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Childhood Poverty and Cognitive Development in Latin America in the 21st Century

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Abstract

For at least eight decades, researchers have analyzed the association between childhood poverty and cognitive development in different societies worldwide, but few of such studies have been carried out in Latin America. The aim of the present paper is to systematically review the empirical studies that have analyzed the associations between poverty and cognitive development in children under 18 years of age from Latin American and Caribbean countries between 2000 and 2015. This analysis takes into consideration the country where the work was conducted, the experimental and analytical design, sample size and composition, cognitive and poverty paradigms implemented, levels of analysis, and the inclusion of mediation analyses. Through these, we identify common patterns in the negative impact of poverty that have been repeatedly verified in the literature in other continents; we also call attention to a set of issues regarding sample, design, paradigms, impact, and mediation analyses that should be considered in future studies in the region. © *2016 Wiley Periodicals, Inc.*

Childhood poverty and cognitive development are complex phenomena involving the dynamic interaction of several biological and psychosocial dimensions (Bradley & Corwyn, 2002; Hackman, Farah, & Meaney, 2010; Lipina & Colombo, 2009; Romens, McDonald, Svaren, & Pollak, 2015). Identifying their associations is a promising scientific effort, which could contribute to the understanding of how childhood poverty influences achievement, health, and psychosocial development throughout the life cycle and consequently inform the design of interventions and policies. Several studies have suggested a number of pathways through which poverty can influence cognitive development during childhood, at multiple levels of analysis (i.e., individual, family, and social contexts) (Gianaros & Hackman, 2013; Lipina, 2014; Moffitt et al., 2011; Roy & Raver, 2014). Among the environmental factors that have been associated with these influences, the most cited in the scientific literature, worldwide are: family income composition, and social support; parental level of education, occupation, mental health, parenting style, and parent–child interactions; housing conditions, quality of home and school environments, early childhood program attendance; neighborhood resources; and health and nutrition (Bradley & Corwyn, 2002; Evans & Wachs, 2010; Spencer & Swanson, 2013). However, it is important to consider that the influence of poverty may be modulated and moderated by systematic differences among individuals and societal cultural patterns of parenting, schooling, and psychosocial environments (Spencer & Swanson, 2013). In addition, the influence of these factors may vary according to the type, number, and accumulation of risk factors to which children are exposed, the timing of exposure to poverty, and the individual susceptibility to each of these variables (Roy & Raver, 2014).

The designs implemented to analyze the influence of poverty on cognitive development have shown to be sensitive to different methodological aspects: the paradigms used to define poverty and measure cognition, the consideration of individual and cultural differences, and several issues related to the sampling protocol, such as ages of children, sample size, and source of data (Duncan & Magnusson, 2012; Lipina, Simonds, & Segretin, 2011). These methodological issues are particularly relevant in the context of Latin America, which is one of the most unequal regions in the world (Zmerli & Castillo, 2015), and has less development of this area of research, in comparison with research generated in North America, Europe, and Australia (LeVine & New, 2008). In the following sections, we highlight three of the main issues related to design and methodology, which we consider necessary for this systematic review.

Conceptual and Operational Childhood Poverty Definitions

Because childhood poverty is a complex construct involving several factors at the individual, family, and environmental levels, its conceptual and

operational definitions vary depending on the theoretical approach (Spicker, Álvarez Leguizamón, & Gordon, 2006). Consequently, different definitions of poverty can lead to variation in the identification of specific influences and mediating mechanisms regarding cognitive development (Duncan & Magnuson, 2012; Lipina et al., 2011). In general, studies on childhood poverty and cognitive development approach the definition of poverty in terms of socioeconomic status (SES). This construct refers to a family's access to economic and social resources and the social positioning, privileges, and prestige that derive from these. Because it may be difficult to measure directly SES or a position in a social hierarchy, social scientists often use a combination of single indicators, mostly income, parental occupation, and maternal education (Duncan & Magnuson, 2012). Definitions based on other criteria such as deprivations of basic needs, human rights, and well-being have also been applied (Gordon, Nandy, Pantazis, Pemberton, & Townsend, 2003). In the deprivation approach, the general concept of poverty is determined through comparing personal or family circumstances, a set of universal (absolute) and specific (relative) needs, and the resources available to satisfy them. Basic needs can be classified according to how they are fulfilled through economic, political, cultural, and/or social means. Needs such as affection, participation in social activities, identity, and freedom are not easy to include in empirical studies. However, satisfaction of those noneconomic needs is modulated indirectly by household economic circumstances (Lipina et al., 2011). In Latin America, studies on this topic consider the family economic well-being as a proxy for poverty. This concept has been assessed in different ways, including income level, main source of family income, source of health care, child health status, household sanitation practices, maternal health status, and parental education. Generally, across different types of measurements, poorer scores on measures of economic well-being correlate significantly with poorer scores on measures of child development (Berghout Austin et al., 2006). Last, it is important to consider that none of these approaches considers the experience of poverty in terms of how children experience it at different levels of analysis (Lipina et al., 2011).

Paradigms of Cognitive Development

Taking into account the perspectives of developmental cognitive psychology and neuroscience, the first two decades of life is a critical phase for the development of those cognitive skills involved in socialization, the early learning, and the entry to formal school (Posner & Rothbart, 2007). In the study of the influence of poverty on cognitive development during that period, previous studies have applied primarily a psychometric framework. This approach considers the level of cognitive development of each child with respect to peers, using standardized tests that measure factors related to several aspects of cognitive, motor, language, and social

development. Other approaches have considered the construct of cognitive control (executive functions and self-regulation), which refers to specific interrelated information-processing skills involved in the control and coordination of information to achieve goal-directed actions, such as attention, inhibitory control, flexibility, working memory, and self-monitoring processes (Garon, Bryson, & Smith, 2008). The importance of considering the cognitive paradigm used rests on the fact that different cognitive processes could be differentially sensitive to distinct aspects of the deprivations imposed by poverty (Lipina, 2014; Roy & Raver, 2014).

Influences of Poverty on Cognitive Development. Most of the studies conducted in the past nine decades in different societies have analyzed the effects of poverty on physical health, cognitive performance in terms of intelligence quotients (IQ) or patterns of maturation (i.e., developmental quotients), educational achievement, and socioemotional behavior. Findings include different physical, cognitive, and socioemotional impacts from birth through adolescence and the existence of different risk factors and mediating mechanisms that modulate the degree and extent of impacts (Bradley & Corwyn, 2002; Evans & Wachs, 2010). Until recently, however, there were no comparable data sets on cognitive development of young children for most developing countries (Harpham, 2002). Only in the past few years have some studies begun to analyze cross-sectional data from low-income countries, and results showed significant differences in early cognitive development between children of high- and low-SES backgrounds (Fernald, Weber, Galasso, & Ratsifandrihamanana, 2011; Paxson & Schady, 2007; Schady, 2011).

In the present systematic review, we provide an overview of the literature on poverty and cognitive development over the past 15 years in Latin American and Caribbean countries. In particular, our aim is to explore the state of progress of the research in this area considering the main issues mentioned previously on sample, design, paradigms, and mediation analyses.

Methods

We performed several bibliographic searches of articles published in academic journals, using the databases from PubMed and EBSCO. First, we used the following search terms: poverty, environmental factors, risk factors, adversity, SES, income, stress, neurotoxicity, effects, impact, mediation, cognitive development, executive functions, and self-regulation. We considered the reference to three possible psychological constructs with respect to the operationalization of *cognition*: self-regulation, executive function, and cognitive development. Regarding *poverty*, we have considered six constructs: environmental factors, risk factors, adversity, SES, income, and poverty. In addition, *nutrition, stress,* and *neurotoxicity* constructs were

considered as specific factors associated with poverty experience. We refer to the associations among the search-term variables in terms of effects, impacts, and mediation. Second, we applied the following filters: works from Latin American and Caribbean countries, children from 0 to 18 years of age, the analysis of relations between poverty and cognitive development (i.e., effects or impact and/or mediation analyses), empirical articles, and articles published between the years 2000 and 2015. The searches were limited to publications in English, Spanish, or Portuguese. Reviews, case reports, editorials, commentaries, discussions or letters to the editor, books, dissertations or congress abstracts, and doctoral thesis were excluded. Likewise, we excluded studies of interventions and those including only academic achievement information without explicit reference to cognition.

Based on different combinations from these terms, a total of 56 searches were performed. Additionally, six complementary searches using the following terms were conducted by country: (a) poverty and cognitive development, (b) SES and cognitive development, (c) poverty and executive functions, (d) SES and executive functions, (e) income and cognitive development, and (f) income and executive functions. These searches included the 24 Latin American countries based on UNESCO classification: Argentina, Bolivia, Belize, Brazil, Colombia, Chile, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, Venezuela, and Suriname.

After defining the final number of studies, we tabulated them according to the following categories: author, year, country, type of study (cross-sectional/longitudinal), sample (composition/size), cognitive paradigm (psychometric/information processing), consideration of different levels of analysis in the evaluation of cognition (molecular/neural activation/behavior), poverty paradigm (income, deprivations, rights), type of analysis (impact, mediation), instruments for cognitive assessment, and main findings.

Results

The initial search resulted in 324 articles, from which 53 articles fitted the selection criteria (Table 1.1). Of these, 34 (64%) were published in the past 5 years, 16 (30%) between 2005 and 2009, and the last three (6%) between 2000 and 2004. Sample sizes varied from 30 to 220,062 children (Table 1.2), and the designs of the studies were mostly cross-sectional ($n = 37$; 70%). Regarding the age of the samples, among the cross-sectional studies, only three (6%) included children older than 12 years, whereas 12 (23%) included infants (6 to 24 months), 19 (36%) included toddlers and preschool children (2 to 6 years), and 13 (25%) included school-age children (6 to 12 years). In the case of those studies that implemented longitudinal designs

Table 1.1. Studies on Poverty and Cognitive Development in Children Under 18 Years of Age from Latin America and the Caribbean between the years 2000 and 2015

Authors	*Year*	*Country*	*Study Design*	*Sample Size*	*Children's Ages*	*Poverty Paradigm*	*Cognitive Paradigm*	*Levels of Analysis*	*Type of Analysis*
Andrade et al.	2005	Brazil	Cross-sectional	350	17 to 42 months	Deprivation	Psychometry	Behavioral	Impact
Arán-Filippetti	2011	Argentina	Cross-sectional	254	7 to 12 years	Deprivation	Psychometry, information processing	Behavioral	Impact
Arán-Filippetti & Richaud de Minzi	2012	Argentina	Cross-sectional	254	7 to 12 years	Basic needs	Psychometry, information processing	Behavioral	Impact and mediation
Batrouni et al.	2006	Argentina	Cross-sectional	276	6 to 24 month	N/A	Psychometry	Behavioral	Impact
Berghout Austin et al.	2006	Paraguay	Cross-sectional	30	12 to 24 months	Deprivation	Psychometry	Behavioral	Impact
Caballero & Contini de González	2008	Argentina	Cross-sectional	52	12 to 24 months	Deprivation	Psychometry	Behavioral	Impact
Calderón & Hoddinott	2011	Guatemala	Cross-sectional	646	0 to 12 years	Deprivation	Psychometry	Behavioral	Impact
Camargo-Figuera et al.	2014	Brazil	Longitudinal	3523	perinatal period, 3 months, 12 months, 6 years	Deprivation	Psychometry	Behavioral	Impact
Coddington et al.	2014	Chile	Cross-sectional	1589	0 to 5 years	Deprivation	Psychometry	Behavioral	Mediation
Crookston et al.	2011	Peru	Longitudinal	1674 (YL)	6/18 months to 4/6 years	Deprivation	Psychometry	Behavioral	Impact

(*Continued*)

Table 1.1. Continued

Authors	*Year*	*Country*	*Study Design*	*Sample Size*	*Children's Ages*	*Poverty Paradigm*	*Cognitive Paradigm*	*Levels of Analysis*	*Type of Analysis*
Crookston et al.	2013	Peru	Longitudinal	1674 (YL)	6/18 months to 4/6 years	Deprivation	Psychometry	Behavioral	Impact
Crookston et al.	2014	Peru, India, Vietnam, Ethiopia	Longitudinal	Ethiopia (N = 787), India (N = 813), Peru (N = 626), Vietnam (N = 854) (YL)	7/8 years, 11/12 years, 14/15 years	Deprivation	Psychometry	Behavioral	Impact
Dahlman et al.	2013	Bolivia	Cross-sectional	67	10 to 17 years.	Deprivation	Psychometry, Information processing	Behavioral	Impact
Di Cesare et al.	2013	Peru	Longitudinal	2052 (YL)	6/18 months to 4/5 years	Deprivation	Psychometry	Behavioral	Impact and mediation
Engel de Abreu et al.	2014	Brazil	Cross-sectional	106	6 to 8 years	Deprivation	Information processing	Behavioral	Impact
Fan et al.	2013	Brazil	Cross-sectional	97	6 to 7 years	Deprivation	Psychometry	Behavioral	Impact
Fernald et al.	2006	Mexico	Cross-sectional	896	12.5 to 23.5 months	Deprivation	Psychometry	Behavioral	Impact
Fernald et al.	2008	Mexico	Cross-sectional	639	2.5 to 5 years	Income	Psychometry	Behavioral, molecular (cortisol)	Impact
Fink & Rockers	2014	India, Peru, Vietnam, Ethiopia	Longitudinal	Ethiopia (974), India (976), Peru (678), Vietnam (976) (YL)	8 to 15 years	Deprivation	Psychometry	Behavioral	Impact

(*Continued*)

Table 1.1. Continued

Authors	*Year*	*Country*	*Study Design*	*Sample Size*	*Children's Ages*	*Poverty Paradigm*	*Cognitive Paradigm*	*Levels of Analysis*	*Type of Analysis*
Fonseca et al.	2008	Brazil	Cross-sectional	70	6 to 15 years	Deprivation	Psychometry	Behavioral	Impact
Galván et al.	2013	Chile	Cross-sectional	1089	4 to 5 years	Deprivation	Psychometry	Behavioral	Impact
Galván et al.	2014	Chile	Cross-sectional	115	5 years	Deprivation	Psychometry	Behavioral	Impact
Lima et al.	2004	Brazil	Longitudinal	245	0 to 12 months	Deprivation	Psychometry	Behavioral	Impact
Lipina et al.	2000	Argentina	Cross-sectional	150	3 to 5 years	Deprivation	Psychometry, Information processing	Behavioral	Impact
Lipina et al.	2004	Argentina	Cross-sectional	208	3 to 5 years	Deprivation	Psychometry, Information processing	Behavioral	Impact
Lipina et al.	2005	Argentina	Cross-sectional	280	6 to 14 months	Deprivation	Psychometry, Information processing	Behavioral	Impact
Lipina et al.	2013	Argentina	Cross-sectional	250	4 to 5 years	Deprivation	Psychometry, Information processing	Behavioral	Mediation
Lopez Boo	2013	Peru	Longitudinal	1562 (YL)	5 to 8 years	Deprivation	Psychometry	Behavioral	Impact
Lozoff et al.	2006	Costa Rica	Longitudinal	185	12/23 months, 5 years, 11/14 years, 15/18 years, and 19 years	Deprivation	Psychometry	Behavioral	Impact

(*Continued*)

Table 1.1. Continued

Authors	*Year*	*Country*	*Study Design*	*Sample Size*	*Children's Ages*	*Poverty Paradigm*	*Cognitive Paradigm*	*Levels of Analysis*	*Type of Analysis*
Lu et al.	2009	Costa Rica	Cross-sectional	35	4 to10 years	N/A	Psychometry	Behavioral	Impact
Macours & Vakis	2010	Nicaragua	Cross-sectional	2086	3 to 7 years	Deprivation	Psychometry	Behavioral	Impact
Marques dos Santos et al.	2008	Brazil	Cross-sectional	320	20 to 42 months	Deprivation	Psychometry	Behavioral	Impact
Mata et al.	2013	Brazil	Cross-sectional	137	3 to 5 years	Deprivation	Information processing	Behavioral	Impact
Mayer Foulkes & Serván Mori	2009	Mexico	Cross-sectional	3758	5 to 17 years	Deprivation	Psychometry	Behavioral	Impact
Mayer Foulkes et al.	2008	Mexico	Cross-sectional	2400	5 to 8 years	Deprivation	Psychometry	Behavioral	Impact
Mendive et al.	2013	Chile	Cross-sectional	33	9 months	Income	Information processing	Behavioral	Impact
Musso	2010	Argentina	Cross-sectional	120	6 to 10 years	Deprivation	Information processing	Behavioral	Impact
Orozco-Hormaza et al.	2012	Colombia	Cross-sectional	405	3 to 5 years	Deprivation	Information processing	Behavioral	Impact
Paiva et al.	2010	Brazil	Cross-sectional	136	9 to 12 months	Deprivation	Psychometry	Behavioral	Impact
Patrick et al.	2005	Brazil	Longitudinal	77	6 to 2 years	Income, deprivation	Psychometry	Behavioral	Impact
Paxson & Schady	2007	Ecuador	Cross-sectional	3153	36 to 71 months	Deprivation	Psychometry	Behavioral	Impact

(*Continued*)

Table 1.1. Continued

Authors	*Year*	*Country*	*Study Design*	*Sample Size*	*Children's Ages*	*Poverty Paradigm*	*Cognitive Paradigm*	*Levels of Analysis*	*Type of Analysis*
Rindermann et al.	2010	Brazil and Germany	Longitudinal	Brazil (833), Germany (722)	Brazil: 7 to 15 years; Germany: 10/11 to 19/20 years	Deprivation	Psychometry	Behavioral	Impact
Rolleston	2014	India, Peru, Vietnam, Ethiopia	Longitudinal	YL Samples (N/S)	5 to 15 years	Deprivation	Psychometry	Behavioral	Impact
Rubio Codina et al.	2015	Colombia	Cross-sectional	1330	6 to 42 months	Deprivation	Psychometry	Behavioral	Impact
Santos et al.	2008	Brazil	Cross-sectional	346	5 years	Deprivation	Psychometry	Behavioral	Impact
Schady	2011	Ecuador	Longitudinal	2118	36 to 71 months	Deprivation	Psychometry	Behavioral	Impact
Schady et al.	2015	Chile, Colombia, Ecuador, Peru, Nicaragua	Longitudinal	1817/5394	between 36 and 71 months	Deprivation	Psychometry	Behavioral	Impact
Shayer et al.	2015	Brazil	Cross-sectional	60	6 to 12 years	Income, Deprivation	Psychometry	Behavioral	Impact
Torche & Echevarria	2011	Chile	Longitudinal	220062	9 years	Deprivation	Psychometry	Behavioral	Impact
Valadez	2010	Mexico	Cross-sectional	1870	48 to 71 months	Deprivation	Psychometry	Behavioral	Impact
Valadez Martinez	2014	Mexico	Cross-sectional	2000	4 to 6 years	Deprivation	Psychometry	Behavioral	Impact

(*Continued*)

Table 1.1. Continued

Authors	*Year*	*Country*	*Study Design*	*Sample Size*	*Children's Ages*	*Poverty Paradigm*	*Cognitive Paradigm*	*Levels of Analysis*	*Type of Analysis*
Walker et al.	2015	Jamaica	Longitudinal	89	12 to 72 months	Deprivation	Psychometry	Behavioral	Impact
Wehby & McCarthy	2013	Argentina, Brazil, Chile, Ecuador	Cross-sectional	Argentina (664), Brazil (516), Chile (388), Ecuador (464)	3 to 24 months	Deprivation	Psychometry	Behavioral	Impact

Note. YL: Young Lives Project; N/S: nonspecified; N/A: not available; IQ: Intelligence quotient.

Table 1.2. Ranges of Sample Sizes by Number of Studies

Sample Size	*Number of Studies*
<50	4
51 to 200	12
201 to 500	11
501 to 1000	6
>1001	19

(30%), seven used data from the Young Lives Project (Lyytikäinen, Jones, Huttly, & Abramsky, 2006), which includes a sample of 12,000 children followed for 15 years in three rounds of assessments. Regarding the other nine longitudinal studies, four included between two and five cognitive assessments. The rest of the longitudinal studies involved only one cognitive measure, and sample ages ranged from birth to 9 years.

Most of the articles ($n = 51$; 92%) analyzed the impact of poverty on cognitive development, we classified the main findings in four categories: (a) modulation of SES on executive function ($n = 9$; 16%); (b) modulation of SES on motor and mental development, language, academic achievement, nutrition, stress regulation, and neurotoxicity ($n = 39$; 74%); (c) absence of SES modulation on cognitive development ($n = 3$; 6%); and (d) absence of data on impacts ($n = 2$; 4%). Only four (8%) studies included the analysis of mediation pathways of the impact.

With regard to cognitive paradigms, the measures used to assess cognitive development were quite diverse: (a) 41 (77%) studies used psychometric approaches (e.g., Bayley Scales of Infant and Toddler Development, Wechsler Intelligence Scale for Children, Controlled Oral Word Association Test, Kaufman Brief Intelligence Test, Matching Familiar Figures Test–20, Argentinian Scale of Sensorimotor Intelligence, Raven, Cognitive Development Assessment, Denver Developmental Screening Test, Woodcock–Johnson Test, Peabody Picture Vocabulary Test); (b) five (10%) studies applied an information-processing approach, looking for specific cognitive processes (e.g., Wisconsin Card Sorting Test, Verbal Fluency, Porteus Maze Test, Stroop Color/Word, Children's Color Trails Test, Attention Network Task, Simon Task, Go/no Go, Duck task, Automated Working Memory Assessment); and (c) seven (13%) applied a combination of both approaches. In addition, most studies ($n = 49$; 92%) included some indicators from the deprivation perspective, and only two works used family income.

As for levels of analysis, all studies included at least one behavioral cognitive measure, and in only one study (Fernald et al., 2006) the authors added a second level of analysis, the measurement of cortisol.

Finally, the countries ranked as follows in terms of publications on the topic, from highest to lowest: Brazil, Argentina, Perú, Chile, México,

Figure 1.1. Number of articles published by country

Ecuador, Colombia, Costa Rica, Bolivia, Guatemala, Jamaica, Nicaragua, and Paraguay (Figure 1.1).

Discussion

The objective of this paper was to systematically review and analyze Latin American and Caribbean studies that have investigated the relationship between poverty and cognitive development in children under 18 years of age over the last 15 years. The number of studies included in this review is relatively high (53 empirical articles), even though not all Latin American countries had such publications. The map of the publications by country shows a high concentration of articles in South America. Most Caribbean and Central American countries are underrepresented. One key question

therefore is about the opportunities and barriers for those countries to implement scientific research in this area of study, which could be related to the availability of adequate human and financial resources, and policy and social priorities, among others.

Many of the studies used information available from national censuses or surveys, or international databases (e.g., Young Lives). Although all of them are an important and valuable data source for researchers worldwide, some limitations should be considered regarding the appropriateness of the design and demographic variability of samples to analyze the influence of poverty on cognitive development (Duncan & Magnuson, 2012; Lipina et al., 2011).

Most studies analyzed the impact of poverty on cognitive performance, implementing for such a purpose different statistical approaches, such as one-way ANOVA, multivariate ANOVA, multiple regression, mixed-effects regression, hierarchical linear modeling, Mann–Whitney and Kruskal–Wallis tests. In general, these analytical methods are appropriate for exploring the hypothesis about the impact of poverty on cognition. Actually, most studies validated previous findings from other regions of the world about the negative effects of poverty on children's cognitive performances in a broad range of measures. The latter is important in terms of building a regional database that would be more culturally appropriate and reliable for policy considerations. Eventual and progressive inclusion of more levels of analysis for characterizing cognition (i.e., molecular, neural activation, and behavior) in a longitudinal context of changes caused by development or interventions should consider other analytical approaches that could contemplate multiple interrelationships changing over time (e.g., mixed models).

Only four studies focused on the mechanisms through which poverty impacts cognitive development. The statistical methods implemented in such cases were the Sobel–Goodman mediation test, the structural equation model, and a multi-group path analysis. In one of these studies, authors analyzed the association between SES and executive functions, finding that impulsivity partially explained the impact of SES on cognition (Arán-Filippetti & Richaud de Minzi, 2012). A second study explored SES and receptive vocabulary, and results showed that this relation was partially mediated by indices of the family's standard of living, and parental level of cognitive and linguistic stimulation at home (Coddington, Mistry, & Bailey, 2014). A third study found that maternal education was associated with reduced risk of mental health problems for mothers, and with improved nutrition and cognitive development in children (Di Cesare, Sabates, & Lewin, 2013). Finally, a fourth study analyzed mediation relationships among different environmental factors and cognitive control performance. Results showed indirect effects of literacy activities on working memory and fluid processing domains, as well as effects of computer resources on fluid processing. In addition, marginal indirect effects of computer resources on attentional

control and working memory domains were also identified (Lipina et al., 2013).

A larger number of studies implemented cross-sectional designs. From those that used a longitudinal design, more than half included data from the Young Lives project. This indicates a preference for cross-sectional designs over longitudinal ones (a worldwide tendency), which may be due to the methodological, financial, and logistic difficulties and demands. Latin America is not an exception. In the same sense, the implementation of different levels of analysis for the cognitive assessment was not present in the studies, with the exception of one that included the analysis of children's cortisol levels associated with the cognitive evaluation (Fernald, Burke, & Gunnar, 2008). All studies were conducted taking into consideration the behavioral level of analysis, using various instruments of cognitive assessment belonging to the most common paradigms: psychometric and information processing. Thus, there are many studies that used the same tasks, in particular when the cognitive paradigm used was the psychometric, which implies the use of standardized IQ and developmental tests. In the case of the information-processing approach, tasks varied across studies and involved the assessment of planning, inhibitory control, memory, attention, and cognitive flexibility—most without appropriate parametric validations. In addition, most studies involved samples of children aged 2 to 12 years; in a few cases, the samples included preadolescents and adolescents (e.g., Lu et al., 2009; Mayer Foulkes & Serván Mori, 2009). This highlights the need for more samples at various ages and using parametric and information-processing validated tasks, to improve the conditions of evaluation and eventually the comparison among studies and countries.

Finally, regarding the poverty paradigms, most of the articles used measures based on the basic-needs perspective, although some applied measures from the income framework; none included measures from the perspective of human rights. In the poverty literature, studies on rights, security, empowerment, and social capital, as well as psychological experiences, have drawn less attention than those focused on income or economic stratification (Lipina et al., 2011). Only recently has the need to address poverty measures from a diverse perspective including child developmental frameworks been increasingly recognized (White, Leavy, & Masters, 2002).

Conclusion

The present review found 53 empirical studies that analyzed the associations between poverty and cognitive development in children from Latin America and the Caribbean. The approaches in the region are characterized as focused on the analyses of impacts in cross-sectional contexts of design, the psychometric and deprivation paradigms, and the behavioral level of analysis. In such a context, there is also a remarkable lack of inclusion of

an ecological framework (i.e., different contexts of development), considering a child perspective of poverty.

Consequently, it is important to prioritize the need to continue and expand the analysis of the impact of poverty on cognitive development by considering several key issues: (a) sample size, (b) potential design biases (e.g., nonrandomized), (c) underrepresented countries, (d) the inclusion of mediation analysis to understand the mechanisms in which those impacts are based, (e) the application of longitudinal designs to contribute with the understanding of the influences of biological and social determinants on trajectories, (f) the assessment of cognition applying executive functions paradigms to identify the modulation of poverty on specific cognitive processes, (g) the inclusion of several levels of analysis rather than only the behavioral, and (h) the innovation in childhood poverty measures to go beyond the income and deprivation rationales. Without careful attention to these issues in future research, we cannot hope to adequately inform policy makers and political leaders of the importance of the battle against poverty and the deleterious role it plays not only in children's early development but also in the economic and social well-being of all individuals and families living in poverty.

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