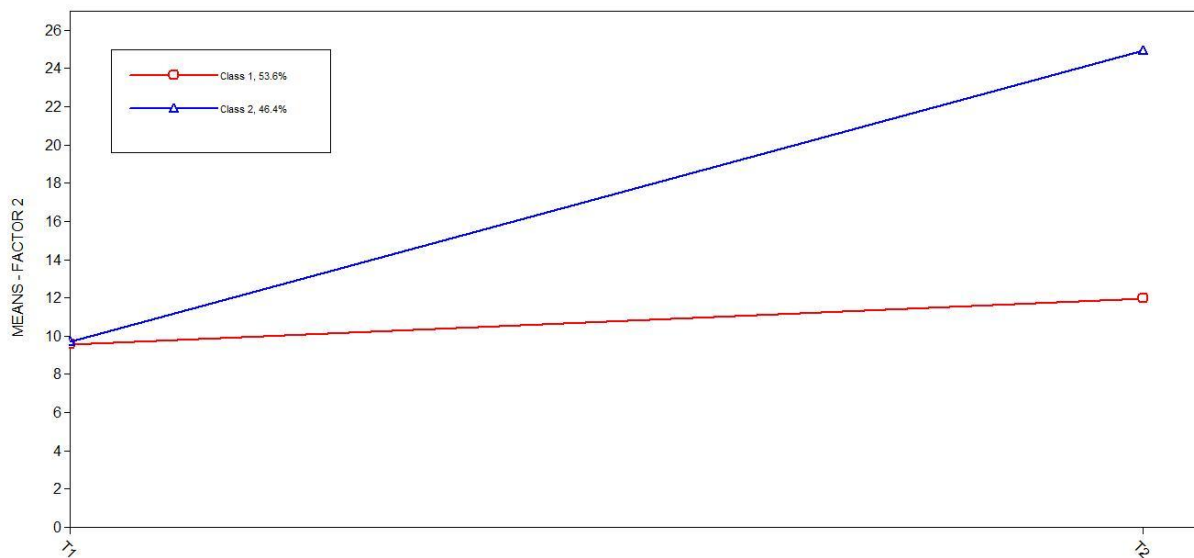
The group blue decreases very over time, while the red group decreases little

**Factor 2 = Phonological Memory, Phonological Awareness**

**Change over time of the second factor**

N° CLUSTERS	BIC	LRT
2	897.239	< .05
3*	895.358	< .05

\* one of the cluster was composed of just one child



**Figure : 9**

**The group grows very blue, the red group grows poorly**

### Factor 3: Pseudowords

#### Change over time of the Pseudoword

N° CLUSTERS	BIC	LRT
2	842.331	< .05
3*	816.665	< .05

\* one of the cluster was composed of just two children

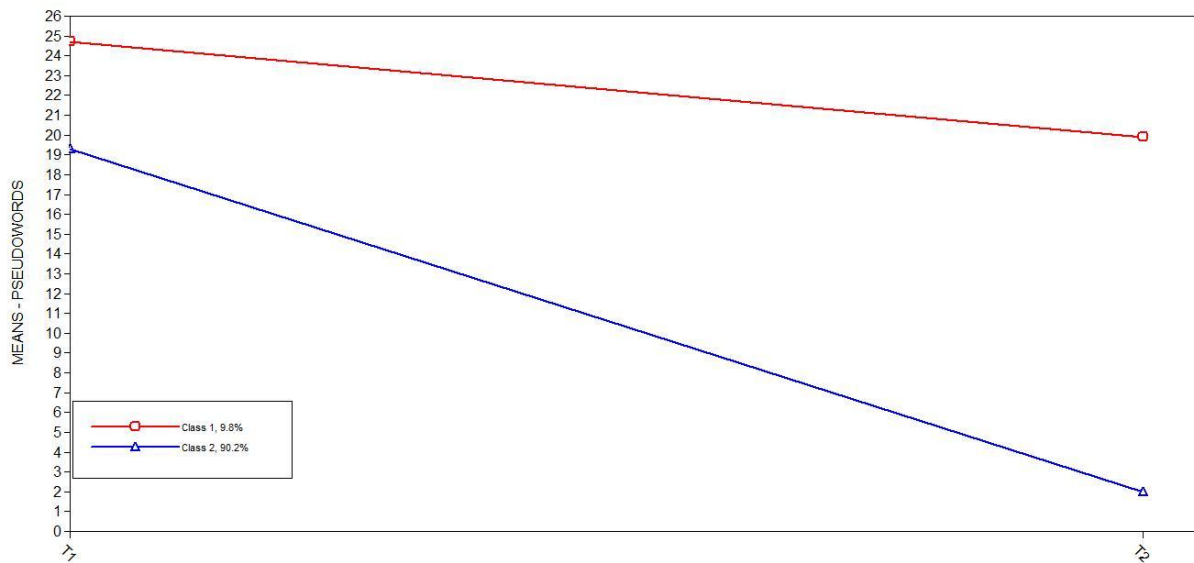


Figure : 10

The blue group greatly decreases while the little red group

		C1		C2		C3	
		I1	S1	I2	S2	I3	S3
	I1	1.00					
C1	S1	-0.80***	1.00				
	I2	0.10 <sup>NS</sup>	-0.19**	1.00			
C2	S2	-0.08 <sup>NS</sup>	0.17 <sup>NS</sup>	-0.70***	1		
	I3	0.39**	-0.32***	0.41**	-0.22 <sup>NS</sup>	1	
C3	S3	-0.23 <sup>NS</sup>	0.19*	-0.34***	0.17 <sup>NS</sup>	-0.79***	1

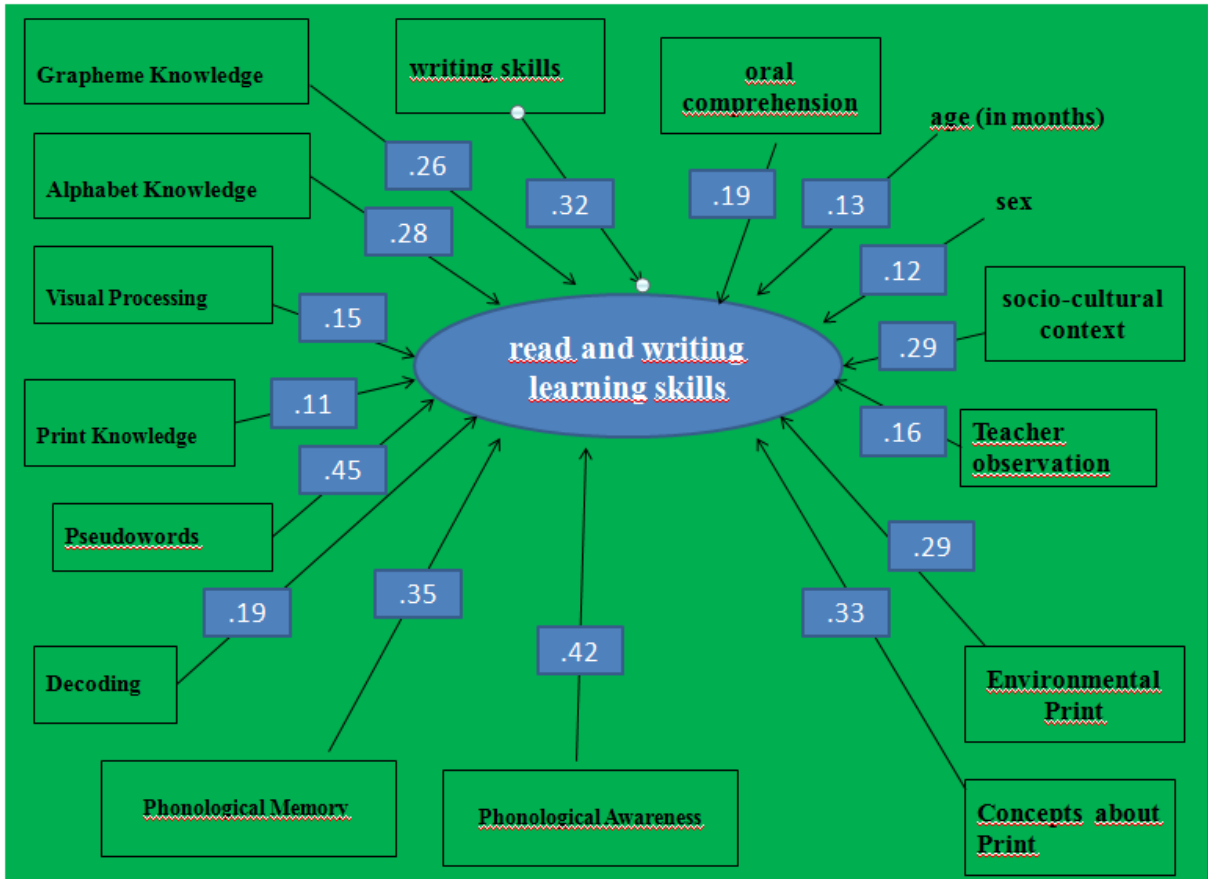
\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

C1 = Cluster Factor 1
C2 = Cluster Factor 2
C3 = Cluster Factor 3
I1, I2, I3 = intercepts (Time 0)
SLOPES: S1, S2, S3 trajectories of change over the time

**Figure 11**

Then we draw and test a model to test with the Structural Equation Model (SEM), in order to identify the predictors risk in reading and writing. Specifically, to identify the predictors risk in reading and writing at T1 and T2 will be included to then the variables at time to might be tested as longitudinal predictors (**Figure 12**). All variables underlying the learning of reading and writing that we have included in the SEM measured by specific tests. Continue analyzing the data about the role of the teachers and in particular, we analyze the correlations with other variable at T1 and T2, like sex, age and socio-cultural context. This a good solution may be to include them into the SEM previously described. Confirmatory factor analyses revealed that all included indicators were reliable and valid measures of their respective latent variable, as suggested by their significant moderate to high factor loadings ( $b = .46-.83, p < .001$ ). The basic model depicts the direct relationship between learning of reading and writing measures and functional socio cultural context, age and sex . This path was statistically significant (standardized coefficient  $b = .38, P < .01$ ). Learning of reading and writing measures accounted for 14% of the variance in functional outcome. The basic model provided a very good fit for the observed data indicated  $\text{Chi}^2(40) = 39.891, p = .022; \text{RMSEA} = .048; \text{CFI} = 0.974; \text{TLI} = 0.964$ . These results satisfy Baron and Kenny's69 first step of testing mediation. The model confirms that the most significant variables are: Pseudowords ( $\beta = 0.45, P < 0.01$ ) , Phonological Awareness ( $\beta = 0.42, P < 0.01$ ), Phonological Memory ( $\beta = 0.35, P < 0.01$ ). They are also relevant variables Environmental Print ( $\beta = 0.29, P < 0.01$ ) and Concepts about Print ( $\beta = 0.33, P < 0.01$ ). Sex, age and socio-cultural context does not have a weight in this model is essential for learning to read and write as shown by the data. This is because from the point of view methodologist and analysis of data, the multivariate models as this that we are analyzing for the study of learning to read and write, the two phases (Time 1 and Time 2) are not enough to have a good overview of the

trend variables over time. With regard to the sex, we think that it is a variable to be observed better in change over time. The variable socio - cultural is significant but it will become increasingly important during the growth of the child, as amply demonstrated in the literature.



**Figure 12.** Structural model of the relationship for learning skill to read and writing  
 $\chi^2(40) = 39.891, p = .022; RMSEA = .048; CFI = 0.974; TLI = 0.964$



### *Defining At-Risk Status*

Furthermore, in order to identify the trajectory of the learning disabilities' trend over the time, We performed a GMM Growth Mixture Model. The internal reliability estimates for the full number sense battery as well as the subtests, by time point. Internal consistency for the full battery is sufficiently high across all two time points (at least  $\geq .8$ ). Reliabilities for individual subtests were somewhat lower, and thus the data should be viewed in a cautionary light. Alpha coefficients for counting and number recognition at Time 1 and Time were particularly low and internal reliability for oral comprehension was low across the two time points. In order to have certain data are needed at least four different times. This procedure will allow to identify the clusters of children that show similar changes over time with respect to predictors risk in reading and writing. The identified clusters' difference respect to other factors (e.g., parents' education and work) will be tested through the Multivariate Analysis of Variance (MANOVA). In order to validate our clusters, the same pattern of performance across clusters would need to be demonstrated for additional measures of reading, writing such as those available for our assessment for level to reading and writing at the of the two phase. Thus, we compared the reading test and writing test in a multivariate (MANOVA) with the measures of reading and writing, entered as multivariate's. All effects were significant,  $F(2, 4) > 78.5, p < .001, \eta^2, p > 0.155$  for the reading level and  $F(2, 4) > 75.5, p < .001, \eta^2, p > 0.155$  for the writing level. Descriptive statistics and results of pair wise comparisons with Bonferroni correction.

The results show that the children that are outside the cluster that we have identified is the poor performance evaluation tests of the level of reading and writing are a "risk status".

### **3.3 Second study:**

#### **Training and not – training: analysis of the effectiveness of a protocol of two short cycle times of intervention**

Some children (84) who have been assessed as "at risk" in learning of reading and writing during the screening of the first phase of the research (Time 1) were included in a specific training. Appropriate tools have been used for an assessment of all the skills involved in learning to read and write, according to the suggestions provided by The National Early Literacy Panel (NELP; see Lonigan, Schatschneider, & Westberg, 2008a). In particular, for this research, we have carried forward a Training and not – training: analysis of the effectiveness of a protocol of two short cycle times of intervention. This training has the aim to improving the learning skills to reading and writing in children.

#### **Method**

##### *Participant*

The 84 children (42 male and 42 female; M age = 65,22 months; SD = 0,86; age range = 59 – 79 months) included in the training were from primary schools of four Sicilian provinces: Western Sicily (Palermo 20 children, 20 children of Trapani), and two of Eastern Sicily (20 children of Ragusa and Siracusa 20).

The participants were equally distributed in two different socio - cultural contexts (medium and high).

### *Procedure*

This research shows an analysis of a protocol of prevention and treatment aimed at children 84. The children included in this training were treated before taking part in the second phase of the research (Time 2). This is to evaluate the difference and / or the improvement between the first (Time1) and the second phase (Time 2) of the research.

The training was organized in two distinct cycles, approximately 30 “training sessions” for each child.

Between one cycle and the other there are two months interruption. Exactly, for each child fifteen hours of for the first cycle, fifteen hours for the second cycle.

The fifteen hours of “training sessions” for each child for both of the two cycles, will be divided to three hours a week in five weeks.

The children were subjected to sessions to improve the skills underlying the learning of reading and writing. The exercises were aimed at enhancing the variables in this research are considered essential for learning to read and write in Italian language.

In particular, Environmental Print, Concepts about Print, Alphabet Knowledge, Grapheme Knowledge, Print Knowledge, Visual Processing, Pseudowords, Phonological Awareness, Phonological Memory, Decoding, Oral Comprehension. The ability to understand and gain meaning from text.

### *Material*

For the training has been used *Progetto MT* (La Prevenzione e il Trattamento delle difficoltà di lettura e scrittura, Cornoldi, 2010)

### **3.4 Result : early identification a “risk status”**

Lastly, a repeated measure ANOVA will be used to test the changes over time (Time 1 and Time 2) in the children who attended to the intervention (training).

We analyzed the data with an analysis of variance (ANOVA) for repeated measures. The repeated measures (within-group factor) were the pretreatment and post treatment Impact of training for each group. The between-group factor evaluated the differences between group 1 and group 2. Gender and socio-cultural context were covariates.

The within-group treatment effect was highly significant ( $F=21.13$ ,  $df=1, 40$ ,  $p<0.001$ ), whereas the between- group difference (time 1 and time 2) was not significant ( $F=2.62$ ,  $df=1, 40$ ,  $p>0.11$ ). The socio-cultural context did not significantly affect the outcome of treatment ( $t=1.01$ ,  $df=41$ ,  $p=0.32$ ), nor did

and sex have a significant treatment effect ( $t=0.22$ ,  $df=41$ ,  $p=0.83$ ). There were no significant group-by-treatment interactions. We have carried forward a groups resampling . Furthermore, since they are just a very small sub-sample of the entire sample (84 vs. 960) . We may conduct a comparison between these groups resampling the sample of children without the intervention. In fact, the comparison of samples of different size may be hazardous and misleading.

Our results refute the evidence indicates that combining reading activities with writing activities seems to result in the best outcomes for reading and writing - related and reading and writing skills.

It is necessary to program a training concerning the effects of phonological awareness interventions or combined phonological awareness and print interventions than there are concerning the effects of just teaching children about print. Studies of combined phonological awareness and print activities demonstrate that children's print knowledge increases because of the interventions. The few available studies of teaching children about letters alone also indicate that children acquire more print knowledge than do children who do not receive such instruction (Lonigan, 2004), and these studies seem to support an advantage of instructional activities that include teaching about both letter names and letter sounds (Piasta, Purpura, & Wagner, 2010). Hence, examining individual cases is an important complementary approach to group level analyses, because even though the fit of a multiple predictor model to the

population variance in reading may be high, such a result does not necessarily tell us about what is happening at the level of individual with learning disabilities. Clinicians need to know whether the overall fit of a multiple predictor model is good because nearly every individual fits the same multiple predictor model or because subsets of individuals fit different sub-models, all of which are encompassed in the larger multiple predictor model. For example, it could be the case that some individuals' reading skill may be adequately explained by a specific single predictor, while other individuals' reading skill is explained by a different single predictor. There may also be additional individuals that require multiple predictors to explain their reading performance. As long as all the relevant predictors are incorporated into the structural equation model, the overall group level fit to the data will be maximized. However, in this example, the group level results would be misleading, since it would mask the presence of subgroups of individuals, some of whom do not require a multiple deficit model to explain their particular level of reading skill. These different patterns of model fit across individuals, which can only be gleaned when examining individual cases, could potentially define valid subtypes of a disorder or difficulty (or not). In addition, there may be individuals who are not explained by the structural equation model. These individuals, as mentioned previously, can provide an acid test for a theoretical model of

learning disabilities, since the latter is assumed to explain virtually all cases, not just a majority (Lonigan, 2012).

Children arrive in preschool with varying levels of early literacy skills. Depending on where they start, their experiences in the home, and the curriculum being used in their classroom, many children will leave preschool with early literacy skills that put them on a trajectory to transition successfully to learning to read. For some children, however, the support provided by typical classroom practices will not be sufficient for them to acquire these well developed early literacy skills. Although there are effective instructional practices that can support this development, it is unlikely that early childhood educators in most preschool classrooms have sufficient time to provide this level of instruction for all children in their classrooms. Moreover, depending on the population of children served, a majority of children do not need this extra level of instructional support. Consequently, a means of identifying those children who are either starting from a low level of skill, are not making sufficient gains in these skills to catch up, or both is needed. This identification process is where the assessment of children's early literacy skills fits into an integrated system of identification and intervention.

### **3.5 Conclusion**

Knowledge about the causes, correlates, and predictors of children's reading success and reading failure in the early elementary grades has expanded greatly in the past several decades (e.g., National Reading Panel, 2000; Snow, Burns, & Griffin, 1998). This knowledge has been incorporated into methods of identifying, monitoring, and helping struggling readers in the elementary school grades. More recently, research has highlighted the significance of the preschool period for the development of skills that contribute to children's acquisition of reading skills (Whitehurst & Lonigan, 1998).

The results indicated that children's skills related to print knowledge (e.g., alphabet knowledge, print concepts), phonological processing skills (i.e., phonological awareness, phonological access to lexical store, phonological memory), and aspects of oral language (e.g., vocabulary, syntax/grammar, word knowledge) were substantive and independent predictors of children's later reading outcomes.

Similar to results with older children, data from longitudinal studies reveal a high degree of continuity between the levels of reading-related skills displayed by preschool children and the levels of reading-related and reading skills displayed by these children when they are in elementary school (e.g., Lonigan, Burgess, & Anthony, 2000; Storch & Whitehurst, 2002), indicating that the developmental antecedents that underlie the acquisition of reading are found early and prior to the onset of formal schooling. Many children enter kindergarten with well-developed print knowledge, phonological processing skills, and oral language skills, and these children are poised to "crack" the alphabetic code and become skilled readers when provided with effective reading instruction; however, a significant number of children arrive at kindergarten with low levels of these early skills, making it less likely that



they will become skilled readers with the typical instruction provided in the early elementary grades.

It is important to carry out the adaptation of a screening tool to identify possible future reading difficulties in Italian Language.

A growing body of research highlights the importance of the preschool period for becoming a skilled reader. Children's development in the areas of oral language, phonological awareness, and print knowledge is predictive of how well they will learn to read once they are exposed to formal reading instruction in elementary school. Even by the start of preschool, children vary considerably in their level of skill development in these three areas, and in the absence of strong instructional support, there is significant continuity between these early skills and reading outcomes. Children who enter preschool with low levels of early literacy skills are likely to be the children who will have difficulty learning to read when they are in kindergarten and 1st grade. At present, there are a number of instructional activities that have strong evidence for their positive impacts on children's early literacy and reading skills; however, the effects of these interventions are specific to the domains they are intended to address.

Adaptation of the battery of Lonigan (2007) Get Ready to Read (GRTR). The literature review carried out has not detected for the Italian language a battery of screening specific for the identification of children at risk of dyslexia / dysorthography.

Although some screening instruments used to investigate the Italian language skills: phonological, meta-phonological and visual-perceptual and are not appropriate instruments such as those already validated in the English Language.

### **3.6 Future implications: assessment of the prerequisites for learning to read and write**

The current research shows that an achievement gap in emergent literacy exists and can be measured at least as early as the beginning of the prekindergarten year. More importantly, our research indicates that this gap can be reduced substantially for many children who receive differentiated and more intensive Instruction.

Although not as well researched as interventions for older children, there is a growing body of research supporting the use of instructional practices and activities to promote preschool children's early literacy skills (see Lonigan, Shanahan, & Cunningham, 2008; Lonigan, Schatschneider, & Westberg, 2008b; These research reviews identify instructional practices that are supported by causally interpretable evidence (i.e., research studies that rule out alternative explanations for observed gains in children's skills). The types of instructional practices related to reading outcomes that are supported by research can be grouped into two categories--those that promote the skills primarily associated with decoding print (i.e., coderelated skills) and those that promote the skills primarily associated with comprehending what is read (i.e., meaning-related skills).

The use of assessments that provide information on children's developmental achievements in key areas of early literacy can provide teachers with the information they need to provide optimal learning experiences for children. Of course, assessment is not an end in and of itself. It is one part of an identification, intervention, and evaluation sequence. Whereas accurate assessment can be a powerful tool for acquiring information, its value can only be realized in the context of a well-developed intervention program that translates the information obtained from assessments into curriculum modifications and specific instructional tactics and goals that are matched to the

individual needs of a child. These assessments can more clearly focus educational activities on building key early literacy skills, enabling the targeting of skill areas in which a child needs the most help, and providing a means for determining whether instructional goals have been achieved.

The instructional utility of an assessment needs to be demonstrated by evidence that using screening or progress-monitoring assessments improves children's educational outcomes, either by use of the measure alone or by use of the measure in conjunction with an intervention. Currently, there is no strong evidence from preschool or elementary school that just the use of screening or progress-monitoring assessments leads to improved educational outcomes for children. There is a limited amount of evidence from elementary school studies that the use of screening or progress-monitoring assessments in conjunction with teacher-guided intervention efforts does result in improved educational outcomes.

The current research shows that an achievement gap in emergent literacy exists and can be measured at least as early as the beginning of the prekindergarten year. More importantly, our research indicates that this gap can be reduced substantially for many children who receive differentiated and more intensive instruction (Bailet et al., 2011).

It could be universal screening. Essential Characteristics of Universal Screening  
Two essential characteristics of universal screening are efficiency and validity. To assess all children, a screening battery must be quick and easy to administer (i.e., efficiency). Given that instructional time is a precious commodity, screening batteries must minimize the amount of time for children's screening as opposed to instruction. It also must measure the critical variables and have high classification accuracy (i.e., validity). High classification accuracy results when the screen identifies most of the children who would ultimately experience a reading problem (true positive cases). Over identification (false positive cases)

and under identification (false negative cases) are classification errors that work against accuracy. The implications of both types of errors need consideration. False positive errors result in providing additional services to children who ultimately will not experience problems, whereas false negative errors result in not providing services to children who will experience reading difficulties.

## **Addendum**

### **Parametric and non-parametric statistics in psychological research: comparison of methods for the evaluation of the training**

In this addendum, we examined the data from the research to 84 children involving in the training at Time 1 and Time 2. We in previous research, we applied for the analysis of repeated measure ANOVA data, assuming that the population is normally distributed. We examined selected effects of the proper use of nonparametric inferential statistical methods for analysis of non-normally distributed data, as exemplified by a great scientific literature (Vickers, 2005; Qualls et al., 2010; Winterset al., 2010). The hypothesis was that parametric methods have been used inappropriately for evaluation of social sciences. To illustrate why such a methodological flaw should be avoided, a demonstration, using data from the non – parametric. The demonstration shows how inappropriate analysis increases the probability of type II errors. Applying parametric statistical tests to such non normally distributed data reduces power and increases the probability of a type II error, which is the failure to find true associations. Appropriate use of nonparametric statistics should be a core component of statistical literacy because such use increases the validity of research and quality improvement projects.

It has generally been argued that parametric statistics should not be applied to data with non-normal distributions.

Empirical research has demonstrated that Friedman Test generally has greater power than the repeated measure ANOVA unless data are sampled from the normal. In the case of randomized trials, we are typically in how an endpoint, such as changes following treatment/training.

We analyzed the result to training using Friedman Test, rather than repeated measure ANOVA. The objectives of this study were:

- a) to compare the relative power of repeated measure ANOVA and Friedman Test;
- b) to determine whether repeated measure ANOVA provides an unbiased estimate for the difference between groups;
- c) to investigate the distribution of change scores between repeat assessments of a non normally distributed variable.

It has generally been argued that parametric statistics should not be applied to data with non-normal distributions. Empirical research has demonstrated that Friedman Test generally has greater power than the repeated measure ANOVA unless data are sampled from the normal. In the case of randomized trials, we are typically interested in how an endpoint, such as blood pressure or pain, changes following treatment.

Simulation studies compared the power of Friedman Test and repeated measure ANOVA for analyzing each distribution, varying sample size, correlation and type of treatment effect . We have examined the results of training with Friedman Test and repeated measure ANOVA.

Change between skewed baseline and post-training data tended towards a not normal distribution. Friedman Test was generally superior to repeated measure ANOVA in most situations, especially where log-transformed data were entered into the model. The estimate of the treatment effect from repeated measure ANOVA was not importantly biased.

In conclusion, Friedman test is the preferred method of analyzing randomized trials with baseline and post-treatment measures. In certain extreme cases, Friedman test is less powerful than repeated measure ANOVA. Notably, in these cases, the estimate of training effect provided by repeated measure ANOVA is of questionable interpretability.

In this addendum we have not examined lumpy or multimodal distributions. Yet given that the relative power of parametric methods seems primarily affected by asymmetry – compare the normal and uniform with the skewed distributions the results cited here should apply to such distributions.

The effects of the training were comparable in between two test. In this case the Freedman test confirms the results to the repeated measure ANOVA. The result to the Training and not – training: analysis of the effectiveness of a protocol of two short cycle times of intervention is not significant. The values of the Freedman test for the children belonging medium socio cultural is not significant ( $\chi = 2.250$ ;  $P= NS$ ) and for the children belonging medium socio cultural is not significant ( $\chi = 6.360$ ;  $P=NS$ ). This result confirms the result repeated measure ANOVA and invites us to think and formulate training programs / intervention more effective and efficient. These results are confirmed the power by the nonparametric Freedman test.

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