Early Childhood Research Quarterly 28 (2013) 123–133

Contents lists available at SciVerse ScienceDirect

Early Childhood Research Quarterly

Preschool teacher attachment, school readiness and risk of learning difficulties

Elena Commodari*

Department of Educational Processes, Faculty of Education, University of Catania, Via Ofelia, Catania 95100, Italy

ARTICLE INFO

Article history:
Received 25 August 2010
Received in revised form 8 March 2012
Accepted 13 March 2012

Keywords:
Attachment to preschool teacher
School readiness
Learning difficulties

ABSTRACT

Attachment is the emotional bond between children and their caregivers (parents or otherwise). Infants and young children usually have more than one selective attachment, and all of these attachment relationships, including those between children and teachers, have important effects on cognitive and social development. Secure attachment to a preschool teacher may help children to improve their preschool experience. Recent studies suggest that the adverse effect of inadequate preschool experiences can lead to skill deficiencies that mimic the effects of basic cognitive deficits. This study evaluates the relationships among attachment to preschool teachers, school readiness, and the risk for developing learning difficulties in preschoolers using three measures: the School Readiness 4-5 battery, the Precocious Identification of Learning Difficulties, and the Attachment Q Set. This study examined 152 preschoolers. The results showed that attachment to preschool teachers is related to linguistic development level, the psychomotor skills involved in school readiness, and learning difficulty risk.

1. Introduction

Attachment is the emotional bond between children and their caregivers (parents or otherwise). Caregiver attachment formation is a normative event. All children form attachments to their caregivers, even those who do not receive adequate care; thus, attachments vary in quality (Ainsworth, Blehar, Waters, & Wall, 1978). Bowlby (1958, 1969, 1973, 1980, 1988) and Ainsworth (1982, 1989) pioneered attachment theory, which describes the dynamics of the interpersonal relationships' that contribute to continuities in adaptation throughout the lifespan. Furthermore, this theory proposes that child attachment relationships fundamentally influence development. Children use attachment figures as a secure base from which to explore the environment, and different attachment patterns have been identified (Ainsworth & Bell, 1970; Main & Solomon, 1990).

Psychologists have created several measures to assess attachment patterns since the Strange Situation Procedure (SSP; Ainsworth & Wittig, 1969). In this paradigm, child attachment behavior toward their parent is observed in a laboratory playroom in which they encounter a stranger and are briefly separated from their attachment figure twice. One of the best-known modern measures of attachment is the Attachment Q Set (AQS, Waters, 1995; Waters & Deane, 1985), which was developed for use in naturalistic observations at home or in other settings. The AQS assesses overlapping but different dimensions of the attachment construct with respect to the SSP (van Ijzendoorn, Vereijken, Bakermans-Kranenburg, & Riksen-Walraven, 2004), emphasizes the interplay between the attachment and exploratory systems in a natural setting, and addresses the child's expectations of parental guidance under normal circumstances.

1.1. Attachment and child development

Several studies have investigated how infant attachment security might be related to various aspects of cognitive and socio-emotional development (Cassidy, 1988; Marvin & Britner, 1999; Vandell, Belsky, Burchinal, Steinberg, & Vandergrift, 2010). As early as the 1970s, Matas, Arend, and Sroufe (1978) found that 2-year-olds with secure attachments show greater persistence and efficacy on cognitive tasks. Other studies reported security-related differences in the areas of object/person permanence, language acquisition and symbolic play. Jacobsen, Edelstein, and Hofmann (1994) showed that children with secure attachment representations have more successful cognitive performance in childhood. Conversely, children with insecure-disorganized attachment representations perform poorly on deductive reasoning tasks and were likely to be strongly inhibited from engaging in cognitive transactions with their environment (Liberman & Pawl, 1990).

In addition, researchers have discovered that secure child attachments promote positive outcomes including prosocial beliefs (Catalano, Kosterman, Hawkins, Newcomb, & Abbott, 1996), self-esteem, and life satisfaction in adolescence (Greenberg, Siegel, & Leitch, 1983), and higher levels of social competence (Rice, Cunningham, & Young, 1997), psychological well-being as well as social and emotional adjustment in early adulthood (Al-Yagon &

* Tel.: +39 3386754459.
E-mail address: e.commodari@unict.it

0885-2006/$ – see front matter © 2012 Elsevier Inc. All rights reserved.
doi:10.1016/j.ecresq.2012.03.004

Mikulincer, 2004; Lyons-Ruth, Alpern, & Repacholi, 1993; Moss, Parent, Gosselin, Rousseau, & St-Laurent, 1996; Speltz, Greenberg, & Deklyen, 1990). Likewise, Al-Yagon (2003) found that secure attachments are a protective factor in maintaining emotional adjustments among at-risk preschoolers with mild developmental delays.

The link between parental attachment security and school success has also been investigated. Secure preschoolers tend to have higher attention skills and develop better reading/pre-reading skills and attitudes toward reading compared with insecurely attached preschoolers (Bergin & Bergin, 2009; Bus, Belsky, van Ijzendoorn, & Crnic, 1997; Bus & van Ijzendoorn, 1988; Frankel & Bates, 1990; Main, 1983; Moss & St-Laurent, 2001). After they enter school, insecure children show lower verbal and math abilities, reading comprehension, and overall academic achievement than securely attached children (Granot & Mayseless, 2001; Jacobsen & Hofmann, 1997; Pianta & Harbers, 1996).

Based on these findings, numerous researchers have recently investigated relationships between attachment and learning disabilities. Al-Yagon and Mikulincer (2004) examined patterns of close relationships among school-age children with learning disabilities as manifested in their attachment style, self-perceived loneliness, and sense of coherence, as well as teacher ratings of their academic performance. Their findings identified the value of attachment patterns for understanding social and emotional adjustment among school-age children with learning disorders. Furthermore, they found that school-age children with learning disorders appraised their close relationships as less secure than their peers without learning difficulties. Moreover, children with learning disabilities reported higher levels of avoidance and anxiety in their close relationships compared with children with typical development.

Other studies (Al-Yagon, 2007, 2010) have examined the potentially meaningful role of mothers' affection and attachment in aiding child adjustment. In particular, Al-Yagon (2010) investigated cumulative vulnerability/protection models of individual-level factors (i.e., child attachment relationships and the sense of coherence) and maternal emotional resources to explain the differences in socio-emotional and behavioral adjustment among typical 8–12-year-olds and those with learning disabilities. His research discovered that child attachment and the sense of coherence mediated the associations between maternal emotional resources and their functioning.

Moreover, Bauminger and Kimhi-Kind (2008) found major difficulties in social information processing, lower attachment security, and less emotion regulation in children with learning disabilities compared with typically developing children. These authors showed that attachment as well as the interaction between attachment and emotion regulation emerged as important contributors to most social information processing steps. This result suggests that children with secure attachments and effective emotion-regulation skills have better social information processing capabilities compared with a reference group.

1.2. Attachment to non-parental figures

Infants and young children usually have more than one selective attachment (Rutter & O'Connor, 1999). Most children form a network of attachment relationships with the family and other people who take care of them, and these attachment relationships (including those between children and teachers) can be reliably and validly assessed. Most of the studies on non-parental attachments have used the SSP (Ainsworth et al., 1978) or the AQS (Waters, 1995; Waters & Deane, 1985).

The research on child attachment to non-parental figures presents conflicting findings. Some of these studies have found that children are just as likely to develop secure attachments to non-parental figures as they are to their parents, and the security of these relationships is often equal to relationships with parents (Ainslie, 1990; Goossens & van Ijzendoorn, 1990). Other studies (Ahnert & Lamb, 2000; Ahnert, Lamb, & Seltenheim, 2000) have reported that secure non-parental attachments are less common than secure parental attachments. In a meta-analysis of 40 investigations from to 1977 to 2005, Ahnert, Pinquart, and Lamb (2006) found that the security of child/parent relationships (both mothers and fathers) and child/non-parental figure relationships were modestly but significantly correlated. Interestingly, secure child/caregiver attachments were less common than secure child/parent attachments when the SSP was used, and discordance between the security of child/parent and child/caregiver attachments was common. Greater concordance was found when the AQS was used. According to Ahnert et al. (2006), these results are related to differences within the two procedures. The SSP emphasizes the security-seeking and proximity-promoting behaviors that characterize child interactions with non-professional caregivers less so than they do with parents (Ahnert, Rickert, & Lamb, 2000). In contrast, the AQS captures a variety of child behaviors (e.g., seeking security, attention, support, and assistance) in the context of exploration (Booth, Kelly, Spieker, & Zuckerman, 2003).

Other studies have investigated the influence of non-parental figure attachment on child development and shown that these relationships have an important effect on cognitive and social acquisitions (DeMulder, Dehnam, Schmidt, & Mitchell, 2000; Howes, 1997; Howes & Smith, 1995; Mitchell-Copeland, Copeland, Denham & DeMulder, 1997; Rutter & O'Connor, 1999; Seibert & Kerns, 2009). Within school contexts, children use their teacher as a secure base (Goossens & van Ijzendoorn, 1990; Howes & Hamilton, 1992a,b; Howes & Ritchie, 1999; Pianta, Belsky, Vandergrift, Houts, & Morrison, 2008; Pianta, Nimetz, & Bennett 1997; Richters & Waters, 1991; Watson & Kowalski, 1999), and there is a growing body of research that supports the assumption that children who have a more secure attachment are more successful in school (Birch & Ladd, 1997; Hamre & Pianta, 2001; Peisner-Feinberg et al., 2001; Pianta, Hamre, & Sthulman, 2003; Pianta, Steinberg, & Rollins, 1995; Pianta & Stuhlman, 2004).

Howes and Ritchie (1999) described four types of attachment to teachers that parallel the typology of parent/child attachments (Bergin & Bergin, 2009): secure, avoidant, resistant, and near secure. Avoidant children are more interested in classroom materials than in the teachers or other children. When hurt or upset, they do not seek the teachers, or even move away if the teachers try to comfort them; resistant children are irritable with the teachers for no apparent reason. They are demanding and impatient with the teachers. Secure children accept comfort if hurt or upset and spontaneously hug the teachers. They readily share their activities with the teachers and ask for help if they needed it. Near-secure children display moderate avoidant and some secure behaviors. They distrusted their teachers, but conform readily to classroom procedures, such that the teachers do not perceive a problem in their relationship.

Child development research that observes child/teacher relationships has shown that early learning establishes the basis for school success. There is increasing interest in child relationships as a predictor of their educational competence (Birch & Ladd, 1997; Bowlby, 1969; Howes & Smith, 1995; Pianta, 1999). Young children who develop secure relationships with their teachers often feel more confident in a caring environment and will be more successful at learning in that environment.

In a study of 850 children who ranged in age from 10 to 70 months, Howes and Smith (1995) showed that children who had a secure attachment with their teachers were engaged in competent explorations of their environments and had enhanced cognitive

activity. Similarly, Howes, Hamilton, and Philipsen (1998) provided evidence of continuity in the relationship between child–teacher attachment and learning in a longitudinal study. They noted that children's initial experiences with their preschool teachers served to organize their school behavior and their relationships with their elementary school teachers. Another longitudinal study followed children in center-based preschools into second grade and found that the child/preschool teacher relationship predicted both the quality of the child/teacher relationship in elementary school and their academic and social success therein (Peisner-Feinberg et al., 2001). In particular, this study showed that the closeness of the teacher/child relationship was related to cognitive and social skills. Moreover, this study found that the quality of childcare environments influences child skills through the elementary school years. Similar connections between teacher relationship quality and academic success were found from kindergarten through the first grade (Pianta et al., 1995) as well as from kindergarten through the eighth grade (Hamre & Pianta, 2001).

More recently, Mashburn et al. (2008) examined the development of academic, language, and social skills among 4-year-olds in pre-kindergarten programs. They found that improved teacher/child interactions facilitate school readiness. Together, these results suggest that secure attachments to preschool teachers are an asset to children's continuing sense of security (DeMulder et al., 2000). These attachments also help to maximize children's preschool experience, giving them confidence to exploit the social and curricular resources available in preschool and increase their compliance to the teacher's socialization practices.

1.3. School readiness and learning difficulties

School readiness is the set of cognitive, social, and behavioral skills involved in school learning. According to High and the Committee on Early Childhood, Adoption, and the Dependent Care and Council on School Health (2008), school readiness comprises physical well-being, motor development, social, emotional and language development, approaches to learning, and general knowledge and cognition. In particular, school readiness involves the prerequisites of reading, writing, and arithmetic skills, the ability to manage emotions and handle stress without a breakdown, and the ability to cooperate with others. School readiness depends not only on academic skills, such as vocabulary size and spoken language complexity, but also on social and emotional skills, such as the ability to follow directions, work in a group, engage in classroom tasks, and control impulses (Rouse, Brooks-Gunn, & McLanahan 2005; Gillan, 1997).

A well-balanced acquisition of the different skills involved in school readiness plays a critical role in children's subsequent academic achievement because these skills provide the foundation for the development of complex cognitive abilities and positive classroom adaptation (Cunha, Heckman, Lochner, & Masterov, 2006). Children who enter primary school with effective social skills, physical well-being, age-appropriate motor skills, a solid base of language and cognitive skills, and the ability to handle frustration and stress are the most likely to be able to take full advantage of the learning opportunities offered by their school.

Scholastic achievement is a cumulative process that involves mastering new skills and improving those that already exist. Two meta-analyses have emphasized the relationship between cognitive skills and social skills in the school success of preschoolers and kindergarteners (Duncan et al., 2007; La Paro & Pianta, 2000). La Paro and Pianta (2000) found middle-range correlations between the cognitive/academic skills of preschoolers and kindergarteners as well as between kindergarteners and first/second graders, whereas Duncan et al. (2007) found that early math, reading, and attention skills predicted later achievement. Other studies have suggested that the ability to control and sustain attention as well as participate in classroom activities predicts achievement test scores and grades during preschool and early elementary school (Alexander, Entwisle, & Dauber, 1994). According to the findings of these meta-analyses, many important and recent research studies explain specific learning difficulties in most children with regard to early acquired experiential and instructional deficits, rather than focusing on possible cognitive and biological deficits (Vellutino, Fletcher, Snowling, & Scanlon, 2004). Scholastic skill prerequisites appear significantly early in development; on the other hand, children may fail to learn at school for many reasons including economic disadvantage, poor language skills, emotional difficulties and inadequate academic instruction (Donovan & Cross, 2002).

Researchers have hypothesized that the adverse effects of inadequate preschool experience can lead to skill deficiencies that mimic the effects of basic cognitive deficits (Clay, 1985). This theory favors the development of a new perspective in the study and treatment of learning disabilities. In particular, the Response to Instruction Model of Learning Disabilities (Berninger & Abbott, 1994; Fuchs & Fuchs, 1998; Vellutino & Scanlon, 1987) aims at redefining learning disabilities as an inadequate response to instruction (Vaughn & Fuchs, 2003) and focuses on the early identification of learning difficulty development risk rather than on deficits. The goals of this model are to improve the academic and behavioral outcomes of all students and to provide data to identify learning disabilities. This model has greatly helped early identification and instruction.

According to the Individuals with Disabilities Education Act (IDEA; US Office of Education, 1997) specific learning disabilities are disorders involving one or more of the basic psychological processes with regard to understanding or using language (spoken or written) that manifests itself in a dysfunctional ability to listen, think, speak, read, write, spell, or calculate. Learning disorders are usually diagnosed when child achievement on individually administered standardized tests of reading, mathematics, or written expression is substantially below the child's age range and intelligence level (American Psychiatric Association, 2000). This diagnostic approach is based on the "discrepancy model" (Bateman, 1965) and centered on a severe disconnect between intellectual ability and academic achievement. Therefore, this diagnostic approach identifies learning difficulties at the end of the first years of school when a lack of skills or an inadequate pattern of mental functioning is already set (Mather & Gregg, 2006).

Due to this diagnostic delay, this learning disability approach has been recently criticized as one that does not provide early effective academic intervention (Mather & Roberts, 1994). Instead, the model's opponents argue that it waits for a child's academic performance to degrade sufficiently to qualify them for remediation service. Therefore, the need for an alternative approach to identify, prevent, and remediate learning disabilities has emerged.

The Response-to-Instruction approach includes screening all children for academic and behavioral problems, monitoring the progress of children at risk for difficulties, and applying increasingly intense interventions based on their response to progress-monitoring assessments (Vaughn & Fuchs, 2003). Children who do not adequately respond may be selected for a comprehensive evaluation to determine their eligibility for special education services. Through this comprehensive evaluation, some children will be eligible for special education and others might need alternative services because their learning difficulties are not due to a specific disorder (Fletcher & Vaughn, 2009). This model was developed on the assumption that if corrective adaptations in general education do not result in a child's growth, then they must have some intrinsic deficit preventing them from deriving benefits from the instructional environment.

This approach increases the efficacy of interventions by promoting the fundamental need for an early assessment of basic cognitive

and socio-emotional skills (i.e., those related to linguistics, logic, and mathematics as well as psychomotor, social, and behavioral abilities) before the occurrence of overt learning difficulties. Child socio-emotional well-being is critical to school success, and attachment is the foundation of socio-emotional well-being: attachment influences school success indirectly through parental attachment and directly through teacher attachment. Attachment has at least two functions pertinent to classrooms: providing feelings of security and forms the basis for socializing (Bergin & Bergin, 2009).

1.4. Research aims

The overall goal of this study was to investigate the relationships among preschool teacher attachment, school readiness, and learning-difficulty development risk. In particular, this study seeks to provide a better understanding of the role of attachment in detecting the early risk of developing learning difficulties. Specifically, this study analyzes whether child attachment security to their preschool teachers influences school readiness and the risk of developing learning difficulties. In addition, gender- and age-related differences in attachment security, school readiness and learning-difficulty development risk in preschoolers were explored.

Previous studies have highlighted the relationships between child attachment and learning difficulties, but most of these were conducted with specific cognitive tasks using school-age children who had already developed problems (e.g., Al-Yagon, 2003; Bauminger & Kimhi-Kind, 2008). Thus, this work does not provide a complete assessment of the cognitive and behavioral functions of these children. The potential clinical and educational utility of precocious assessments of school readiness and learning-difficulty risk (Vaughn & Fuchs, 2003; Vellutino et al., 2004) remains unexplored.

This research aims to overcoming some of the limitations of previous studies by using instruments with a global score of the evaluated areas (i.e., attachment to preschool teacher, learning difficulty risk, and skills involved in school readiness). Furthermore, this study tests 4–5-year-olds who have not been diagnosed with a learning difficulty. This method allows for an analysis of learning difficulty risk within normal development given the RTI framework.

2. Method

2.1. Setting and participants

Research was conducted using a sample of 152 children (81 male, 71 female) who attended three preschools in a town in Southern Italy. Unlike the USA in which kindergarten and preschool are separate (i.e., American children attend preschool from 3 to 5 years and kindergarten at 5–6 years because the latter curriculum is a part of the public school curriculum), Italian children attend the same childcare setting (called "preschool" in this study) from 3 to 5 years and begin primary school at 6 years of age. Preschool teaches children the prerequisite skills of reading and writing but not the ability to read and write.

All participants were between 4 and 5 years old, came from two-parent, intact families, and attended the preschool where the research was conducted for at least 1 year. Seventy-eight children were 4 years old, and 74 children were 5 years old (mean age = 4.49, SD = .51).

Participants spent at least 25 h per week at the preschool from Monday to Saturday. The teachers (mean age = 37.2, SD = 4.6) who cared for the children had a specific education certificate (high school certificate) and the post-certificate qualification required by Italian law. The ratio of teachers to children was 1 to 15. All of the teachers were female.

2.2. Procedures

Trained observers monitored the children for a prolonged time in their classroom. Tests were administered in a familiar, well-known setting at the preschool away from distracting noises. The trained observers were women with university degrees in "infancy education" and specific training on the observation techniques of child behavior. Moreover, these observers had previous experience with the observational measures used in this study. Before beginning data collection, observers participated in a training session to familiarize themselves with the procedures. Three observers systematically and independently observed each child. Each observer administered one of the research instruments. The sequence of observations and test administration were counterbalanced across all participants. Institutional review approval was obtained, and parental consent for each child was obtained.

2.3. Measures

This study was conducted using three standardized instruments: the AQS (Italian version, Cassibba & D'Odorico, 2000; Waters, 1987) assessed preschool teacher attachment, the School-Readiness 4-5 battery (S-R 4-5, Zanetti & Miazza, 2002) measured school readiness, and the Precocious Identification of Learning Difficulties Questionnaire (IPDA; Terreni, Tretti, Corcella, Cornoldi, & Tressoldi, 2002) measured learning difficulty development risk. The AQS analyzes attachment to the mother/professional caregiver. In this study, the Italian version of the AQS was used. The AQS items describe the secure-base behaviors of 1–5-year-olds at home or at indoor/outdoor public places. Version 3.0 of the AQS consists of 90 statements that describe a young child's behavior during caregiver interactions. Its items were designed to provide a comprehensive description of "secure-base" behavior with caregivers. Similar to other Q-sorts, the AQS is performed by sorting the 90 items into categories using a fixed distribution. An attachment security score is derived by comparing the resulting descriptions with the behavioral profile of a prototypical secure child as provided by several attachment theory experts. The AQS can be sorted by trained observers or by the attachment figure who is being assessed (e.g., the mother, father, or teacher).

Waters and Deane (1985) extensively discussed the item content and sorting procedure of the AQS and concluded that both are appropriate to measure attachment; thus, this assessment has content validity. Moreover, many studies have shown that the AQS is a valid measure of caregiver/child attachment. Both the test-retest reliability and inter-observer agreement are satisfactory (Cassibba & D'Odorico, 2000; DeMulder et al., 2000; Denham & Burton, 2003; Goossens & van Ijzendoorn, 1990; Moss, Bureau, Cyr, & Dubois-Comtois, 2006; Teti & Mc Gourty, 1996).

van Ijzendoorn et al. (2004) tested the reliability and validity of the AQS in a series of meta-analyses and found that the convergent, predictive, and discriminant validity of observers' AQSs, but not self-report AQSs, are sufficient. These authors concluded that this attachment measure belongs to the small set of gold standard infancy attachment measures. Several adjustments to the number of items and phrasing of the AQS have been developed. In their meta-analysis, Van Ijzendoorn et al. found the AQS has shown to be robust against these minor adaptations.

The current study uses the Italian form to evaluate attachment to professional caregivers (Cassibba & D'Odorico, 2000). It was derived from the Italian version of the original AQS and assesses the infant/caregiver attachment in the context of childcare centers. This version is similar to the original one but replaces the terms "mother" and "home" with "caregiver" and "childcare center", respectively. Briefly, authors conducted cultural/language translation of the original AQS form following a three-step process.

Firstly, they edited a first draft of the Italian version following the Brislin's instruction (1980). Then, this version was translated back into English by a native English translator. Finally, three translators discussed the discrepancies between the two English versions, the original and retranslated one.

With regard to the psychometric characteristics of this AQS form, the test-retest reliability and inter-observer agreement were satisfactory. In particular, Cassibba, Van Ijzendoorn, and D'Odorico (2000) tested the stability of the Q-security scores comparing two repeated-security scores derived by the same child/professional caregiver dyads using the same observer twice at an interval of 15–20 days. The correlation indicated a high degree of stability between the two assessments (Pearson $r = .83$). Inter-observer reliability was measured using the caregiver–child dyad observations of two independent observers at the same time (Pearson $r = .70$). These authors considered this level of inter-observer agreement satisfactory; it was lower but not significantly different from the one obtained for maternal attachment. With regard to the reliability and validity information of this version of the AQS within my sample, I did not collect this information because the inter-observer and test–retest reliability as well as the convergent, predictive, and discriminant validity of the AQS (when used by trained observers) have been demonstrated in many previous studies. Moreover, AQS is robust against minor adaptations (van Ijzendoorn et al., 2004).

In the present study, a trained observer, with previous experience with this AQS form, sorted the AQS. The preschools in which the data were collected presented typical structural, and organizational characteristics of public preschools in Italy. The observer visited children and their caregivers at preschool twice in 1 week. During observation periods, the teachers were encouraged to perform routine classroom activities while the observer monitored the children. A second observation was scheduled 2–3 days after the end of the first visit. The observer sorted the AQS at the conclusion of the second observation. Each visit lasted at least 3 h. A previous meta-analysis showed that AQS data that are more valid have been collected in studies with more than 3 h of observation (van Ijzendoorn et al., 2004).

Criterion sort scoring, in which experts use a q-set to define a construct and compare that description of individual participants to the q-set defined hypothetically most secure children (i.e., the criterion), was used. The similarity between this criterion sort (an array of n-item means) and the q-sort description of a particular participant (either an array of n scores from one observer or the average of several observers) is used as the participant's attachment score. This similarity is usually measured by correlating the n-item array of criterion sort scores with the n-item array of scores that describe the participant. These correlation coefficients are used as the participants' scores on the construct.

Because the AQS criterion sort scores are correlation coefficients (i.e., r scores), these scores were converted to z scores using Fisher's r to z transformation to increase their linearity. The sampling distribution of Pearson's r is not normal. Waters (1987) recommended this transformation and even suggested it for the specific AQS version used in this study (Cassibba & D'Odorico, 2000; Reynolds & Miller, 2003). The Italian version of the AQS includes a computerized scoring system.

The S-R 4-5 Battery (Zanetti & Miazza, 2002) measures school readiness in preschoolers. The tasks are different for 4- and 5-year-olds. This battery has emerged as a psychometrically reliable measure of school readiness (Cronbach's alphas = .85 and .94 for 4- and 5-year-olds, respectively). The S-R 4-5 is composed of 4 tests: "linguistic skills" (37 items), "phonological skills" (15 items), "logical-mathematic skills" (20 items), and "psychomotor development" (13 items).

The "linguistic skills" test (reliability coefficients = .74 and .79 for 4- and 5-year-olds, respectively) measures different aspects of its namesake and includes the following tasks: "object naming", "understanding of morph-syntactic structures", "production of morph-syntactic structures", "comprehension of illustrated text", and "understanding and production of stories". "Object naming" measures child lexical knowledge, and semantic skills. "Understanding of morph-syntactic structures" and "production of morph-syntactic structures" examine child understanding and production of morph-syntactic structures to evaluate their ability to use and correctly interpret propositions that present syntactic difficulties. "Comprehension of illustrated text" measures children's ability to produce a story based on visual stimuli. "Understanding and production of stories" evaluates children's capacity to produce and understand a story. The "phonological skills" test (reliability coefficients = .59 and .79 for 4- and 5-year-olds, respectively) includes the following tasks: "phonemics discrimination" and "reproduction of articulator difficulties". This test measures the recognition and discrimination of phonemes based on evidence that these abilities play an important role in learning to read. The "logical-mathematical skills" test (reliability coefficients = .67 and .81 for 4- and 5-year-olds, respectively) includes the tasks "understanding of number concept" (which analyzes quantification, classification, and seriating abilities), "count skill," and geometry." The "psychomotor development" test (reliability coefficients = .52 and .75 for 4- and 5-year-olds, respectively) measures psychomotor development using the Le Boulch (1982) classification. The S-R 4-5 was individually administered in a well-known setting at the preschool. The mean time required to administer the S-R 4-5 was 20 min.

The IPDA (Terreni et al., 2002) enables the precocious identification of children at risk for developing learning difficulties. This observational questionnaire consists of 43 items and is divided into two sections. The first section, "general skills," evaluates children's general capacity to learn and measures the following areas: "behavior," "motor skills," "linguistic understanding," "oral production," "meta-cognition" and "other cognitive abilities" (e.g., memory, orientation and so forth). "Behavior" items evaluate children's motivation to learn and their coping skills to changing situations as well as their cooperation, autonomy, and concentration skills. "Motor skills" items analyze coordination and well as fine and gross motility. "Linguistic understanding" items evaluate listening and conversational skills as well as word and instruction understanding. "Oral production" items evaluate clarity of expression, the ability to tell a story, morph-syntactic phrase level, and lexical richness. "Meta-cognition" items explore the ability to consciously use a learning strategy, control cognitive processes, and be aware of not understanding some things. Lastly, "specific abilities" items evaluate memory, visual motor coordination and spatial orientation. The second section of the IPDA, "specific abilities", measures "prerequisites for alphabetization" (e.g., phonological abilities, phonemic and grapheme discrimination, the ability to sequentially reproduce phonemes, and the relationships between written and oral language) and "prerequisites for math learning" (e.g., symbol-number associations and large/small number associations).

For each item of the different areas, several scenarios are presented to aid the observer with child assessment (e.g., General Ability Section, "Behavior" area, Item 1: "The child is capable of engaging in a task while resisting interfering stimuli."). Illustrative situations include "When the child is playing with Play-Doh, he or she is easily distracted by environmental noises or by other children's voices" and "The child is capable of listening to a story told by the teachers even if the other children are playing or are engaged in other activities".

The IPDA requires a prolonged surveillance of the child by trained observers and provides a global score of learning disability development risk. Although this instrument identifies children with this risk, through the conversion of a global score into a

percentile score, it also allows researchers to calculate a partial score for each area by evaluating single performances. Children who obtain a global score less than 103 are at risk of developing a learning difficulty.

The inter-observer ($r = .71, p < .01$) and test-retest reliability after 30 days ($r = .76$, $p < .01$) as well as the predictive and concurrent validity of the IPDA are satisfactory. Predictive validity was evaluated by reassessing the standardization sample at the end of the first year of primary school, which was obtained using a standardized scholastic achievement battery. The concurrent validity was evaluated by comparing a group of children with low IPDA global scores with a control group of children with higher IPDA scores.

In this study, the IPDA was collected after a week of observation, as Terreni et al. (2002) indicated. Children were observed for 2 h at each visit. These visits occurred in the morning during different preschool activities.

3. Results

First, descriptive analyses and *t*-tests examined differences in the means with respect to gender and age; second, *t*-tests using the AQS security scores as an independent variable and either the S-R or IPDA scores as dependent variables were also performed. Correlation and regression analyses examined the relationships among the major variables.

3.1. Descriptive analyses

Table 1 shows the descriptive analyses of the S-R, IPDA, and AQS scores including the means and standard deviations of all measures by gender and age. Girls outperformed boys on the S-R 4-5 scales "phonological skills", "logical-mathematical skills", and "psycho-motor skills" as well as the IPDA scales "behavior", "pre-alphabetization", and "total". Although the IPDA total scores were significantly different between genders, percentiles of the total score are a better measure of learning difficult development risk according to its authors (Terreni et al., 2002); nevertheless, there were still no differences between males and females. There were no significant gender differences with regard to the AQS scores. Significant differences related to age were observed for most of the scores. These findings were expected, considering the developmental characteristics of school learning abilities. There were no significant differences in the AQS criterion sort scores related to age.

3.2. Mean comparisons with AQS security as an independent variable and either the S-R or IPDA scores as the dependent variables

The sample was divided into two groups based the AQS criterion sort scores. Following Howes, Rodning, Galluzzo, and Myers (1990) and Ahnert et al. (2006), the continuous AQS measures were converted into categories. Children with AQS values < 33 were deemed as securely attached; those with AQS values > .33 were deemed as insecurely attached. Among all participants, 60 children were classified as having secure attachments, and 92 children were classified as having insecure attachments. The large number of children categorized as insecure children was not surprising. This result was similar to that obtained by Ahnert et al. (2006) in their meta-analysis.

Children who were considered securely attached showed better performance on many of the skills involved in school readiness. Furthermore, these children presented lower risk of developing learning difficulties (see Table 2). In particular, significant differences between the secure and insecure children were observed on the S-R "linguistic skills", "phonologic skills", and "psychomotor skills" scores, as well as on all IPDA scores, in which secure children obtained better scores.

3.3. Correlation analyses

A correlation matrix was performed. Table 3 shows the Pearson-Correlation Coefficients, corrected for multiple comparisons. The Pearson Correlation matrix showed that "AQS criterion sort" scores were correlated with S-R battery and IPDA questionnaire scores, with the exception of "S-R logical-mathematical" scores. This finding suggests a relationship between attachment security and the development of skills involved in school learning.

As expected, significant correlations were found between S-R battery and IPDA scores: these measures assess cognitive and behavioral domains that are strongly related to each other. Linguistic, phonological, logical/mathematical, and psycho-motor skills, as evaluated by the S-R battery, were related to general behavioral and cognitive abilities, as well as several specific abilities, such as those

Table 1
Descriptive analyses of the measures including the means and SD by gender and age.

Measures	All Sample		Male		Female		*t*	Aged 4		Aged 5		*t*
	M	*SD*	*M*	*SD*	*M*	*SD*		*M*	*SD*	*M*	*SD*	
AQS scores	.42	1.60	.29	.16	.33	.187	.78	.30	.14	.55	.2.2	.98
S-R scores												
Linguistic	32.38	10.10	31.81	9.62	33.03	10.66	−.73	24.88	6.77	40.28	6.29	−14.49**
Phonological	15.12	3.45	14.52	3.30	15.80	3.51	−2.3*	12.46	2.34	17.92	1.83	−15.92**
Logical-mathematical	16.25	3.98	15.62	3.94	16.97	3.92	−2.11*	13.85	2.99	18.78	3.26	−9.72*
Psycho-motor	12.09	4.25	11.28	4.54	13.00	3.71	−2.52**	10.24	3.76	14.03	3.86	−6.11
IPDA scores												
Behavior	25.93	5.46	24.68	5.13	27.37	5.50	−.311*	24.40	4.68	27.55	5.77	−3.70**
Motor skills	6.42	1.33	6.30	1.36	6.56	1.28	−1.23	6.33	1.24	6.51	1.41	−.83**
Linguistic comprehension	9.45	2.14	9.33	2.20	9.59	2.06	−.74	9.54	1.92	9.36	2.35	.49
Oral production	13.86	4.54	13.57	4.69	14.18	4.37	−.83	13.33	4.26	14.41	4.75	−1.46
Meta-cognition	10.61	3.39	10.21	3.47	11.06	3.26	−1.54	9.81	3.25	11.45	3.35	−3.05*
Other cognitive abilities	31.51	6.38	30.59	6.58	32.55	6.02	−1.90	29.53	6.72	33.59	5.29	−4.13
Pre-alphabetization	19.86	5.09	18.99	5.19	20.85	4.82	−2.27*	17.63	4.92	22.20	4.14	−6.17**
Premathematic	9.27	2.28	9.04	2.47	9.54	2.02	−1.3	8.82	2.34	9.74	2.13	−2.53**
Total	126.90	26.80	122.70	26.98	131.69	25.95	−2.08*	119.38	25.02	134.82	26.48	−3.69**
Total percentiles	36.92	35.09	33.72	34.89	40.63	35.21	−1.2	29.96	31.55	44.36	37.32	−2.56*

* $p < .05$.
** $p < .001$.

Table 2
Mean comparisons with AQS security as an independent variable and either the S-R or IPDA scores as the dependent variables.

Measures	Secure children		Insecure children		*t*	*95% CI*	
	M	*SD*	*M*	*SD*		*LL*	*UL*
S-R battery scores							
Linguistic	34.53	9.82	30.98	10.09	2.14*	.27	6.83
Phonological	15.09	3.10	14.58	3.57	2.43*	.26	2.48
Logical-mathematical	17.02	4.18	15.75	3.78	1.93	.02	2.56
Psycho-motor	14.45	2.60	10.54	4.41	6.18**	2.65	5.15
IPDA scores							
Behavior	28.79	5.51	24.17	4.63	5.54**	2.72	6.02
Motor skills	7.19	1.13	5.95	1.22	6.26**	.87	1.64
Linguistic comprehension	10.48	1.68	8.82	2.15	5.01**	1.05	2.34
Oral production	16.83	3.54	12.02	4.10	7.37**	3.56	6.11
Meta-cognition	12.60	3.20	9.37	2.88	6.42**	2.19	4.17
Other cognitive abilities	35.29	5.34	29.17	5.84	6.47**	4.24	7.95
Pre-alphabetization	21.88	4.94	18.61	4.80	4.03**	1.67	4.85
Pre-mathematic	10.78	1.70	8.34	2.09	7.44**	1.77	3.06
Total	143.84	22.99	116.45	23.51	7.03**	19.49	34.81
Total percentiles	59.60	34.63	23.17	27.54	7.13**	26.49	46.48

Note: *CI*, confidence interval of the difference; *LL*, lower limit; *UL*, upper limit.
* $p < .05$.
** $p < .001$.

involved in reading, writing, and math learning, as measured by the IPDA.

3.4. Regression analyses

Multiple regression analysis using "AQS criterion sort" scores, "gender", and "age" as independent variables and IPDA "total" scores as dependent variable showed that attachment security predicted the risk of developing learning difficulties. "AQS criterion sort" scores explained much of the variation in the dependent variable (see Table 4).

Multiple regression analyses using "AQS criterion sort" scores, "gender", and "age" as independent variables and "S-R linguistic skills" scores, "S-R phonological skills" scores, "S-R mathematical skills" scores, and "S-R psychomotor skills" scores as dependent variables were also conducted. Results showed the significant contribution to the model of the variables "AQS criterion sort" scores and "age." Considering the developmental characteristics of skills measured by the S-R battery, a greater contribution of variable "age," respect to the variable "AQS criterion sort" scores, is expected. However, the variable "AQS criterion sort" scores was a useful predictor for all the S-R battery scores (see Table 4).

4. Discussion

The present study highlights several interesting points concerning the relationships that occur among attachment to preschool teachers, school readiness, and learning difficulty development risk. Preliminary gender and age difference analyses showed that males and females differ with regard to several skills involved in school learning such as phonological skills (in which girls outperformed boys). These data are consistent with the scientific literature that finds that males and females perform differently in many cognitive domains (Burman, Bitan, & Booth, 2008; Calvin, Fernandes, Smith, Visscher, & Deary, 2010). Researchers have demonstrated that language performance is generally better in females than males, even in children as young as 2–3 years (Bornstein, Haynes, Painter, & Genevro, 2000; Dionne, Dale, Boivin, & Plomin, 2003). Girls begin talking earlier (Murray, Johnson, & Peters, 1990), acquire vocabulary faster (Roulstone, Loader, & Northstone, 2002), and show more spontaneous language (Bauer, Goldfield, & Reznick, 2002; Lutchmaya, Baron-Cohen, & Raggatt, 2002). Although small, these female advantages in verbal and written language persist through the school years (Lynn, 1992; Mann, Sasanuma, Sakuma, & Masaki, 1990; Martin & Hoover, 1987). Moreover, males have a higher risk of developing language impairments and learning disabilities such as dyslexia (Lambe, 1999). As expected, significant age-related differences were also observed in

Table 3
Pearson Correlation Matrix of All Measures.

Measures	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. AQS														
2. SR ling. Skills	.18*													
3. SR phon. Skills	.22**	.80**												
4. SR logical math. skills	.14	.59**	.68**											
5. SR psycho-motor skills	.43**	.46**	.54**	.43**										
6. IPDA behavior	.46**	.56**	.53**	.43**	.39**									
7. IPDA motor skills	.49**	.34**	.33**	.23**	.57**	.60**								
8. I PDA ling. comprehen.	.38**	.38**	.24**	.18*	.30**	.71**	.58**							
9. IPDA oral production	.52**	.51**	.43**	.19*	.52**	.67**	.65**	.75**						
10. IPDA meta-cogn.	.50**	.62**	.49**	.29**	.46**	.77**	.64**	.69**	.80**					
11. IPDA other cogn.	.49**	.60**	.53**	.34**	.61**	.66**	.72**	.60**	.79**	.29**				
12. IPDA Pre-alphabet.	.33**	.72**	.62**	.43**	.54**	.68**	.61**	.61**	.71**	.83**	.20*			
13. IPDA Pre-mathematic	.52**	.51**	.44**	.27**	.56**	.58**	.65**	.58**	.77**	.83**	.72**	23**		
14. IPDA total	.52**	.65**	.56**	.37**	.57**	.84**	.75**	.78**	.89**	.92**	.89**	.84**	.21**	

* $p < .05$.
** $p < .001$.

Table 4
Multiple regressions analyses using "AQS Criterion Sort" scores, "gender" and "age" as the independent variables and S-R 4-5 battery and IPDA "total" scores as the dependent variables (n for each regression = 152).

Independent variables	Dependent variables									
	SR linguistic		SR phonological		SR logical mathematic		SR psychomotor		IPDA total	
	Multiple R: .70 F = 47.38**		Multiple R: .75 F = 65.08		Multiple R: .66 F = 38.47		Multiple R: .59 F = 27.06		Multiple R: .57 F = 24.34	
	Std coefficient	t	Std coefficient	t	Std coefficient	t	Std coefficient	t	Std coefficient	t
AQS	.26	4.43**	.28	5.19**	.19	3.11*	.46	6.91**	.54	7.90**
Gender	−.052	−.87	.06	1.2	.07	1.10	.09	1.46**	.075	1.09
Age	.68	11.46**	.71	13.02**	.63	10.20**	.38	5.67**	.204	2.98**

* $p < .05$.
** $p < .001$.

the current study. Indeed, school learning abilities tend to increase rapidly as preschoolers age.

With regard to the principal aim of this research, the findings showed that child/preschool teacher attachment is related to acquiring the basic skills involved in school learning, which confirms the hypothesis that socio-emotional development could significantly contribute to enhance linguistic and cognitive competence (Shonkoff & Phillips, 2000). Children who are securely attached to their professional caregivers and obtain an AQS criterion sort score that indicates they are well-adjusted to preschool had better performance on most of the S-R 4-5 battery tasks that measure school readiness. Moreover, these children were less likely to develop learning difficulties.

In particular, children with secure attachments presented higher levels of language and psychomotor ability as well as general (e.g., attention and meta-cognition skills) and specific cognitive abilities (e.g., those involved in the prerequisites of reading, writing, and mathematics) compared with children with insecure attachments. Likewise, previous studies have shown that the quality of emotional interactions and the amount of exposure to specific activities may predict achievement trajectories (Pianta et al., 2008), and increasing teacher–child interactions may facilitate school readiness in such a way that favors the development of language and social skills (Mashburn et al., 2008). A positive bond between children and their teachers probably encourages linguistic communication, promotes richer conversations, and helps children acquire linguistic abilities. It is important to consider that the relationship between attachment and cognitive/social abilities is bidirectional. Language and social skills support child relationship with adult and peers, and encourage his social-emotional adjustment. Moreover, language and social abilities ameliorate child's ability to understand and copy the behavioral demands of the school. More competent children may be able to present their needs in a clearer fashion, this facilitating relationships with their teachers. Thus, teachers find it easier to respond, react sensitively and create secure relationships with these children. For this reason, attachment has at least two functions pertinent to classrooms: providing feelings of security and socializing children (Bergin & Bergin, 2009). Although all children seek to feel secure, attachment helps them balance this need with their innate motivation to explore their environment. Moreover, as children and adults come together and interact, the former more easily adopt the latters' behaviors and values. A positive teacher–student relationship provides the support, encouragement, and guidance necessary for children to thrive in the classroom.

The correlation analyses support these considerations. Specifically, correlations analysis showed that the "AQS criterion sort" scores were correlated with all of the skills evaluated using the S-R 4-5 battery and IPDA questionnaire, with the exception of S-R logical-mathematical scores. The relationship between attachment and skills involved in school learning confirms the numerous observations that positive child–teacher relationships could increase school adjustment and success (Hamre & Pianta, 2001; Mashburn et al., 2008; Pianta et al., 1995). Particularly, the relationship between "AQS criterion sort" scores and "phonological skills" scores as measured by the S-R battery (among the numerous skills that comprise school readiness) is worthy of attention. The significant correlation between attachment scores and phonological skills scores opens an interesting discussion about the role that phonological skills play in the development of learning disabilities, such as dyslexia. As Vellutino et al. (2004) have suggested, the phonological skills deficiencies associated with general phonological coding deficits might cause reading disorders. Such deficits might explain the differences on measures of phonologically based skills such as phonological awareness, alphabetic mapping, phonological decoding, verbal memory, and name encoding and retrieval between

poor and normal readers. Moreover, the significant correlations between quality of attachment, skills involved in school learning and risk of developing learning, highlighted the "power" of a positive child/teacher relationship into achievement improvement. The relationship between attachment and development of scholastic skills is bidirectional. Secure attachment influences development of skills involved in school learning, and, on the other hand, high levels of skill involved in school readiness favor a child's positive relationship with teachers.

Finally, multiple regression analyses showed that attachment to professional caregivers was significantly related to learning difficulty development risk, as well as to the skills involved in school readiness. Particularly, results showed that "AQS criterion sort" scores and "age" were significant predictors both of the learning difficulty risk and the level of development of the skills involved in school learning. Interestingly, "AQS criterion sort" score showed to be the better predictor for the learning difficulty risk. As expected, "age" was the better predictor for all the skills involved in school readiness. It is predictable that children of different age presented a different development of the skills involved in school learning, considering that linguistic, phonological, logical mathematical and psychomotor skills evolve rapidly in childhood. However, even if age is a well-known variable in determining cognitive and social development, the quality of attachment can significantly influence achievement and school adjustment. Interestingly, quality of attachment is related to the level of development of linguistic and phonological skills that play a pivotal role in reading and writing acquisition. Although the nature of our data does not allow us to formulate a directional hypothesis, this last issue is of great interest because current theories emphasize the role that linguistic processes play in learning difficulties and the importance of psycho-motor levels in developing the perceptual and motor skills involved in reading decoding, written text production, and basic mathematical abilities (Mather & Wendling, 2005; Vellutino et al., 2004).

Children who are securely attached to their preschool teacher might demonstrate explorative behavior and active environmental experimentation, both of which are critical for adequate acquisition of all the communicative skills, in which linguistic processes play a central role, and a normal cognitive developmental trend based on sensory-motor processes. These data are in accordance with the evidence showing that children diagnosed with learning disabilities have weaker attachment securities (Al-Yagon, 2003; Bauminger & Kimhi-Kind, 2008) than those without learning disabilities.

However, emphasizing that children with learning difficulties are not simply those who are not "ready" for school is important. Not all children with learning difficulties can be categorized as having a learning disability. There are many cognitive, social, emotional, and educational reasons as to why children do not learn at school. The most recent approaches to managing learning difficulties emphasize the need to distinguish between children who are eligible for special education and those whose difficulties are related to other variables. Consequently, these latter children need different types of intervention (Vellutino et al., 2004). An early assessment of the quality of the relationship between children their preschool teachers might assist in identifying children who are not well-adapted to preschool and improve the quality of their socio-emotional adjustment.

5. Conclusion

The results of the present study revealed that children's secure-base behavior in relationship to their preschool teachers is related to social competence and most of the cognitive and behavioral skills involved in school readiness. Not acquiring these skills might cause learning difficulties when these children begin primary school. Inadequate interpersonal skills and a non-secure child–teacher bond might reduce children's participation in collaborative learning activities and adversely influence achievement (Sthulman & Pianta, 2004). Compared with their securely attached peers, children with insecure attachments to their teachers might be less able to spontaneously exploit the learning occasions offered to them in the social and physical environments of preschool. This hypothesis agrees with Clegg and Lansdall-Wellfare's (1995) affirmation in which attachment theory explains two of the phenomena observed in people with learning disabilities: limited exploration of the world and discontinuities in behaviors.

The findings of this study might also have clinical relevance. Attachment to a teacher can be easily assessed in preschool, and its measurement might allow us to identify children who are able to benefit from the social and cognitive stimuli that increase their explorative behavior, emotional regulation, and environmental adaptability. Indeed, all of these aspects are connected, directly and indirectly, to the development of basic and complex cognitive and behavioral skills.

In conclusion, the precocious assessment of children's social skills, including those involved in child–preschool teacher relationships, might reveal a relationship pattern that hinders the optimization of their learning occasions. Social skills and the bond between a child and teacher encourage the child's participation in collaborative learning activities and stimulate achievement (Sthulman & Pianta, 2004).

5.1. Study limitations and future directions

This study has several limitations. First, caution needs to be taken when interpreting my findings. Indeed, several variables contribute to child learning, and the relationships between attachment and learning difficulties are complex and difficult to examine. In addition, many observational instruments that do not supply longitudinal data characterized this study. The use of observational instruments has some well known limitations, and observer effects may occur. However, the age of participants, and the characteristics of the preschool setting, make these measures appropriate for this study.

Despite these limitations, the present study suggests interesting applications. Traditional interventions rely on waiting for students to encounter learning difficulties. This approach, often referred as the "wait to fail" model, has a built-in disadvantage: the relatively late identification of students with special needs. As a consequence, this model has been criticized because it does not provide early identification and increases the difficulty of early intervention by waiting for a child's academic performance to sufficiently worsen to qualify for remediation service. Moreover, researchers have demonstrated that learning difficulties are often related to ineffective general education environments (Vaughn & Fuchs, 2003). In the light of these considerations, my findings show a relationship between the quality of the child–preschool teacher attachment and level of skill development related to school readiness. These findings emphasize the potential usefulness of screening all preschoolers and kindergarteners for potential behavioral and emotional problems. The early identification of insecurely attached children and the adoption of subsequent, prompt, and effective measures to increase their school adjustment might be critical to prevent learning difficulties. Intensive prevention trials centered on social and emotional skills are needed. These measures are relatively inexpensive and could easily be realized in school and managed by teachers, and they might be effective for all children considering that the teacher–student relationship contributes to a child's future academic achievement.

References

Ahnert, L., & Lamb, M. E. (2000). Child-care provider attachments in contrasting German child care settings II: Individual-oriented care after German reunification. *Infant Behavior and Development*, *23*, 211–222.

Ahnert, L., Lamb, M. E., & Seltenheim, K. (2000). Infant-care provider attachments in contrasting German child care settings I: Group-oriented care before German reunification. *Infant Behavior and Development*, *23*, 197–209.

Ahnert, L., Pinquart, M., & Lamb, M. (2006). Security of children's relationships with non-parental care providers: A meta-analysis. *Child Development*, *3*, 664–679.

Ahnert, L., Rickert, H., & Lamb, M. E. (2000). Shared caregiving: Comparisons between home and child-care settings. *Developmental Psychology*, *36*, 339–351.

Ainslie, R. C. (1990). Family and center contributions to the adjustment of infants in full-time day care. *New Directions for Child Development*, *49*, 39–52.

Ainsworth, M. D. S. (1982). Attachment: Retrospect and prospect. In C. M. Parkes, & J. Stevenson-Hinde (Eds.), *The place of attachment in human behavior* (pp. 3–30). New York, NY: Basic Book.

Ainsworth, M. D. S. (1989). Attachments beyond infancy. *American Psychologist*, *44*, 709–716.

Ainsworth, M. D. S., & Bell, S. M. (1970). Attachment, exploration, and separation: Illustrated by the behavior of one-year-olds in a strange situation. *Child Development*, *41*, 49–67.

Ainsworth, M. D. S., Blehar, M. C., Waters, E., & Wall, S. (1978). *Patterns of attachment: A psychological study of the strange situation*. Hillsdale, NJ: Erlbaum.

Ainsworth, M. D. S., & Wittig, B. A. (1969). Attachment and exploratory behavior of one year-olds in a strange situation. In B. M. Foss (Ed.), *Determinants of infant behaviour* (pp. 129–173). London, UK: Methuen.

Alexander, K. L., Entwisle, D. R., & Dauber, S. L. (1994). *On the success of failure. A reassessment of the effects of retention in the primary grades*. Cambridge, M A: Cambridge University Press.

Al-Yagon, M. (2003). Children at risk for learning disorders: Multiple perspectives. *Journal of Learning Disabilities*, *36*(4), 318–335.

Al-Yagon, M. (2007). Socio-emotional and behavioral adjustment among school-age children with learning disabilities: The moderating role of maternal personal resources. *The Journal of Special Education*, *40*, 205–217.

Al-Yagon, M. (2010). Maternal emotional resources and socio-emotional well-being of children with and without learning disabilities. *Family Relations*, *59*, 152–169.

Al-Yagon, M., & Mikulincer, M. (2004). Patterns of close relationships and socioemotional and academic adjustment among school-age children with learning disabilities. *Learning Disabilities Research and Practice*, *19*(1), 12–19.

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.

Bateman, B. (1965). Learning disabilities: An overview. *Journal of School Psychology*, *3*(3), 1–12.

Bauer, D. J., Goldfield, B. A., & Reznick, J. S. (2002). Alternative approaches to analyzing individual differences in the rate of early vocabulary development. *Applied Psycholinguistics*, *23*, 313–335.

Bauminger, N., & Kimhi-Kind, I. (2008). Social information processing, security of attachment, and emotion regulation in children with learning disabilities. *Journal of Learning Disabilities*, *36*(4), 318–335.

Bergin, C., & Bergin, D. (2009). Attachment in the classroom. *Education Psychological Review*, *21*, 141–170.

Berninger, V. W., & Abbott, R. D. (1994). Redefining learning disabilities: Moving beyond aptitude-achievement discrepancies to failure to respond to validated treatment protocol. In G. R. Lyon (Ed.), *Frames of reference for the assessment of learning disabilities: New views on measurement* (pp. 163–183). Baltimore, MD: Brookes.

Birch, S. H., & Ladd, G. W. (1997). The teacher–child relationship and children early school adjustment. *Journal of School Psychology*, *35*, 61–79.

Booth, C. L., Kelly, J. F., Spieker, S. J., & Zuckerman, T. G. (2003). Toddler's attachment security to child-care providers: The safe and secure scale. *Early Education and Development*, *14*, 83–100.

Bornstein, M. H., Haynes, O. M., Painter, K. M., & Genevro, J. L. (2000). Child language with mother and with stranger at home and in the laboratory: A methodological study. *Journal of Child Language*, *27*, 407–420.

Bowlby, J. (1958). The nature of child's tie to his mother. *International Journal of Psycho-Analysis*, *39*, 350–373.

Bowlby, J. (1969). *Attachment and loss, vol. 1: Attachment*. New York, NY: Basic Books.

Bowlby, J. (1973). *Attachment and loss, vol. 2: Separation, anxiety and anger*. New York, NY: Basic Books.

Bowlby, J. (1980). *Attachment and loss, vol. 3: Loss, sadness and depression*. New York, NY: Basic Books.

Bowlby, J. (1988). *A secure base: Parent–child attachment and healthy human development*. New York, NY: Basic Books.

Brislin, R. W. (1980). Translation and content analysis of oral and written material. In H. C. Triandis, & J. W. Berry (Eds.), *Handbook of cross-cultural psychology* (pp. 389–444). Boston, MA: Allyn & Bacon.

Rouse, C., Brooks-Gunn, J., & McLanahan, S. (2005). School readiness, closing racial and ethnic gaps. Introducing the issue. *The Future of the Children*, *15*(1), 4–14.

Burman, D. B., Bitan, T., & Booth, J. R. (2008). Sex differences in neural processing of language among children. *Neuropsychologia*, *46*(5), 1349–1362.

Bus, A. G., & van IJzendoorn, M. H. (1988). Attachment and early reading: A longitudinal study. *The Journal of Genetic Psychology*, *149*(2), 199–210.

Bus, A. G., Belsky, J., van IJzendoorn, M. H., & Crnic, K. (1997). Attachment and bookreading patterns. A study of mothers, fathers, and their toddlers. *Early Childhood Research Quarterly*, *12*, 81–98.

Calvin, C. M., Fernandes, C., Smith, P., Visscher, P. M., & Deary, I. D. (2010). Sex, intelligence and educational achievement in a national cohort of over 175,000 11-year-old schoolchildren in England. *Intelligence*, *38*, 424–432.

Cassibba, R., & D'Odorico, L. (2000). *La valutazione dell'attaccamento nella prima infanzia. L'adattamento Italiano dell'Attachment Q-Sort di Everett Waters*. Milano, Italy: Franco Angeli.

Cassibba, R., van Ijzendoorn, M. H., & D'Odorico, L. (2000). Attachment and play in child centers: Reliability and validity of the attachment Q sort for mother and professional caregiver in Italy. *International Journal of Behavioural Development*, *24*(2), 241–255.

Cassidy, J. (1988). Child–mother attachment and self in six years old. *Child Development*, *59*, 121–134.

Catalano, R. F., Kosterman, R., Hawkins, J. D., Newcomb, M. D., & Abbott, R. D. (1996). Modeling the aetiology of adolescent substance use: A test of the social development model. *Journal of Drug Issues: Empirical Validity of Theories of Drug Abuse*, *26*(2), 429–455.

Clay, M. (1985). *The early detection of learning difficulties*. Portsmouth. NH: Heinemann Educational Books.

Clegg, J. A., & Lansdall- Wellfare, R. (1995). Attachment and learning disability: A theoretical review informing three clinical interventions. *Journal of Intellectual Disability Research*, *39*(4), 295–305.

Cunha, F., Heckman, J., Lochner, L., & Masterov, D. (2006). Interpreting the evidence on life cycle skill formation. In E. Hanushek, & F. Welch (Eds.), *Handbook of the economics of education* (pp. 307–451). Amsterdam, North Holland: Elsevier.

DeMulder, E. K., Denham, S., Schmidt, M., & Mitchell, J. (2000). Q-Sort assessment of attachment security during the preschool years. *Developmental Psychology*, *36*(2), 274–282.

Denham, S., & Burton, R. (2003). *Social and emotional prevention and intervention programming for preschoolers*. New York, NY: Kluwer-Plenum.

Dionne, G., Dale, P. S., Boivin, M., & Plomin, R. (2003). Genetic evidence for bidirectional effects of early lexical and grammatical development. *Child Development*, *74*, 394–412.

Donovan, M. S., & Cross, C. T. (2002). *Minority students in special and gifted education*. Washington. DC: National Academy Press.

Duncan, G. J., Dowsett, C. J., Claessens, A., Magnuson, K., Huston, A. C., Klebanov, P., et al. (2007). School readiness and later achievement. *Developmental Psychology*, *43*(6), 1428–1446.

Fletcher, J. M., & Vaughn, S. (2009). Response to intervention: Preventing and remediating academic difficulties. *Child Development Perspectives*, *3*(1), 30–37.

Frankel, D., & Bates, J. (1990). Mother–toddler problem solving: Antecedents in attachment, home behavior, and temperament. *Child Development*, *61*, 810–819.

Fuchs, L. S., & Fuchs, D. (1998). Treatment validity: A unifying concept for reconceptualizing the identification of learning disabilities. *Learning Disabilities Research and Practice*, *13*, 204–219.

Gillan, D. (1997). *From zero to six: The base for school readiness*. Gatineau, Quebec, Canada: HRDC Publication Centre.

Goossens, F. A., & van Ijzendoorn, M. H. (1990). Quality of infants' attachment to professional caregivers: Relation to infant–parent attachment and day care characteristics. *Child Development*, *61*, 832–837.

Granot, D., & Mayseless, O. (2001). Attachment security and adjustment to school in middle childhood. *International Journal of Behavioral Development*, *25*(6), 530–541.

Greenberg, M. T., Siegel, J. M., & Leitch, C. J. (1983). The nature and importance of attachment relationships to parents and peers during adolescence. *Journal of Youth and Adolescence*, *12*(5), 373–386.

Hamre, B. K., & Pianta, R. C. (2001). Early teacher–child relationships and the trajectory of children's school outcomes through eighth grade. *Child Development*, *72*, 625–638.

High, P. C., Committee on Early Childhood, Adoption and Dependent Care, & Council on School Health. (2008). School readiness. *Pediatrics*, *121*(4), 1008–1015.

Howes, C. (1997). Children's experiences in center-based child care as a function of teacher background and adult:child ratio. *Merrill-Palmer Quarterly*, *43*, 404–425.

Howes, C., & Hamilton, C. E. (1992a). Children's relationships with caregivers: Mother and child care teachers. *Child Development*, *63*, 859–866.

Howes, C., & Hamilton, C. E. (1992b). Children's relationships with child care teachers stability and concordance with parental attachment. *Child Development*, *63*, 867–878.

Howes, C., Hamilton, C. E., & Philipsen, L. C. (1998). Stability and continuity of child–caregiver and child-peer relationships. *Child Development*, *69*, 418–426.

Howes, C., & Ritchie, S. (1999). Attachment organizations in children with difficult life circumstances. *Development and Psychopathology*, *11*, 251–268.

Howes, C., Rodning, C., Galluzzo, D. C., & Myers, L. (1990). Attachment and child care: Relationships with mother and caregiver. In N. Fox, & G. Fein (Eds.), *Infant day care: The current debate* (pp. 169–182). Norwood, NJ: Ablex.

Howes, C., & Smith, E. W. (1995). Children and their care caregivers: Profiles of relationships. *Social Development*, *4*, 44–61.

Jacobsen, T., Edelstein, W., & Hofmann, V. (1994). A longitudinal study of the relation between representations of attachment in childhood and cognitive functioning in childhood and adolescence. *Developmental Psychology*, *30*(1), 112–124.

Jacobsen, T., & Hofmann, V. (1997). Children's attachment representations: Longitudinal relations to school behavior and academic competency in middle childhood and adolescence. *Developmental Psychology*, *33*(4), 703–710.

Lambe, E. K. (1999). Dyslexia, gender, and brain imaging. *Neuropsychologia*, *26*, 521–536.

La Paro, K. M., & Pianta, R. C. (2000). Predicting children's competence in the early school years: A meta-analytic review. *Review of Educational Research*, *70*, 443–484.

Le Boulch, J. (1982). *Vers une science du mouvement humain*. France: ESF: Paris.

Liberman, A. F., & Pawl, J. J. (1990). Disorders of attachment and secure base behavior in the second years of life: Conceptual issues and clinical intervention. In M. T. Greenberg, D. Cicchetti, & E. M. Cummings (Eds.), *Attachment in the preschool years* (pp. 375–390). Chicago, IL: University of Chicago Press.

Lutchmaya, S., Baron-Cohen, S., & Raggatt, P. (2002). Foetal testosterone and vocabulary size in 18- to 24-month-old infants. *Infant Behavior and Development*, *24*, 418–424.

Lynn, R. (1992). Sex differences on the differential aptitude test in British and American adolescents. *Educational Psychology*, *12*, 101–106.

Lyons-Ruth, K., Alpern, L., & Repacholi, B. (1993). Disorganized infant attachment classification and maternal psychological problems as predictors of hostile-aggressive behavior in the preschool classroom. *Child Development*, *64*, 572–585.

Main, M., & Solomon, J. (1990). Procedures for identifying infants as disorganized/disoriented during the Ainsworth Strange Situation. In M. T. Greenberg, D. Cicchetti, & M. Cummings (Eds.), *Attachment in the preschool years: Theory, research, and intervention* (pp. 121–160). Chicago, IL: University of Chicago Press.

Main, M. (1983). Exploration, play, and cognitive functioning related to infant–mother attachment. *Infant Behavior and Development*, *6*, 167–174.

Mann, V. A., Sasanuma, S., Sakuma, N., & Masaki, S. (1990). Sex differences in cognitive abilities: A cross-cultural perspective. *Neuropsychologia*, *28*, 1063–1077.

Martin, D. J., & Hoover, H. D. (1987). Sex differences in educational achievement: A longitudinal study. *Journal of Early Adolescence*, *7*, 65–83.

Marvin, R. S., & Britner, P. A. (1999). Normative development: The ontogeny of attachment. In J. Cassidy, & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research and intervention*. New York, NY: Guilford Press.

Matas, L., Arend, R. A., & Sroufe, L. A. (1978). Continuity in adaptation in the second year: The relationship between quality of attachment and later competence. *Child Development*, *49*, 547–556.

Mather, N., & Gregg, N. (2006). Specific learning disabilities: Clarifying not eliminating a construct. *Professional Psychology: Research and Practice*, *37*, 99–106.

Mather, N., & Roberts, R. (1994). Learning disabilities: A field in danger of extinction? *Professional Psychology: Research and Practice*, *9*, 49–58.

Mather, N., & Wendling, B. (2005). Linking cognitive assessment results to academic interventions for students with learning disabilities. In D. P. Flanagan, & P. L. Harrison (Eds.), *Contemporary intellectual assessment: Theories, tests, and issues* (2nd ed., Vol. 1, pp. 269–294). New York, NY: Guilford Press.

Mashburn, A. J., Pianta, R. C., Hamre, B. K., Downer, J. T., Barbarin, O. A., Bryant, D., et al. (2008). Measures of classroom quality in prekindergarten and children's development of academic, language, and social skills. *Child Development*, *79*, 732–749.

Mitchell-Copeland, J., Copeland, S., Denham, S. A., & DeMulder, E. (1997). Child–teacher attachment and social competence. *Early Education and Development*, *8*, 27–39.

Moss, E., & St-Laurent, D. (2001). Attachment at school age and academic performance. *Developmental Psychology*, *37*(6), 863–874.

Moss, E., Bureau, J. F., Cyr, C., & Dubois-Comtois, K. (2006). Is the maternal Q set a valid measure of preschool child attachment behavior. *International Journal of Behavioral Development*, *30*, 488–497.

Moss, E., Parent, S., Gosselin, C., Rousseau, D., & St-Laurent, D. (1996). Attachment and teacher-reported behavior problems during the preschool and early school-age period. *Development and Psychopathology*, *8*, 511–552.

Murray, A. D., Johnson, J., & Peters, J. (1990). Fine-tuning of utterance length to preverbal infants: Effects on later language development. *Journal of Child Language*, *17*, 511–525.

Peisner-Feinberg, E. S., Burchinal, M. R., Clifford, R. M., Culkin, M. L., Howes, C., Kagan, S. L., et al. (2001). The relation of preschool child-care quality to children's cognitive and social developmental trajectories through second grade. *Child Development*, *72*, 1534–1553.

Pianta, R. C. (1999). *Enhancing relationships between children and teachers*. Washington. DC: American Psychological Association.

Pianta, R. C., Belsky, J., Vandergrift, N., Houts, R. M., & Morrison, F. J. (2008). Classroom effects on children's achievement trajectories in elementary school. *American Educational Research Journal*, *45*(2), 365–397.

Pianta, R.C., Hamre, B., & Sthulman, M. (2003). Relationships between teachers and chidren. In W. M. Reynolds & G. E. Miller (Eds.), *Handbook of psychology: Volume 7: Educational psychology*. (I. B. Weiner, Series Ed., pp. 199–234). New York, NY: John Wiley & Sons.

Pianta, R. C., & Harbers, K. (1996). Observing mother and child behavior in a problem-solving situation at school entry: Relations with academic achievement. *Journal of School Psychology*, *67*, 307–322.

Pianta, R. C., Nimetz, S. L., & Bennett, E. (1997). Mother child relationships, teacher–child relationships and adjustment in preschool and kindergarten. *Early Childhood Research Quarterly*, *12*, 263–280.

Pianta, R. C., Steinberg, M., & Rollins, K. (1995). The first two years of school: Teacher–child relationships and deflections in children's classroom adjustment. *Development and Psychopathology*, *7*, 295–312.

Pianta, R. C., & Stuhlman, M. W. (2004). Teacher–child relationships and children's success in the first years of school. *School Psychology Review*, *33*, 444–458.

Reynolds, W. M., & Miller, G. E. (Eds.) (2003). *Handbook of psychology: Volume 7: Educational psychology* (I. B. Weiner, Series Ed). New York, NY: John Wiley & Sons.

Rice, K. G., Cunningham, T. J., & Young, M. B. (1997). Attachment to parents, social competence, and emotional well being: A comparison of black and white late adolescents. *Journal of Counseling Psychology*, *44*(1), 89–101.

Richters, J., & Waters, E. (1991). Attachment and socialization: The positive side of social influence. In M. Lewis, & S. Feinman (Eds.), *Genesis of Behavior Series, Vol. 6 Social influences and socialization in infancy* (pp. 185–213). New York, NY: Plenum.

Roulstone, S., Loader, S., & Northstone, K. (2002). Descriptive data from the Avon longitudinal study of parents and children. *Early Child Development and Care*, *22*, 259–268.

Rutter, M., & O'Connor, T. G. (1999). Implication of attachment theory for child care policies. In J. Cassidy, & P. Shaver (Eds.), *Handbook of attachment theory and research* (pp. 823–844). New York, NY: Guilford.

Seibert, A. C., & Kerns, K. A. (2009). Attachment figures in middle childhood. *International Journal of Behavioral Development*, *33*(4), 347–355.

Shonkoff, J. P., & Phillips, D. A. (2000). *From neurons to neighborhoods: The sciences of early childhood development*. Washington. DC: National Academic Press.

Speltz, M. L., Greenberg, M. T., & Deklyen, M. (1990). Attachment in preschoolers with disruptive behavior: A comparison of clinic-referred and non problem children. *Development and Psychopathology*, *2*, 31–46.

Sthulman, M., & Pianta, R. (2004). Teacher child relationship and child's success in the first years of school. *School Psychology Review*, *33*(3), 444–458.

Terreni, A., Tretti, M. L., Corcella, P., Cornoldi, C., & Tressoldi, P. (2002). *IPDA, Questionario osservativo per l'identificazione precoce delle difficoltà di apprendimento*. Trento, Italy: Erickson.

Teti, D. M., & Mc Gourty, S. (1996). Using mother versus trained observers in assessing children's secure base behavior theoretical and methodological considerations. *Child Development*, *67*, 597–605.

US Office of Education. (1997). *Individual with disabilities education act—IDEA*. Washington, DC: Author.

Vandell, D. L., Belsky, J., Burchinal, M., Steinberg, L., Vandergrift, N., & NICHD ECCRN. (2010). Do effects of early child care extend to age 15 years? Results from the NICHD Study of Early Child Care and Youth Development. *Child Development*, *81*, 737–756.

van Ijzendoorn, M. H., Vereijken, M. J. L., Bakermans-Kranenburg, M. J., & Riksen-Walraven, J. M. (2004). Assessing attachment security with the Attachment Q Sort: Meta-analytic evidence for the validity of the observers AQS. *Child Development*, *75*, 1188–1213.

Vaughn, S., & Fuchs, L. (2003). Redefining learning disabilities as inadequate response to instruction: The promise and potential pitfall. *Learning Disabilities: Research and Practice.*, *18*(3), 137–148.

Vellutino, F. R., Fletcher, J. M., Snowling, M. J., & Scanlon, D. M. (2004). Specific reading disabilities (dyslexia): What have we learned in the past four decades? *Journal of Child Psychology and Psychiatry*, *45*, 2–40.

Vellutino, F. R., & Scanlon, D. M. (1987). Phonological coding, phonological awareness, and reading ability: Evidence from a longitudinal and experimental study. *Merrill-Palmer Quarterly*, *33*, 321–363.

Waters, E. (1987). *The Attachment Q Set (version 3.0) unpublished instrument*. State University of New York at Stony Brook, Department of Psychology.

Waters, E. (1995). Appendix A: The attachment Q-Set (version 3.0). In E. Waters, B. E. Vaughn, G. Posada, & K. Kondo-Ikemura (Eds.), Caregiving, cultural, and cognitive perspectives on secure-base behavior and working models. *Monographs of the Society for Research in Child Development*, 60 (2–3, Serial No. 244) (pp. 247–254).

Waters, E., & Deane, K. E. (1985). Defining and assessing individual differences in attachment relationships: Q-methodology and the organization of behavior in infancy and early childhood. In I. Bretherton, & E. Waters (Eds.), *Growing points of attachment theory and research: Monographs of the Society for Research in Child Development*, 50 (1–2, Serial No. 209) (pp. 41–65).

Watson, J., & Kowalski, H. (1999). Toddler–caregiver interaction: The effect of temperament. *Early Child Development and Care*, *159*, 53–73.

Zanetti, M. A., & Miazza, D. (2002). *SR 4-5 school readiness*. Trento, Italy: Erickson.