Volume 19 Issue 60
Originally issued as G10



Global Journal of human-social science: G
Linguistics & Education
Volume 19 Issue 10 Version 1.0 Year 2019
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-460X & Print ISSN: 0975-587X

# Ready for School? Systematic Review of School Readiness and Later Achievement

By Marília Mariano, Amilton Santos-Junior, Jacqueline L. Lima, Jacy Perisinotto, Clara Brandão, Pamela J. Surkan, Silvia S. Martins & Sheila C. Caetano

*Federal University of São Paulo*

*Abstract-* The association between specific school readiness skills and long-term school-related outcomes are still unclear and under debate. It is the first study to systematically review the literature on factors associated with school readiness evaluation about school-age achievement. This review included longitudinal studies with a minimum follow-up of five years; these studies performed the assessments during early childhood. The authors registered the study in the PROSPERO database (CRD42018089694). Five databases were searched (PubMed, Scielo, Scopus, ERIC, and Psyc Articles). Independent reviewers screened a total of 4,278 articles that were retrieved, and 13 were eligible for inclusion. Results showed that early language and math abilities at preschool age, middle to higher socioeconomic status, and socialemotional skills were the most significant variables in the promotion of positive school-age development. Preschool education and socioe motional or behavioral skills may compensate for academic difficulties in later school achievement.

*Keywords:* *child, achievement, school, readiness, systematic review.*

*GJHSS-G Classification:* *FOR Code: 139999*



*Strictly as per the compliance and regulations of:*



© 2019. Marília Mariano, Amilton Santos-Junior, Jacqueline L. Lima, Jacy Perisinotto, Clara Brandão, Pamela J. Surkan, Silvia S. Martins & Sheila C. Caetano. This is a research/review paper, distributed under the terms of the Creative Commons Attribution-Noncommercial 3.0 Unported License http://creativecommons.org/licenses/by-nc/3.0/), permitting all non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

# Ready for School? Systematic Review of School Readiness and Later Achievement

Marília Mariano [α], Amilton Santos-Junior [σ], Jacqueline L. Lima [ρ], Jacy Perisinotto [ω], Clara Brandão [¥], Pamela J. Surkan [§], Silvia S. Martins [χ] & Sheila C. Caetano [ν]

*Abstract-* **The association between specific school readiness skills and long-term school-related outcomes are still unclear and under debate. It is the first study to systematically review the literature on factors associated with school readiness evaluation about school-age achievement. This review included longitudinal studies with a minimum follow-up of five years; these studies performed the assessments during early childhood. The authors registered the study in the PROSPERO database (CRD42018089694). Five databases were searched (PubMed, Scielo, Scopus, ERIC, and Psyc Articles). Independent reviewers screened a total of 4,278 articles that were retrieved, and 13 were eligible for inclusion. Results showed that early language and math abilities at preschool age, middle to higher socioeconomic status, and social-emotional skills were the most significant variables in the promotion of positive school-age development. Preschool education and socioe motional or behavioral skills may compensate for academic difficulties in later school achievement.**

*Keywords: child, achievement, school, readiness, systematic review.*

## I. Introduction

There is a growing awareness of the influence of early childhood education on academic performance and emotional-behavioral functions that have repercussions throughout the life course (Duncan et al., 2007; Grissmer, Grimm, Aiyer, Murrah, & Steele, 2010; Heckman, 2011). Many early education programs are designed to promote children's physical, intellectual, and social competencies that contribute to overall developmental competence and readiness for school. However, how specific skills in preschool children are related to long-term academic or emotional outcomes are still unclear and debatable (Pianta, Cox, & Snow, 2007).

Aspects of school readiness tested in Duncan et al. (2007) came from six longitudinal data sets and included measures of early reading and math skills, social skills, attention, and internalizing and externalizing behavior. Their results suggested that early math skills should receive more highlighted in curricula, interventions, and research because they predicted both future math and reading skills. However, they found no effects of social skills or internalizing and externalizing behavior as predictors of later academic or emotional outcomes (Duncan et al., 2007). Pagani, Fitzpatrick, Archambault, and Janosz (2010) extended the studies of Duncan et al. (2007) by including the measurement of motor skills. They found that attention, motor skills, and general knowledge were much stronger overall predictors of later math, reading, and science scores than were early math and reading scores alone (Pagani et al., 2010).

Recently, Thomson et al. (2019) examined a population cohort of 34,552 children and found that children exhibiting poor social-emotional functioning at school entry had at least two times the odds of a subsequent mental health condition by age 14, including depression, conduct disorder, anxiety and attention-deficit/hyperactivity disorder (ADHD). The authors also observed patterns of symptom continuity between early childhood, measured as internalizing and externalizing symptoms, and adolescent mental health problems, such as depression, conduct disorder, anxiety, and ADHD. They also highlighted that more than 40% of children entered the school system with relative vulnerabilities in social-emotional functioning that were associated with early-onset mental health conditions (Thomson et al., 2019).

Considering the inconsistencies in the literature in regards to school readiness and, to date, and there is no known systematic reviews that conducted in this area, we aimed to clarify which factors evaluated in preschool promote positive outcomes in childhood or adolescence. Also, there are no standardized models of measuring school readiness, and less is known whether existing models might assess individual skills in their childhood, adolescence, and adulthood. Given this context, this systematic review has the following aims: (1) to analyze associations between school readiness and later achievement; (2) to describe factors that are key to school readiness; and (3) to clarify which and how the components of child readiness could promote later positive development.

## II. Method

### a) Design

We conducted and reported a systematic review by the reporting guidance provided in Preferred Reporting Items for Systematic Reviews and Meta-

*Author α ρ ω ¥ ν: Federal University of São Paulo.*
*e-mail: mariano.mrl@gmail.com*
*Author σ: State University of Campinas, UNICAMP.*
*Author §: Johns Hopkins Bloomberg School of Public Health.*
*Author χ: Mailman School of Public Health, Columbia University.*



© 2019 Global Journals

Analyses (PRISMA) (Moher et al., 2009). The guidelines and criteria outlined were followed and applied to ensure proper reporting of the data (Moher et al., 2009). We elaborated a systematic review protocol and registered it with PROSPERO (CRD42018089694; https://www.crd.york.ac.uk/prospero/display_record.php?RecordID=89694).

*b) Search criteria*

A literature search was conducted in the following electronic databases: PubMed, Scielo, Scopus, Eric, and Psyc Articles. The keyword-based queries for all databases were the terms "school readiness" AND "achievement" OR "attainment."

The studies included in this systematic review accomplished the following inclusion criteria: longitudinal design with follow-up of a minimum of 5 years (so we could study the academic outcomes later in school), publication in an English-language peer-reviewed journal and child assessment during early childhood or preschool, including measurements of general child developmental skills (e.g. language, motor skills, cognition, social-emotional, and executive functioning) that could have an impact on later achievement, transition phases, and/or subsequent stages of human development, including in adolescence and adulthood.

*c) Selection procedure*

The search included articles from 2000 to February 2019, returning 4,278 references. The domain of school readiness is broad, and in the first round of assessment, all titles that could address the following questions were selected without restrictions on study designs: "How is school readiness defined?"; "What are its main components?"; "How do different testing models compare?"; "What are social, environmental, and biological factors that influence school readiness?"; "How does school readiness affect outcomes in the health, socialization, and education of children and their later development?" In this first round, all three study team members performed automated searches in the databases discussed above, removed duplicates, and screened titles. The titles were divided and distributed to three authors (MM, ASJ, and JLL). These same authors conducted an independent selection of abstracts and extraction data. A fourth author (SCC) decided differences in judgment on selection criteria occurred in two articles. .

*d) Data extraction*

The same independent reviewers extracted the data.. All researchers independently read and filled in the table with the summary data from 10% of all articles to ensure internal validity. Data were entered separately into forms of variables, including publication year, country of study, sample size, children's and caregivers' characteristics, analysis/statistical methods, instruments, and main findings and study limitations. Data were reviewed and collated into tables by the first author (MM).

## III. Results

Figure 1 displays the flow of search information through the phases of this systematic review. We identified 4,278 records through database searches, and 68 articles remained eligible based on the criteria of having a longitudinal design with a follow-up equal to or greater than five years. We excluded two studies that used six different longitudinal data sets (Duncan et al., 2007; Grissmer et al., 2010) that could not be used to answer aims (2) and (3). One article that analyzed only social-emotional function or mental health were also excluded (Thomson et al., 2019). The final sample for data extraction consisted of 13 articles.

Table 1 displays the descriptive information for studies included in this systematic review. These articles were published between 2001 to 2018, with the majority (n=12) published after 2010. Sample sizes ranged from 204 children in a Canadian study (Bernier, McMahon, & Perrier, 2016) to 10,666 children in the Early Childhood Longitudinal Study–Kindergarten Cohort (ECLS-K) (Li-Grining, Votruba-Drzal, Maldonado-Carreño, & Haas, 2010). All studies had balanced samples with respect to sex (proportions by sex ranging from 47% to 53% boys) and described sex differences regarding child development (Cooper, Osborne, Beck, & McLanahan, 2011; Fitzpatrick & Pagani, 2012; Hammer et al., 2017; Li-Grining et al., 2010; Pagani & Fitzpatrick, 2014; Quirk, Grimm, Furlong, Nylund-Gibson, & Swami, 2016; Sabol & Pianta, 2012; Shah, Kaciroti, Richards, & Lumeng, 2016). Regarding the age of first child evaluation and ethnicity, we noticed a wide range of diversity. Almost half of the studies (n=5; 38%) had samples focused on specific ethnic groups (e.g., all Latino children in the study of Quirk, Grimm, Furlong, Nylund-Gibson, & Swami, 2015) or that disproportionately represented a particular ethnic group (e.g., 87% European ethnic origin in the study of Woodward, Lu, Morris, and Healey, 2016). Pagani and Fitzpatrick (2014) did not report subjects' ethnicities in the samples in their two studies. The age of the first evaluation ranged from newborn infants (e.g., Pagani, & Fitzpatrick, 2014) to eleven-year-olds in a retrospective study (Kurdek & Sinclair, 2001).

Socioeconomic status was reported in different ways based on various indicators, such as caregivers' jobs (semiskilled, unskilled/unemployed) (Woodward et al., 2016), average family income (Bernier, Mcmahon, & Perrier, 2016), and a composite of socioeconomic status, occupational prestige, and level of education (Fitzpatrick & Pagani, 2012). The proportion of low-income families ranged between 12% and 44% of the sample, except one study, in which all children were from families of low socioeconomic status (Quirk et al., 2016).



© 2019 Global Journals

Less than half of the studies (n=5; 38%) had follow-up periods of longer than five years, and the longest follow-up period was ten years (Paschall, Gershoff, & Kuhfeld, 2018). Most studies discussed attrition rates (n=10; 77%), that ranged from 10% (Woodward et al., 2016) to 56% (Fitzpatrick & Pagani, 2012).

The studies used a wide variety of instruments as predictor and outcome measures representing the full range of components included in different definitions of readiness. As noted, standardized assessment tools, such as the Peabody Picture Vocabulary Test, the Woodcock-Johnson Psycho-Educational Battery–Revised, and the Wechsler Preschool and Primary Scale of Intelligence, were the most commonly used academic/cognitive predictor and outcome measures. Social/behavioral measures included parent and teacher reports of behavior using, respectively, the CBCL and TRF. Studies also included assessments regarding the family and school climate and classroom engagement behavior, e.g., Sabol & Pianta (2012). As expected, all authors showed direct relation between preschool language, math skills, social-emotional skills, family characteristics, poverty, and a later performance at school age. Sex impacted performance differently, but the majority of studies showed that boys had lower cognitive and social-emotional abilities than did girls. The most common study limitations were that the samples were not representative of the population, had limited generalizability, weak reliability of assessments, could not infer causality and had much-missing data at follow-up.

In Table 2, we present the variety of measures evaluated in each study and across studies. Birth weight, a widely used classical variable impacting child development, was present only in a few articles (n=5; 38%). Sleep, average weekly hours of television viewing, prenatal smoking, and maternal mental health each appeared once in different studies. More than a half of the works examined the parent-child effects and interactions, classroom engagement and school characteristics, and maternal education. The majority of studies (n= 11; 84%) extensively discussed about poverty.

Finally, to describe the components that are important or that contain the constructs of school readiness, we described in Table 3 the assessment of each measure. All studies used language and math skills as measures of the construct of readiness, except for one work (Quirk et al., 2016), which did not use math skills for the same purpose. Behavioral and emotional aspects, such as approaches to learning, social or socio emotional skills, and externalizing and internalizing symptoms, were present in approximately half of the articles (n= 7; 54%). Few studies have evaluated memory, motor skills, attention, and health-related behaviors (e.g., consumption of soft drinks or sweet snacks) as factors significant to readiness.

## IV. Discussion

This systematic review revealed a small but growing body of literature associated with school readiness and later achievement. It is the first review that aims to understand how the preschool experience impacts the child later performance. Also, we synthesize the evidence about factors which promoting positive outcomes in life course. We included thirteen recent studies in the review and found promising evidence for a protective role of the preschool experience in enhancing school readiness. Also, we evidenced a positive influence on child development for behavioral and emotional child functioning, including problematic behaviors, social-emotional skills, and approaches to learning. Factors associated with family characteristics, especially socioeconomic status, also showed a strong influence on readiness. The results of this review provide a unique overview of longitudinal and cohort research focusing on school readiness and later achievement and highlight links among the academic success, social-emotional skills, and behavioral skills that originate in early childhood.

### *a) Sex differences*

Girls showed higher classroom engagement (Fitzpatrick & Pagani, 2012; Sabol & Pianta, 2012), attention skills (Pagani & Fitzpatrick, 2014), school readiness (including math and reading scores (Quirk et al., 2016; Shah et al., 2016)), and social-emotional skills (Hammer et al., 2017; Quirk et al., 2016). Overall, boys showed more disruptive behavior (e.g., Sabol & Pianta, 2012), as they are more than two times as likely to enter kindergarten with lower academic and social-emotional readiness (Quirk et al., 2016) and are more negatively affected by parental partnership instability than girls—thus contributing to the gender gap in school readiness and educational attainment (Cooper et al., 2011). Li-Grining et al. (2010) found a protective impact of approaches to learning on girls' math growth and boys' reading growth.

### *b) Social-emotional and behavioral factors*

This review highlighted the protective role of children's emotional and/or behavioral functioning, such as social-emotional regulation and approaches to learning, motivation, and problematic behavior (Cooper, Osborne, Beck, & McLanahan, 2011; Hammer et al., 2017; Li-Grining et al., 2010; Pagani, & Fitzpatrick, 2014; Quirk et al., 2016; Sabol, & Pianta, 2012; Woodward et al., 2016).

Li-Grining et al. (2010) found that children with higher levels of early learning showed improved academic achievement (reading and math) and indicated a continuing increase across elementary



© 2019 Global Journals

school. Sabol and Pianta (2012) discussed that children's early social skills might have inhibited or helped their performance in the fifth grade. It is particularly important to note that social skills may compensate for weaknesses in other domains, such as executive functioning. Woodward et al. (2016) carefully investigated the associations between child development and mental health. They found in children at age nine that almost 33% of infants born very preterm, compared to 20% of children born full-term, met DSM-IV criteria for at least one mental health disorder, such as ADHD and anxiety disorders (the most common diagnosis). They concluded that early emotional and behavioral regulation difficulties might place preschoolers, regardless of birth status, at an increased risk of longer-term mental health and educational problems, especially at risk of language difficulties. This finding is a concern in the integrated development of children, as more effective communication skills offer young children an alternative means of expressing their needs and desires as well as an additional tool for regulating their behavior in the form of self-talk and other strategies. Therefore, delays in one domain, such as regulatory abilities, seem to promote disadvantages in various dimensions (Woodward et al., 2016).

Given the significant impact that emotional and behavioral functioning can have on child readiness and later achievement (e.g., Quirk et al., 2016; Woodward et al., 2016), further research should include evaluation of these domains of human development (Thomson et al., 2019). Duncan et al. (2007) showed that measures of socioemotional behaviors, including internalizing and externalizing problems and social skills, were generally non-significant predictors of later academic performance, even among children with relatively high levels of problem behaviors. Some years later, Pagani, Fitzpatrick, Archambault, and Janosz (2010) replicated the model of school readiness specified in Duncan et al. (2007) and showed that behavioral problems (externalizing problems—aggression; internalizing problems—anxiety) and prosocial skills also emerged as predictors of some aspects of later achievement, such as classroom engagement and academic success. The last authors also argued that motor skills contributed significantly to the prediction of later performance above and beyond the original primary elements of school readiness (Pagani et al., 2010). Thus, given inconsistencies in the literature, future research should better clarify the role of behavioral and social-emotional outcomes.

*c) Poverty factor*

Overall, poverty was linked with poor initial and later achievement in academic, social-emotional and behavioral functioning and school readiness (Bernier et al., 2016; Fitzpatrick & Pagani, 2012; Hammer et al., 2017; Li-Grining et al., 2010; Paschall et al., 2018; Raffington, Prindle, & Shing, 2018; Sabol & Pianta, 2012; Shah et al., 2016). Hammer et al. (2017) found that children with low socioeconomic status had almost 15 times greater of a chance of being a late talker and had the lowest math performance. Similarly, higher socioeconomic status was prospectively associated with higher classroom engagement, receptive vocabulary, and number knowledge (Fitzpatrick & Pagani, 2012).

Paschall et al. (2018) demonstrated a link between poverty and race: non-poor White students and poor White students had better performance than nonpoor Black students and poor Black students. The differences in scores between these groups were identified at school entry and remained sizeable across historical time and developmental age. Disparities in ethnicity and poverty did not grow across time, but gaps in performance remained the same as at initial school entry (Paschall et al., 2018). Thus, poverty and ethnicity seemed to hamper social mobility. Similarly, Raffington et al. (2018) showed that children with low socioeconomic status had lower average starting points and cognitive growth slopes in verbal comprehension and math ability throughout later childhood. In addition, these children continued to have cognitive growth trajectories that were substantially lower than those of never-poor children. Among these children, there were differential effects of income changes predicting child cognition in early childhood that continued into later childhood and early adolescence: income gains positively predicted cognitive performance of poor children in later childhood; otherwise, income losses negatively predicted cognitive performance of poor children in later childhood (Raffington et al., 2018). Finally, Li-Grining et al. (2010) showed that children's approaches to learning (e.g., independence, flexibility, organization, eagerness to learn, concentration) was a protective factor against poverty, indicating that interventions should enhancing these skills, especially for children with low socioeconomic status.

Moreover, parental partnership transitions or residential instability (as co-residential and dating) had negative impacts on child development: both types of unbalance were associated with lower verbal ability and more externalizing, social, and attention problems (Cooper et al., 2011).

Regarding language achievement, school readiness and higher levels of early verbal ability were linked to positive effects on later language and math performance, socio emotional development, classroom and school engagement, attention levels, dietary habits and preferences, and behavior problems (Bernier et al., 2016; Fitzpatrick & Pagani, 2012; Hammer et al., 2017; Quirk et al., 2016; Sabol & Pianta, 2012; Pagani & Fitzpatrick, 2014; Shah et al., 2016; Kurdek & Sinclair, 2001). Quirk et al. (2016), Shah et al. (2016), and Hammer et al. (2017) showed that preschool experience was a stronger predictor of children's cognitive

© 2019 Global Journals

readiness and later language achievement. For young children with low reading performance, more than 10 hours per week of child school had a compensatory effect, decreasing their chances of maintaining poor reading abilities in kindergarten and elementary school. Concerning the association between language skills and healthier dietary habits and preferences, Pagani and Fitzpatrick (2014) showed that higher receptive vocabulary resulted in a decline in snack consumption (21% unit) and the increase in the intake of dairy products, fruits and, vegetables (15-17% unit).

*d) Academic abilities*

Math skills at school age were positively associated with verbal and behavioral readiness (Hammer et al., 2017; Kurdek & Sinclair, 2001; Li-Grining et al., 2010; Pagani & Fitzpatrick, 2014). Pagani and Fitzpatrick (2014) also found that kindergarten math skills were an relevant predictor of engagement in activities of physical effort (9% unit increase), later child-reported psychosocial adjustment of intrinsic motivation, attention skills, and academic self-concept (7-19% unit increases). Moreover, poor school readiness in math was associated with: low SES, younger age, being male, being small-for-gestational-age, no early intervention at 24 months, and no preschool experience (Shah et al., 2016).

Few studies have examined associations among cognitive abilities (such as attention and working memory), psychomotor abilities, and intelligence with readiness and later academic performance (Fitzpatrick & Pagani, 2012; Kurdek & Sinclair, 2001; Pagani & Fitzpatrick, 2014; Quirk et al., 2016; Sabol & Pianta, 2012; Woodward et al., 2016). Kurdek and Sinclair (2001) found that visuomotor skills were linked to later reading skills, and auditory memory seems significant for both readiness and later success in reading and math. Another study showed that working memory increased classroom engagement, knowledge and receptive vocabulary, and nonverbal IQ predicted receptive vocabulary, number knowledge, and classroom engagement (Fitzpatrick & Pagani, 2012).

*e) Preterm child*

Only two studies in this review found an association between children born preterm and school readiness (Shah et al., 2016; Woodward et al., 2016). Both articles showed that preterm children performed consistently more poorly across all measures of academic functioning, including reading, language, spelling, and math, in preschool and later (Shah et al., 2016; Woodward et al., 2016). In addition, Woodward et al. (2016) discussed that preterm children also had (1) lower levels of positive affect, persistence, regulatory ability, and psychomotor skills; (2) difficulty in transitioning between activities; and (3) higher levels of emotional and behavioral dysregulation and emotional difficulties as hyperactive/inattention problems. Children born preterm were also at a two-fold better rate of delay in language and math abilities (33-45%) (Woodward et al., 2016).

Finally, limitations of the reviewed studies include difficulties in producing causal conclusions, the possibility of unmeasured variables, high attrition rates, and non representative samples (e.g., Cooper et al., 2011; Kurdek & Sinclair, 2001; Li-Grining et al., 2010). As the majority (n= 11) of the studies took place within the USA and Canada, these results could not be generalized to other socio cultural environments. Moreover, the studies used different aspects of child development to assess school readiness. Consequently, the results presented a large variety of conclusions, and it is unclear which dimension of child development (e.g., cognition, verbal ability, early numeracy, problem behavior) and of the environment (e.g., paternity instability, family socioeconomic status, preschool experience) may have a significant influence. Before the results of these studies are generalized to the broader community we need to clarified the inconsistencies in the school readiness framework and predictors

## V. Conclusion

Our research sought to clarify the associations between school readiness and later achievement (see Figure 2 for the School Readiness Framework). Relevant factors of school readiness that could promote future positive development were: early language and math abilities (preschool age), middle to higher family socioeconomic status, social-emotional skills, a lack of behavioral problems, the preschool experience of more than 10 hours per week and classroom engagement, partnership transitions or residential instability. Being a girl and being born full-term were also associated with better child performance. Surprisingly, in this review, the motricity and cognition evaluations did not appear consistently as domains relevant to school readiness. These findings are significant for service providers working in human development and education and who are developing interventions for children and adolescents.

## References Références Referencias

1. Bernier, A., Mcmahon, C. A., & Perrier, R. (2016). Processes A Longitudinal Study of Developmental Processes. Developmental Psychology, 1–12. https://doi.org/10.1037/dev0000225
2. Cooper, C. E., Osborne, C. A., Beck, A. N., & McLanahan, S. S. (2011). Partnership Instability, School Readiness, and Gender Disparities. Sociology of Education, 84(3), 246–259. https://doi.org/10.1177/0038040711402361
3. Duncan, G. J., Dowsett, C. J., Claessens, A., Magnuson, K., Huston, A. C., Klebanov, P., …



© 2019 Global Journals

Japel, C. (2007). School Readiness and Later Achievement. Developmental Psychology, 43(6), 1428–1446. https://doi.org/10.1037/0012-1649.43.6.1428

4. Fitzpatrick, C., & Pagani, L. S. (2012). Intelligence Toddler working memory skills predict kindergarten school readiness. Intelligence, 40(2), 205–212. https://doi.org/10.1016/j.intell.2011.11.007
5. Grissmer, D., Grimm, K. J., Aiyer, S. M., Murrah, W. M., & Steele, J. S. (2010). Fine motor skills and early comprehension of the world: Two new school readiness indicators. Developmental Psychology, 46(5), 1008–1017. https://doi.org/10.1037/a0020104
6. Hammer, C. S., Morgan, P., Farkas, G., Hillemeier, M., Bitetti, D., & Maczuga, S. (2017). Late Talkers: A Population-Based Study of Risk Factors and School Readiness Consequences. Journal of Speech, Language, and Hearing Research, 60(3), 607–626. https://doi.org/10.1044/2016_jslhr-l-15-0417
7. Heckman, B. J. J. (2011). The Value of Early Childhood Education, 31–36.
8. Kurdek, L. A., & Sinclair, R. J. (2001). Predicting Reading and Mathematics Achievement in Fourth-Grade Children from Kindergarten Readiness Scores. Journal of Educational Psychology, 93(3), 451–455. https://doi.org/10.l037//0G22-0663.93.3.45.
9. Li-Grining, C. P., Votruba-Drzal, E., Maldonado-Carreño, C., & Haas, K. (2010). Children's Early Approaches to Learning and Academic Trajectories Through Fifth Grade. Developmental Psychology, 46(5), 1062–1077. https://doi.org/10.1037/a0020066
10. Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., Altman, D., Antes, G., … Tugwell, P. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement (Chinese edition). Journal of Chinese Integrative Medicine, 7(9), 889–896. https://doi.org/10.3736/jcim20090918
11. Pagani, L. S., & Fitzpatrick, C. (2014). Children's School Readiness: Implications for Eliminating Future Disparities in Health and Education. Health Education and Behavior, 41(1), 25–33. https://doi.org/10.1177/1090198113478818
12. Pagani, L. S., Fitzpatrick, C., Archambault, I., & Janosz, M. (2010). School readiness and later achievement: A French Canadian replication and extension. Developmental Psychology, 46(5), 984–994. https://doi.org/10.1037/a0018881
13. Paschall, K. W., Gershoff, E. T., & Kuhfeld, M. (2018). A Two Decade Examination of Historical Race/Ethnicity Disparities in Academic Achievement by Poverty Status. Journal of Youth and Adolescence, 47(6), 1164–1177. https://doi.org/10.1007/s10964-017-0800-7
14. Pianta, R. C., Cox, M. J., & Snow, K. L. (2007). School Readiness and the Transition to Kindergarten in the Era of Accountability. Baltimore, MD: Brookes.
15. Quirk, M., Grimm, R., Furlong, M. J., Nylund-Gibson, K., & Swami, S. (2016). The association of latino children's kindergarten school readiness profiles with grade 2-5 literacy achievement trajectories. Journal of Educational Psychology, 108(6), 814–829. https://doi.org/10.1037/edu0000087
16. Raffington, L., Prindle, J. J., & Shing, Y. L. (2018). Income gains predict cognitive functioning longitudinally throughout later childhood in poor children. Developmental Psychology, 54(7), 1232–1243. https://doi.org/10.1037/dev0000529
17. Sabol, T. J., & Pianta, R. C. (2012). Patterns of school readiness forecast achievement and socioemotional development at the end of elementary school. Child Development, 83(1), 282–299. https://doi.org/10.1111/j.1467-8624.2011.01678.x
18. Shah, P. E., Kaciroti, N., Richards, B., & Lumeng, J. C. (2016). Gestational Age and Kindergarten School Readiness in a National Sample of Preterm Infants. Journal of Pediatrics, 178, 61–67. https://doi.org/10.1016/j.jpeds.2016.06.062
19. Thomson, K. C., Richardson, C. G., Gadermann, A. M., Emerson, S. D., Shoveller, J., & Guhn, M. (2019). Association of Childhood Social-Emotional Functioning Profiles at School Entry With Early-Onset Mental Health Conditions. JAMA Network Open, 2(1), e186694. https://doi.org/10.1001/jamanetworkopen.2018.6694
20. Woodward, L. J., Lu, Z., Morris, A. R., & Healey, D. M. (2016). Preschool self regulation predicts later mental health and educational achievement in very preterm and typically developing children. Clinical Neuropsychologist, 31(2), 404–422. https://doi.org/10.1080/13854046.2016.1251614

## Financial Support

This work was supported by the Brazilian National Council of Research (CNPq) grant number 466688/2014-8, and by the São Paulo Research Foundation (FAPESP) grant number 2016/10120-1 (P.I. Caetano). The project was also partially funded by the Columbia President's Global Innovation Fund-UR008509 (P.I., Martins) and by FAPESP - 2016/11202-1 (Co-I, Perisinotto). One of our researchers (M.M.) received a scholarship from FAPESP (grant number 2016/05116-5).

*Conflict of Interest Statement*

The authors have no conflicts of interest to declare.



© 2019 Global Journals

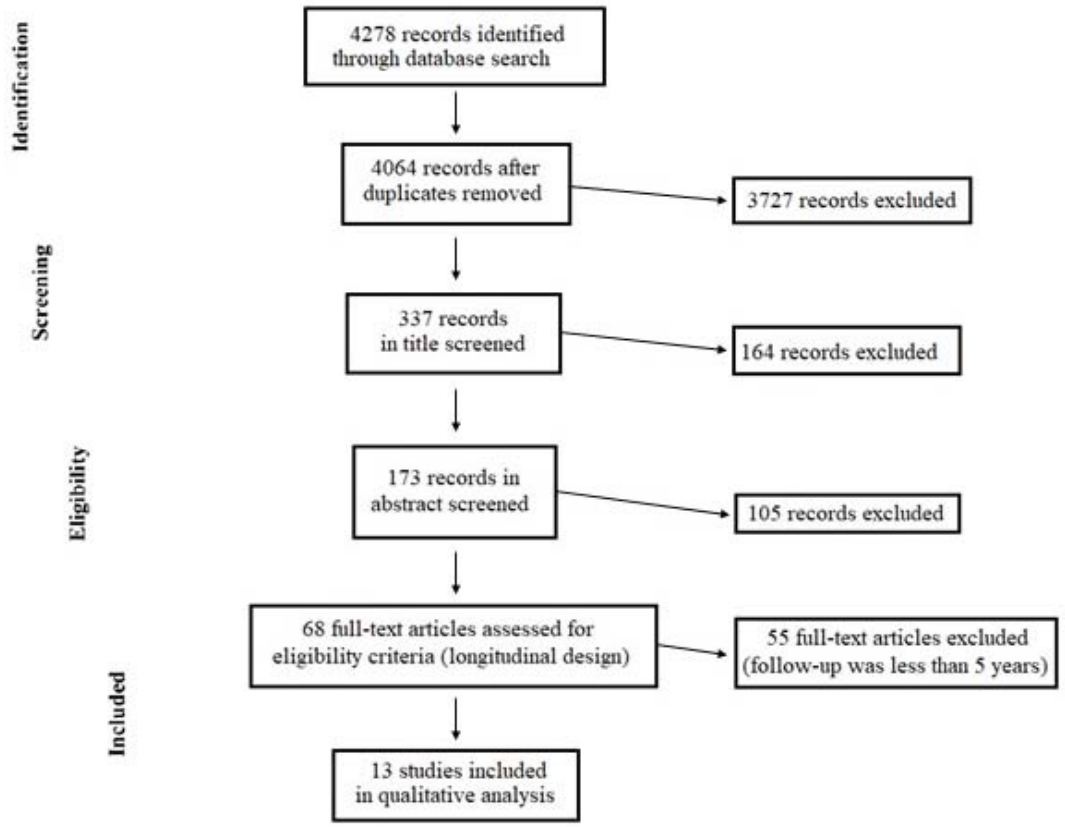



*Fig. 1:* Flow of information through the differnet phases of the scholl readiness systematic review

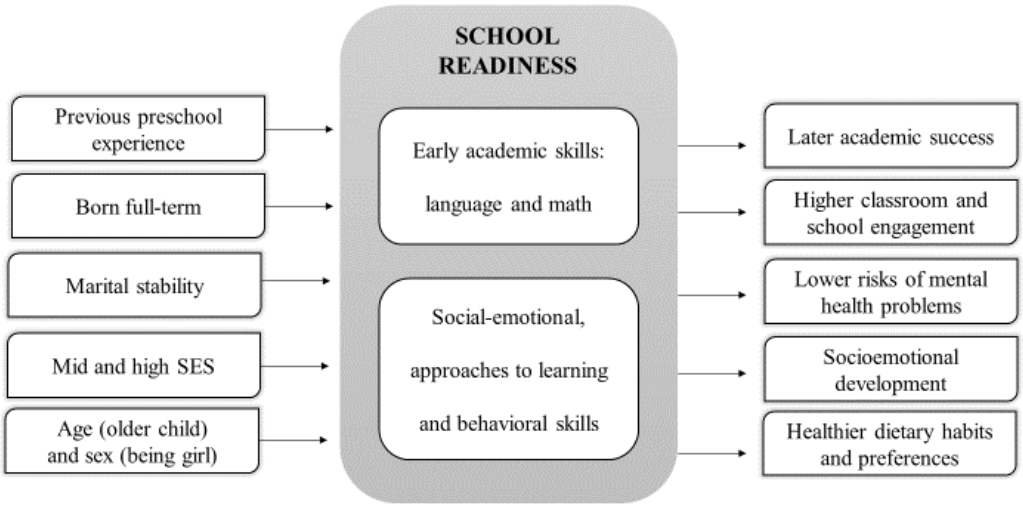



*Fig. 2:* School readiness Framework



© 2019 Global Journals

*Table 1:* Descriptive information for studies of school readiness included in the systematic review

| Authors and year | Country of study/cohort or longitudinal name | Sample: 1st sample size; % boys; mean age at 1st evaluation; race; LIC | Follow-up in y/% lost to follow-up | Instruments | Results | Study limitations |
|---|---|---|---|---|---|---|
| Kurdek & Sinclair (2001) | US/N.A. | 281 children; 47% boys, 93% white; 11.2 y; 17% LIC | 5/N.A. | Kindergarten Diagnostic Instrument; CTB | - Young child in preschool (VS. older child): not at disadvantage to long-term academic performance<br>- Readiness in verbal skills: linked to later performance in reading and math<br>- Readiness in visuomotor skills: linked to later performance in reading<br>- Auditory memory may be a core readiness skill linked to later excellence in reading and math<br>- These links occurred independently of age and were generalized across children's age and gender | - Not a representative sample<br>- Subscores from the readiness assessment were based on different numbers of items - weak reliability |
| Li-Grining, Maldonado-Carreno, Votruba-Drzal & Haas (2010) | US/ECLS-K | 10,666 children; 50% boys; 4 y; 58% white/non-Hispanic, 11% black/non-Hispanic, 18% Hispanic; 18% LIC | 5/38% | PIAT-R; PPVT; SRS; SSRS; Teacher and parent report versions of the ECLS-K SCS | - Children with ↑ ATL tended to experience ↑ rates of growth in reading and math (VS. ↓ ATL), such that differences between them increased across elementary school<br>- Early ATL: ↑ protective for girls' math growth and boys' reading growth<br>- Children's ATL: protective for socioeconomic groups in poverty and at educational and occupational risk<br>- Early ATL: particularly protective for children with ↓ levels of initial academic achievement | - No causal conclusions<br>- Classroom processes, child IQ, and other developmental phenomena not captured by the ECLS-K may confound the associations |
| Cooper, Osborne, Beck, & McLanahan (2011) | US/Fragile Families Study | 4,898 children; 52.44% boys; 1 month in 1st wave; 47.62% black, 27.34% Hispanic, 21.08% white; 36.17% poor families | 5/40% | PPVT-R; CBCL; WAIS | -Partnership transitions: ↓ 1.5 points of verbal ability and school readiness; ↑ attention and social problems, and externalizing problems at age 5<br>- Children born into alternative family forms: ↑ risk for academic and behavioral problems at school entry<br>- Coresidential instability and dating transitions: associated with ↓ verbal ability and ↑ externalizing, attention, and social problems; ↓ cognitive and behavioral readiness for school<br>- Coresidential transitions and child behavioral problems differ by gender: boys responding ↑ negatively - ↑ externalizing problems, attention problems, and social problems; | - Possibility of unmeasured variables (such as mothers' partnership instability)<br>- Unable to accurately measure the proportion of time spent in single-parent homes between transitions<br>- Results may not be generalized |
| Fitzpatrick & Pagani (2012) | Canada/QLSCD | 2,744 children; 53% boys; 0.42 y; .02 SD - SES+ occupational prestige + level of education | 5.75/56% | Imitation Sorting Task; CES; NKT; PPVT; WPPSI-R; ICQ | - ↑ 1 SD in working memory: ↑ classroom engagement and knowledge and receptive vocabulary<br>- ↑ 1 SD in nonverbal intelligence and receptive vocabulary: ↑ classroom engagement<br>- Being a girl predicted ↑ 0.201 SD unit in kindergarten classroom engagement<br>- Early receptive vocabulary predicted ↑ 0.418 SD unit in kindergarten receptive vocabulary and ↑ 0.158 SD in number knowledge<br>- Nonverbal IQ predicted ↑ 0.076 SD unit in receptive vocabulary and ↑ 0.151 SD unit in number knowledge<br>- ↑ SES was prospectively associated with ↑ 0.142 SD unit in classroom engagement, ↑ 0.119 SD unit in receptive vocabulary, and ↑ 0.188 SD unit in number knowledge | - Many missing data at follow-up |



© 2019 Global Journals

| | | | | | | |
|---|---|---|---|---|---|---|
| Sabol & Pianta (2012) | US/NICHD | 944 children; 48% boys; 4.5 y; 82,6% white; 12% LIF | 5/29% | SSRS, CBCL, Positive Engagement SMI; WJ; CPT; TRF; DBD; WJ–R–ACH; HOME; CPT, COS-5th grade | 6 School readiness profiles:<br>- (1) Attention problems: average on positive social and emotional skills, ↑ engagement in school VS. group 4, ↑ reading VS. groups 2 and 4, and < than group 6;<br>-(2) Low working memory: ↓ math achievement VS. groups 3 and 6<br>- (3) Low to average social skills and working memory: ↓ social skills in the classroom and ↓ working memory<br>- (4) Social and externalizing problems: ↓ engaged VS. group 5, ↓ math achievement VS. groups 1 and 6<br>- (5) High social competence<br>- (6) High working memory and mild externalizing: ↑ social skills at 5th grade; ↓ teacher-reported disruptive behavior VS. group 3 and fewer social problems VS. group 4;<br>- Groups 2 and 4: ↑ disruptive behavior disorders VS. group 5 and 6, ↓ scores in reading and math<br>- Groups 3 and 4: ↓ math achievement VS. group 6<br>- ↑ language scores at 54 months predicted ↑ positive socioemotional development<br>- Poor children: ↓ social skills and ↑ disruptive behavior<br>- Boys: ↑ engagement and ↑ disruptive behavior | - No measure of children's functioning between the two time points or test of how that functioning might play a role in children's outcomes |
| Pagani & Fitzpatrick (2014) | Canada/QLSCD | 2,694 children; 47% boys; 0.41 y | 9.75/32% | NKT; PPVT; SBQ; CAT of Mathematics | - Kindergarten receptive vocabulary predicted all 4th-grade dietary habits and preferences: ↑ receptive vocabulary predicted ↓ 21% unit in snack consumption and ↑ 15-17% unit in dairy product, fruit and vegetable intake<br>- Kindergarten math skills associated with engaging in activities of physical effort: ↑ math scores predicted ↑ 9% unit in physical effort<br>- ↑ school readiness skills in kindergarten predicted ↑ performance in 4th grade, ranging from ↑ 6%-34% unit in math, science, reading, receptive vocabulary and attention<br>- ↑ school readiness predicted ↑ 4th-grade teacher-reported psychosocial adjustment: std coefficients predicted ↑ 6-28% unit in classroom and school engagement, attention, receptive vocabulary and ↓ 10% unit in emotional distress<br>- Early math skills: the most consistent predictors between kindergarten and later child-reported psychosocial adjustment: std coefficients predicted ↑ 7-19% unit intrinsic motivation, attention skills, and academic self-concept<br>- Kindergarten math, receptive vocabulary and attention were unrelated to later intrinsic motivation<br>- ↑ in kindergarten receptive vocabulary and attention predicted academic self-concept;<br>- Kindergarten attention related to 4th grade attention skills → stability across raters and over time<br>- Girls: > on attention skills than boys | N.A. |
| Shah, Kaciroti, Richards, & Lumeng (2016) | US/ECLS-Birth Cohort | 6,300 children; 50.5% boys; newborn; 57.4% White/non-Hispanic, 13.7% Black/non-Hispanic, 22.65% Hispanic; 44.2% below | 5/33% | PPVT; Pre-CTOPP | - ↓ gestational age = ↓ school readiness at kindergarten reading and math<br>- VPT child: ↑ % of poor school readiness in reading and math, but the risk dropped and gradually plateaued in infants born at ≥ 32 weeks of gestation<br>- VPT child: ↑ odds of poor school readiness in reading (OR 2.58) and math (OR 3.38), with ↓ odds of poor school readiness for children born at ≥32 weeks of gestation;<br>- Poor school readiness in reading: associated with ↓ SES, younger age, school level, race, male, | - Limited health and neonatal risk information<br>- No data on maternal IQ or family history of learning difficulties |



© 2019 Global Journals

| | | | | | | |
|---|---|---|---|---|---|---|
| | | poverty threshold | | | and no previous preschool experience<br>- Poor school readiness in math associated with ↓ SES, younger age, school level, male, being small-for-gestational-age, no early intervention at 24 months, and no previous preschool experience | |
| Quirk, Grimm, Furlong, Nylund-Gibson, & Swami (2016) | US/ECLS | 1,253 children; 50.6% boys; 4 y; all Latino children and LIC | 5/35% | KSEP; CST; CELDT | - *LCA 5 groups in kindergarten entry*: (1) balanced-high: 10.4% of sample, ↑ KSEP; (2) mod SE, mod Cog: 14.6% of sample, mid scores of social-emotional and cognitive; (3) high SE, low Cog: 15.9% of the sample; (4) low SE, low Cog: 28.8% of sample, ↓ scores of social-emotional and cognitive; (5) extremely low: 30.3% of sample, ↓ KSEP<br>- Physical readiness was not identified in classes<br>- Older students, ↑ proficient in English, female, and ↑ preschool experience: ↑ likely to be in the balanced-high class than the (3) high SE, low cog, (4) low SE, low cog, and (5) extremely low *GMM* 3 groups in grades 2-5: (1) high-decreasing: 10.7% of sample, students scored above average across all for years, but performed lower each year; (2) average: 47.9% of sample, middle of E-LA achievement score; (3) low E-LA: 41.4% of sample, ↓ E-LA<br>- 1 in 10 of Latino students entered kindergarten exhibiting a balanced-high profile of social-emotional, physical, and cognitive school readiness<br>- 3 in 5 students exhibited ↓ or extremely ↓ levels of school readiness across the domains<br>- 1 in 10 students exhibited above average literacy achievement growth patterns in grades 2 through 5, yet 2 in 5 fell into a group of below average literacy achievement<br>- Boys: more than 2x as likely to enter kindergarten with ↓ levels of cognitive and social-emotional readiness VS. girls<br>- Preschool experience: strongest predictor of children's cognitive readiness important to later literacy achievement | - Generalizability of these profiles might be limited |
| Woodward, Lu, Morris, & Healey (2016) | New Zealand/N.A. | 207 children; 49% boys; 87% European ethnic origin; 29% semiskilled/unskilled/unemployed | 9/10% | ERC; BSID-II; WPPSI; DAWBA; WJ-III; SDQ; Elley-Irving SE-Index; HADS | - VPT children at ages 2 and 4: ↓ levels of positive affect, ↓ persistence, ↑ difficulty in transitioning between activities when engaged in structured play interaction, ↓ regulated during psychometric testing at ages 2 and 4, ↑ levels of emotional and behavioral dysregulation, ↑ emotional difficulties and hyperactive/inattention problems, ↓ MDI and PDI<br>- VPT child at age 9: ↑ 3 times diagnosis of ADHD, ↑ 1.6 times anxiety disorder; consistently performed ↓ on reading, language, spelling and math; 33% of children born VPT had at least 1 mental health disorder VS. 20% of FTB<br>- Rates of delay in learning areas: ↑ for VPT child (33-45%) VS. FTB (14–16%)<br>- For both VPT and FTB children: tendency for ↑ regulatory difficulties during early childhood associated with ↑ risks of later mental health problems as ADHD and anxiety (conduct disorder only for VPT)<br>-Weak associations in early regulatory problems and later risk of spelling and math delay | N.A. |
| Bernier, McMahon, & Perrier (2016) | Canada/N.A. | 204 children; 1y; 83.8% European; average of family income | 5/21% | MCDI; DGT; OMMM; Whisper Tower; CL; LM; Simon | - Child initial cognitive performance, family SES, sex, maternal sensitivity, and maternal mind-mindedness predicted child language ability, which in turn predicted 3-year effortful control, which predicted 4-year effortful control, which | - Nonexperimental nature of the design |



© 2019 Global Journals

| | | | | | | |
|---|---|---|---|---|---|---|
| | | (CDN range < than $20,000 to > than $100,000) | | says; Lollipop test; MBQS; BSID | ultimately predicted school readiness | |
| Hammer, Morgan, Farkas, Hillemeier, Bitetti, & Maczuga (2017) | US/ECLS-B | 6,050 children; 51% boys; 0.75 y; 65% white, 15.8% African American, 12.7% Hispanic; 14.4% lowest SES quintile (father's and mother's education and occupation, and household income) | 5/49.6 % | MCDI; CES-D; HOME; Three Bags Task; BSID; PPVT; PLBS; SSRS | - Low reading performance: being a late talker; ↓ SES; having a family member with a learning disability; child care > than 10 hr/week resulted in ↓ odds of ↓ reading at kindergarten entry<br>- Low math performance: being a late talker and having low receptive vocabulary; African-American children; having a family member with learning disabilities; effect of the lowest SES had odds of almost 15 to 1; quality parenting and 48-month center-based child care or Head Start for > than 10 hr/week resulted in ↓ odds of ↓ math skills;<br>- Problem behavior: being a late talker; ↓ SES, ↑ odds of having approaches to learning problems; ↑ quality parenting, ↓ the odds of approaches to learning problems at 60 months; child in Head Start for > than 10 hr/week, ↑ the odds of approaches to learning problems at 60 months; odds of having internalizing were ↑ by low vocabulary at 48 months (2.86:1)<br>- Late talker and ↓ 48-month vocabular, ↑ the odds of externalizing problems at 60 months; ↓ SES, ↑ the odds of externalizing | - Single source of vocabulary bias problem<br>- Children's receptive and expressive vocabularies were not both measured at each of the data collection waves<br>- Did not conduct specific observations of parent/caregiver-child interactions |
| Paschall, Gershoff, & Kuhfeld (2018) | US/NLSCY | 3,250 children; 5y; 53.1% White, 27.9% Black, 18.9% Hispanic | 10/N.A. | PIAT | - Poverty gap changed across time differently for White, Black, and Hispanic students<br>- Differences between poor and nonpoor White students' scores did not grow but rather remained sizeable across time at school entry or ages 13-14<br>- Differences between poor and nonpoor Black and Hispanic students' scores remained sizeable across historical time and across developmental age<br>- Comparing poor White children with nonpoor Black and Hispanic children illuminated the disparities | - Not nationally representative data of schoolchildren<br>- Cannot describe the size of the achievement gaps<br>- Ignores the variability of families above the federal poverty line |
| Raffington, Prindle, & Shing (2018) | Germany/SECCYD | 1,364 children; 52% boys; 4.6 y; 24% ethnic-minority children; 19% LIC | 7.4/N.A. | WJ PE-R (subtests of verbal comprehension and math) | - Poor children: ↓ average starting points and cognitive growth slopes in verbal comprehension and math ability throughout later childhood<br>- ↑ Income gains from 1 wave to the next were a leading indicator in time of ↑ verbal comprehension and math ability at the next wave for children living in poverty (or losses predicting ↓ scores)<br>- Positive effect of income changes predicting child cognition in early childhood, continues into later childhood and early adolescence for poor children<br>- Cognitive performance of poor children in later childhood is positively predicted by income gains and negatively predicted by income losses<br>- Poor children continued to have cognitive growth trajectories<br>substantially ↓ than never-poor children<br>- Income fluctuations in poor families are still a leading indicator in time of cognitive performance | - Sample was predominantly middle class and underrepresented severely financially strained families<br>- Focused solely on cognitive outcomes<br>- Analyses did not provide a direct test of causality |



© 2019 Global Journals

*Table 2:* Comparison of measures evaluated

| Reference | Child outcome measure(s) | |
|---|---|---|
| | Others measure(s) | |
| Kurdek & Sinclair (2001) | - *Preschool measures*: Auditory memory; body awareness; concept mastery; form perception; general information; gross motor skills; number skills; verbal associations; verbal opposites; visual discrimination; visual memory; visuomotor integration; vocabulary | - *Academic achievement in 4th. grade*: Reading; math; verbal skills; visuomotor skills. |
| | - Family income | |
| Li-Grining, Maldonado-Carreno, Votruba-Drzal & Haas (2010) | - Academic achievement,<br>- Early approaches to learning<br>- Experiences in kindergarten: teachers' and schools' attributes and expectations of children's social and academic behavior | - Schools' geographic region (Northeast or West)<br>- Schools' urbanicity: e.g., located in suburbs or small towns |
| | - Ethnicity<br>- Child low birth weight<br>- Parents working or not employed<br>- Marital status<br>- Language other than English was spoken at home | - Family received welfare<br>- Number of individuals in the household<br>- SES disadvantage: (a) an indicator of poverty - federal poverty line; (b) highest level of parental education; (c) parents held higher- VS. lower-prestige jobs |
| Cooper, Osborne, Beck, & McLanahan (2011) | - Verbal ability<br>- Behavioral problems | - Social problems |
| | - Mother relationship status<br>- Partnership instability (changing residences)<br>- Maternal age<br>- Maternal age in years at birth of first child<br>- Ethnicity<br>- Immigrant status<br>- Education<br>- Poverty | - Child low birth weight<br>- Mothers' cognitive ability<br>- Non-joint births (whether mother has children by another partner)<br>- Partnership instability prior to focal child's birth (number of relationships lasting at least one month prior to relationship with focal child's biological father)<br>- Maternal grandmother's mental health (depression or anxiety) |
| Fitzpatrick & Pagani (2012) | - Academic achievement<br>- Classroom engagement working memory<br>- Nonverbal intellectual skills | - Sleep<br>- Child temperament |
| | - Breastfeeding<br>- Family configuration and functioning | - Parents level of education<br>- Maternal age |
| Sabol & Pianta (2012) | - School readiness<br>- Social skills | - Cognition<br>- Externalizing and internalizing problems |
| | - Early home environment<br>- Child-care quality | - Classroom quality |
| Pagani & Fitzpatrick (2014) | *Kindergarten school readiness:*<br>- Math<br>- Receptive vocabulary skills<br>- Attention skills<br>- Health-related behaviors (body mass index)<br>- Kindergarten child characteristics (i.e., attention problems, physical aggression, emotional distress, and prosocial skills)<br>*Academic achievement—4th grade*:<br>- Math | - Reading<br>- Science<br>- Spelling<br>- Global achievement<br>- Psychosocial adjustment (attentional problems, emotional distress, classroom and school engagement)<br>- Academic self-concept<br>- Intrinsic motivation<br>- Average weekly hours of television viewing |
| | - Number of months breastfed<br>- Family functioning and configuration (intact vs. nonintact) | - Maternal education (high school completion or not) |
| Shah, Kaciroti, Richards, & | - School readiness: language and math | |



© 2019 Global Journals

| | | |
|---|---|---|
| Lumeng (2016) | - Gestational age<br>- Maternal age<br>- Ethnicity<br>- Marital status (married/unmarried)<br>- History of prenatal smoking | - Duration of breastfeeding<br>- Plurality (singleton, twin, multiple gestation)<br>- Maternal education (<high school; high school graduate; >high school)<br>- Poverty (<185% federal poverty level; ≥185% federal poverty level) |
| Quirk, Grimm, Furlong, Nylund-Gibson, & Swami (2016) | - School readiness; literacy achievement | - Previous preschool experience<br>- English language proficiency |
| | | |
| Woodward, Lu, Morris, & Healey (2016) | - Emotional and behavioral regulation;<br>- Child behavior during parent-child interaction<br>- Mental health (ADHD, conduct, anxiety, depression, and autism) | - Educational achievement (math and language)<br>- Cognitive ability |
| | - Birthweight<br>- Parent self-regulation | - Family social risk<br>- Maternal mental health |
| Bernier, McMahon, & Perrier (2017) | - School readiness: color, shapes, numbers, letters<br>- Following commands<br>- Comparing sizes<br>- Counting and labeling objects<br>- Building a tower | - Spelling<br>- Inhibitory control<br>- Receptive vocabulary<br>- Child mental development |
| | - Maternal mind-mindedness<br>- Maternal sensitivity | - Family SES (standardized average of maternal education, paternal education, and family income) |
| Hammer, Morgan, Farkas, Hillemeier, Bitetti, & Maczuga (2018) | - Receptive and expressive vocabulary<br>- Reading and math | - Approaches to learning<br>- Behavioral problems: externalizing, and internalizing |
| | - Father's and mother's education and occupation<br>- Household income<br>- Maternal age at child birth<br>- Birth weight<br>- Medical risk factors in pregnancy | - Family health and well-being<br>- Parenting quality<br>- Hours that child spent in center-based child care |
| Paschall, Gershoff, & Kuhfeld (2018) | - Early academic skills (preschool)<br>- Reading and math skills (elementary) | |
| | - Race and ethnicity<br>- Family poverty status | |
| Raffington, Prindle, & Shing (2018) | - Cognition: math ability and verbal comprehension | |
| | - Income: partners' annual pretax employment income, indicated by the selection of one of 22 income ranges<br>- Poverty grouping: poor/chronic poverty versus never poor<br>- Maternal education | |

*Table 3.* Description of evaluation of child readiness

| Reference | Math or numeracy | Language/verbal ability | Approaches to learning/social skills/socioemotional or behavior problems | Others |
|---|---|---|---|---|
| Kurdek & Sinclair (2001) | - Number skills: knowledge of basic numerical concepts – e.g., counting to 10 | -Vocabulary: knowledge of specific word meanings - "What is a pencil?" | Not examined | - Auditory memory: recall of the sequence of words<br>- Concept mastery: knowledge of basic concepts - left, right, bottom, and top<br>- Form perception: names of basic shapes – e.g., circle, triangle<br>- General information: knowledge of facts typically exposed - "What is ice when it melts?"<br>- Gross motor skills: coordination e.g., jumping, skipping, and hopping<br>- Visuomotor skills composite:<br>* Body awareness: drawing a picture of a person with 16 parts<br>* Visual discrimination: discrimination of similarities and differences of shapes and |



© 2019 Global Journals

| | | | | |
|---|---|---|---|---|
| | | | | geometric forms<br>* Visual memory: memory of observed shapes, letters, or words |
| Li-Grining, Maldonado-Carreno, Votruba-Drzal & Haas (2010) | - General math skills: understanding identifying numbers and recognizing geometric shapes | - Language and literacy skills: receptive vocabulary and reading comprehension | - ATL: attentiveness, persistence, learning independence, flexibility, organization, eagerness to learn, concentration, responsibility, creativity, interest in a variety of things, social skills, self-regulation, ability to control temper, acceptance of peer ideas for group activities, respect for the property rights of others, appropriate responses to pressure from peers, frequency of fights, arguments, tantrums or anger | N.A. |
| Fitzpatrick & Pagani (2012) | - Number sequence to 10<br>- 1 to 1 correspondence in which a sequence is mapped onto objects being counted<br>- Understanding the cardinal value<br>- Successive number represents a set which contains more objects | - Vocabulary | Not examined | - Follow rules, instructions and directions<br>- Listen attentively<br>- Complete work on time<br>- Work autonomously<br>- Work and play cooperatively with other children<br>- Work neatly and carefully |
| Sabol & Pianta (2012) | - Calculation | - Letter-word identification<br>- Passage comprehension | - Social skills: positive socioemotional skills, maladaptive socioemotional behaviors, engagement in school<br>- Externalizing and internalizing problems | - Cognition: attention, working memory |
| Pagani & Fitzpatrick (2014) | - Number sequence from 1 to 10<br>- 1-to-1 correspondence in which a numerical value is mapped onto objects being counted<br>- Cardinal value of each number<br>- Generative rule that relates adjacent cardinal values and that each successive number represents a set that contains more objects | - Receptive vocabulary skills; | - Academic self-concept<br>- Intrinsic motivation<br>- Psychosocial adjustment: attentional problems, emotional distress, classroom engagement, school engagement | - Health-related behaviors: weekly frequency of each child's consumption of soft drinks, sweet snacks, fruits and vegetables, dairy products; children's weekly involvement in activities requiring physical effort during free time<br>- Attention skills: easily distracted; inattentive; unable to concentrate, cannot pay attention for long, cannot sit still, restless and hyperactive; trouble sticking to any activity; cannot stop fidgeting; impulsive, acts without thinking; difficulty waiting for his or her turn; and cannot settle down to do anything for more than a few moments |
| Shah, Kaciroti, Richards, & Lumeng (2016) | - Number sense<br>- Geometry<br>- Counting numerical operations<br>- Pattern recognition | - Vocabulary<br>- Letter and word recognition<br>- Understanding letter-sound relationships<br>- Phonological awareness, sight word recognition, and understanding words in the | Not examined | N.A. |



© 2019 Global Journals

| | | | | |
|---|---|---|---|---|
| | | context of simple sentences | | |
| Quirk, Grimm, Furlong, Nylund-Gibson, & Swami (2016) | Not examined | - Literacy achievement: reading comprehension, literary response and analysis, writing strategies, and written conventions. | - Social-emotional, | - Physical<br>- Cognitive elements |
| Woodward, Lu, Morris, & Healey (2016) | - Math fluency e.g., speed and accuracy in completing addition | - Passage comprehension, e.g., matching words to symbols<br>-Understanding directions<br>- Spelling | -Initiative<br>-Attention<br>-Persistence<br>-Enthusiasm towards tasks<br>- Social engagement<br>- Cooperation<br>- Emotional symptoms<br>- Conduct problems<br>- Hyperactivity/inattention | - Child behavior during parent-child interaction, e.g., solve problems<br>- Positive affect: e.g., facial expressions (smiles and laughter)<br>- Negative affect: e.g., pouting, whining, crying, and signs of anger or frustration<br>- Execute function<br>- Cognition: sensory abilities, memory, learning ability, responsivity |
| Bernier, McMahon, & Perrier (2017) | - Knowledge spatial notions (beside, under, etc.)<br>- Knowledge of numbers | - Knowledge of letters<br>- Knowledge of colors and shapes | Not examined | N.A. |
| Hammer, Morgan, Farkas, Hillemeier, Bitetti, & Maczuga (2018) | - Number sense<br>- Counting<br>- Operations<br>- Geometry<br>- Patterns<br>- Measurement | - Basic skills: letter recognition, letter sounds, early reading, phonological awareness, print conventions, and word matching | - Approaches to learning: eagerness to learn, pays attention well, works/plays independently, keeps working until finished, and has difficulty concentrating.<br>- Externalizing: disrupts others, has temper tantrums, is physically aggressive, and annoys others<br>- Internalizing: seems unhappy, worries about things, and acts shy | N.A. |
| Paschall, Gershoff, & Kuhfeld (2018) | - Mathematic concepts taught in mainstream classrooms, such as number recognition and counting. | - Word recognition and pronunciation ability<br>- Skills at matching letters, naming names, and reading single words out loud | Not examined | N.A. |
| Raffington, Prindle, & Shing (2018) | - Applied problems | - Cognition: verbal comprehension—requires children to name familiar and unfamiliar pictured objects | Not examined | N.A. |



© 2019 Global Journals