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Abstract

A significant way to contribute in the analysis of deficiencies in school performance, a known issue particularly in mathematics, is by delving into children's development of informal mathematics during their early childhood, and thus have better elements to intervene in a more timely, effective manner. From this point of view, this study analyzes how the relationship between parenting behavior and early mathematics can be mediated by the development of self-regulation in children. The sample of the study is made of 85 students, between 5 and 6 years old, who are in their last year of preschool in two public schools in Lima. The instruments used are the Spanish translations of the Test of Early Mathematics Ability - 3, Head-Toes-Knees-Shoulders task and Parent Behavior Inventory. The main results show that self-regulation in children and their caregivers' parenting behavior are significant predicting variables in early mathematical development. Specifically, the findings suggest that self-regulation in children can significantly mediate the relationship between the dimension of support/engagement in parenting behavior and the development of early mathematics in children during preschool.

Keywords: early mathematics; self-regulation; parenting behavior; preschoolers; early childhood education.

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El Rol Mediador de la Autorregulación en la Relación de las Conductas Parentales y el Desarrollo de la Matemática Temprana en Niños Preescolares Peruanos

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Resumen

Una manera significativa de contribuir al análisis de la conocida problemática de las deficiencias en los desempeños escolares, especialmente en matemáticas, es profundizar en el entendimiento del desarrollo de la matemática informal de los niños en edad temprana y, así, tener mejores elementos para intervenir de una manera más oportuna y efectiva. En esta perspectiva, en el presente estudio se realiza un análisis de cómo la relación entre las conductas parentales y la matemática temprana puede estar mediada por el desarrollo de la autorregulación de los niños. La muestra del estudio la conformaron 85 estudiantes, entre 5 y 6 años de edad, del último año de educación inicial de dos colegios públicos en Lima. Los instrumentos utilizados son adaptaciones al castellano del Test of Early Math Ability - 3, Head-Toes-Knees-Shoulders task y Parent Behavior Inventory. Los principales resultados muestran que la autorregulación de los niños y las conductas parentales de sus cuidadores son variables predictoras significativas del desarrollo de la matemática temprana. Específicamente, se encuentra que la autorregulación de los niños logra mediar significativamente la relación entre la dimensión de soporte/compromiso de conductas parentales y el desarrollo de la matemática temprana de los niños de educación inicial.

Palabras clave: matemática temprana; autorregulación; conducta parental; preescolares; educación infantil.

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This research seeks new ways to understand and contribute to an old educational problem in many countries around the world: the low level of mathematical competence in students. Among these countries is Peru, where there are alarming results in international tests, such as the ones conducted by the Programme for International Student Assessment (PISA), and national tests, such as the Student School Assessment (*Evaluación Censal Escolar* - ECE) carried out by the Ministry of Education of Peru. According to these results, the majority of Peruvian students do not have the expected mathematical learnings for their age or the grade they are placed in their schools (Cueto et al., 2016; Organization for Economic Co-operation and Development, 2016; Peruvian Ministry of Education, 2020).

Given the fact that one of the most prominent factors to predict future academic achievement is the early mathematical abilities with which a child enters school (Duncan et al., 2007; Watts et al., 2018), it is of vital importance to research and intervene in the factors associated to mathematical learning in children during the preschool stage. In this sense, the National Council of Teachers of Mathematics (NCTM, 2000) mentions that the stage of early childhood education is an important period to stimulate numerical sense and encourage arithmetic development in children, especially due to their great ability to predict their future academic performance (Cerda & Pérez, 2015; Kilday & Kinzie, 2009).

Ginsburg et al. (2008) state that everyday mathematics is an essential – and even inevitable – fact in the cognitive development of children. Likewise, they mention that researchers have collected evidence in the last years, demonstrating that, from birth to five or six years old, children develop mathematics that includes informal ideas of addition, subtraction, form, size, location, patterns, position, etc., that is surprisingly broad and complex.

Ginsburg and Baroody (2007) divide the development of mathematical competence in children as informal and formal. They mention that informal mathematics deals with notions and processes usually learned in non-school everyday dynamics, which are developed from interactions with physical and social means, where the situations presented are, for instance, games that generate meaningful learning in a more natural, spontaneous, fun way (Purpura et al., 2013). The development of formal mathematics is characterized by the abilities and concepts a person usually learns in schools. It is usually characterized by more symbolic, written mathematics (Baroody, 2000; Ginsburg & Baroody, 2007). The forms of learning described above are

related to each other in order to give meaning to the development of mathematical knowledge (Ginsburg et al., 1998; Purpura et al., 2013).

Due to the aforementioned, it is fundamental to stimulate and develop children's mathematical competence from an early age with daily activities in their closest social environment, such as their family. This mathematical learning will be intuitive in an informal experience setting, which is fundamental so that they can then learn better in a formal educational setting (NCTM, 2000; Starkey & Klein, 2008). For this reason, it is important and necessary to delve into research about factors that might be linked to mathematical learning in early ages and informal settings.

One of the main variables to be considered – especially in early childhood – is the family environment, which represents their closest influential social environment where one parents (or main caregiver) are of vital importance, for they directly intervene in children's comprehensive development (Bronfenbrenner, 1986). In this context, it is worth noting that the upbringing has a significant influence in very important aspects of the child, such as the development of social skills and academic performance (Baumrind, 1970).

Over the years, there have been different ways of addressing the subject of parenting practices and their links to behavioral, cognitive and affective aspects when interacting with their children (Palomeque & Ruiz, 2013). The so-called parenting styles are characterized by presenting more affective, emotional and attitudinal factors when parents communicate the way they raise their children. The styles they say they have will be the main guidelines for their actions in specific upbringing situations (Benson & Haith). In this context, parents' specific actions or behaviors that help guide their children to achieve socialization objectives will be referred as parenting behavior (Reséndiz & Romero, 2007).

Parenting behaviors usually look for an adequate upbringing that generates physical care and provides environments for socialization and interaction so that their children can develop (Guerrero & Alva, 2015). These behaviors may include discipline, physical punishment, verbal communication, rewards, spending time with their children, etc. (Millones et al., 2014). There is evidence of significant associations from parenting behavior with socio-economic, cognitive and linguistic aspects in children's different stages of development (Cuervo, 2010).

Lovejoy et al. (1999) focus on parents of children in early childhood education and propose two dimensions in parenting behaviors. The first one is support or engagement, which is characterized by a warm upbringing with the intentional behavior to show comfort, acceptance, moral support and positive affection to their children. The second dimension is hostility or coercion, which is characterized by a behavior that expresses negative affection or indifference to the child; it may even have violent behaviors, such as threats or physical punishment.

It is also known that parents have an influence in the regulatory skills that their children develop, particularly during early childhood education and the first grades of primary school, where they develop their autonomy and self-regulation more (Pino-Pasternak & Whitebread, 2010). Likewise, children's self-regulatory skills are closely tied to their learning, social skills, development of mathematical competence, and general academic performance (Liew, 2012; McClelland et al., 2007; Stevenson & Crnic, 2013).

Self-regulation presents cognitive, behavioral, temperamental and socio-emotional components, since it implies focusing and keeping the attention; initiating or inhibiting actions, thoughts and emotions; as well as monitoring the results in order to achieve a specific objective (McClelland et al., 2015). According to Montroy et al. (2016), it has been demonstrated that, between 3 and 7 years old, notorious changes occur in self-regulation, given that children usually transition from a more reactive behavior to more advanced forms at the cognitive and behavioral level, which requires the integration of several skills, such as executive and language functions.

The cognitive dimension of self-regulation has been developed from the perspective of executive functions, which include the ability to keep and process information in the working memory; control or inhibit dominant or automatic responses for others more appropriate in that context; and change the focus of attention in a flexible way when necessary (McClelland et al., 2018). These executive functions imply the voluntary regulation of cognitions and behaviors in a non-reactive intentional manner (Nozadi et al., 2015), which is why McClelland and Tominey (2016) define self-regulation – within the cognitive domain – as the ability to integrate these three executive functions (short-term memory, inhibitory control and attentional or cognitive flexibility) in behavior.

Nowadays, self-regulation is receiving a lot of attention within the scientific world, given that it is considered a key predictor of different future

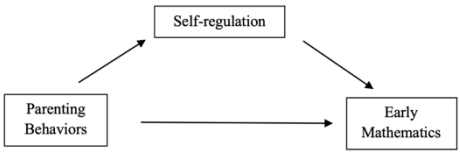
results for people (McClelland et al., 2018), such as in academic performance (McClelland et al., 2013), satisfaction with life, social behavior and physical health (Moffitt et al., 2011). An explanation as to why self-regulation can be linked to academic achievements is that self-regulation supports children's ability to initiate positive social interactions with others, which facilitate learning (Montroy et al., 2014).

Taken the aforementioned into account, the development of self-regulation – especially when the individual is in the early childhood stage – is of vital importance in order to generate a good comprehensive development and performance in people, which makes it more likely for them to find success and wellbeing over the course of their lives (McClelland & Tominey, 2016).

The described evidence suggests that both parenting behaviors and self-regulation are variables that predict informal mathematical development in children. In this sense, the main objective of this research is to analyze how the relationship between parenting behaviors and early mathematics can be mediated by the development of self-regulation in children (Figure 1). Moreover, socio-demographic variables of control will be taken into account, which, according to previous evidence, can show a relation with the variables being studied, such as sex (Clark et al., 2013; Montroy et al., 2016), age of the child (Gingsburg & Baroody, 2007; McClelland et al., 2018), and education of the mother (Blair & Raver, 2015; Montroy et al., 2016).

Figure 1

Relationship between parenting behaviors and early mathematics mediated by self-regulation.



Method

Participants

The sample for this study was made up of 85 preschool children (60% girls and 40% boys) from two public schools in Lima-Peru that are located in marginal urban areas, characterized by their vulnerability at social and economic levels. The students belonged to the preschool education level, they were between 65 and 78 months old (M = 71.4, SD = 3.8), and the vast majority was born in Lima (86%).

Only one child was found not living with his mother (1.2%), 27.1% of the children do not live with their father, and 51.8% do not live with their grandparents. The age of the mothers ranged from 23 to 45 years old (M = 32, SD = 6.3) and the fathers from 25 to 56 years old (M = 36.8, SD = 7.4). As for the mothers' education level, 31.3% of them had not graduated from high school, 32.5% had graduated from high school, and 36.2% had some level of post-secondary education (no one had a master's or doctorate degree).

The students' parents filled out the socio-demographic data sheet provided and then reported on the parenting behavior that they usually have with their children. It is important to mention that, during the entire research process, the relevant ethical considerations were respected. An informed consent was obtained from the parents and an informed assent from the children.

Measures

Test of Early Mathematics Ability, 3rd Edition (TEMA – 3; Ginsburg & Baroody, 2007). It is a Spanish adaptation of the test designed by Ginsburg and Baroody (2003), which measures the mathematical ability of children between 3 years old and 8 years 11 months old. It is based on the results of research in the scope of child arithmetic development. TEMA-3 is applied individually and is composed of 72 items, 41 of which focus on meaningful features of informal mathematics and the other 31 on aspects of formal mathematics.

The test begins in the starting point according to the age of the child (5-year-olds start in item 11 and six-year-olds in item 21) and, to know where it ends, the ceiling (representing the upper limit of the test) and the floor (representing the lower limit of the test) of every student must be taken into account.

The psychometric studies of the test adapted to Spanish show adequately reliable results (α > .90, Test-Retest coefficients > .80). Additionally, adequate statistics of content, construct and convergent validity were observed. In this study, the maximum ceiling of the test was item 41; good internal consistency indicators were found (α = .93, ω = .93). Regarding the validity indicators, evidence of construct was found; given that mathematical competence has an evolutionary nature, it is expected that test scores reflect this through a correlation with age (r = .47, p < .001). Moreover, evidence of convergent validity was found, a correlation with the perception of students' mathematical performance given by the teacher (r_s = .49, p < .001).

Head-Toes-Knees-Shoulders task (HTKS; McClelland & Cameron, 2012). A Spanish adaptation from the same authors of the instrument was applied. This test measures behavioral self-regulation in early childhood and jointly tests the three components of executive function: inhibitory control, working memory and cognitive flexibility. It has a total of 30 items, which can receive the following scores: 0 (incorrect), 1 (self-correct), or 2 (correct).

HTKS is presented as a three-part game where children are first asked to copy the movements shown by an examiner and then to perform movements that are the opposite of what the examiner requested.

This instrument has been applied in different cultures and has an adequate internal consistency, with an alpha between .85 and .94. Furthermore, adequate evidence of predictive and criterion-related validity has been found (McClelland & Cameron, 2012). In this study, good indicators of internal consistency were found (α = .97, ω = .97). In order to analyze the one-dimensional structure of the measurement, an exploratory factor analysis was performed, getting a KMO of 0.84, where Bartlett's Test of Sphericity was significant with χ^2 = 3208, p <.001. The maximum authenticity method was used, identifying a factor that explained the 54.6% variance.

Parent Behavior Inventory (PBI; Lovejoy et al., 1999). This instrument aims at evaluating parenting behavior in two dimensions: hostile/coercive behavior and supportive/engaged behavior. The test consists of 20 statements of specific behaviors, in which parents must answer the level of certainty with which they perform each one of them in relation to their child. Parents answer using a scale from 0 (not true) to 5 (very true).

This instrument has been applied in different contexts, including the Peruvian one, where internal consistency indicators have been found

appropriate for the two dimensions of the variable, with an alpha between .81 and .83. Likewise, adequate evidence of convergent and construct validity has been found (Merino et al., 2004).

In this study, good indicators of internal consistency were found for the hostility/coercion (α = .85, ω = .86) and supportive/engaged (α = .87, ω = .88) dimensions. In order to analyze the measurement structure, an exploratory factor analysis was performed, getting a KMO of 0.74, where Bartlett's Test of Sphericity was significant with χ^2 = 627, p <.001. The maximum authenticity method and Varimax rotation were used, identifying two factors, which explained the 45.4% variance. Finally, it was observed that, in general, these two factors included most items proposed for each factor in both the original version as well as the adapted one for the Peruvian context.

Procedure

First of all, the principals and preschool teachers of the 5-year-old classroom of both schools were contacted. A short explanation of the project was made and they were asked to voluntarily participate in the study. Faced with general acceptance, the next step was to contact the students' parents, so a written note was sent in order to have them sign the informed consent, giving permission for their child to participate in the study. In addition, they were asked to fill out a socio-demographic data sheet, which they had to return so that their children could be tested.

When the informed consent was signed by one of the parents, the students that agreed to participate were tested individually in their respective schools with the instruments of self-regulation and mathematics. Finally, the parents of the children tested were summoned to an informative talk and, during that same talk, the instrument of parenting behavior was applied.

Data Analysis

A database was built using the IBM- SPSS 23.0 software. After verifying the data was correctly filled out, the scores of the research variables were calculated. After that, the descriptive statistics for central tendency, dispersion and form of the research variables were identified. Then, correlation analyses were done between the variables relevant to the study using the Pearson coefficient.

Finally, in order to evaluate the mediating role of self-regulation between the relationship of parenting behaviors and the development of early

mathematics, two mediation models were posed using the macro PROCESS for SPSS (Hayes, 2018). The age of the child and the mother's level of education (measured on a scale with eight answer options) were used as covariables. A 95% confidence interval was used to measure mediation

Results

First of all, the descriptive statistics of the research variables are presented. Then, the results of the correlation coefficient analyses performed among all the relevant variables are shown and, finally, the mediation results are shown.

Table 1 shows the statistical measures of central tendency and dispersion of the variables studied. It also includes the measurements of form, where it is observed that asymmetry and kurtosis values are close to zero.

Table 1

Descriptive statistics of the research variables

Variable	*n*	*M*	*Me*	*SD*	Min	Max	*S*	*K*
Early mathematics	85	17.55	19.00	7.09	2.00	36.00	-0.07	-0.21
Self-regulation	85	19.89	19.00	19.36	0.00	57.00	0.35	-1.34
Parent behavior								
Supportive/engaged	57	40.46	42.00	6.86	20.00	50.00	-1.01	0.83
Hostile/coercive	57	25.11	24.00	9.55	8.00	44.00	0.23	-0.96

Note. M = mean*; Me* = median; *SD* = standard deviation, *S* = Skewness, *K* = Kurtosis

Table 2 shows the results of the analyses of correlation between all the research variables, also considering the pertinent socio-demographic variables. Significant correlations can be observed between early mathematics and the majority of the variables; the only significant correlations unable to be found were those between variables of the sex of the child and the educational level of the mother. Particularly, it is important to point out the significant and positive correlation between early mathematics and the self-regulation measure, given that the latter will be the mediating variable in the proposed models.

Likewise, it has been found that the variable of the sex of the child correlates negatively and significantly with the hostile/coercive dimension of

parenting behavior, which means that there is a tendency to have higher scores in this dimension when parents report about their sons and lower scores when they report about their daughters. It has also been observed that the educational level of the mother correlates positively and significantly with the self-regulation variables and the supportive/engaged dimension of parenting behavior.

Table 2
Pearson correlations for the research variables

Variables	1	2	3	4	5	6	7
1. Early mathematics	-						
2. Self-regulation	.37***	-					
3. Supportive/engaged	.30*	.48***	-				
4. Hostile/coercive	-.28*	-.17	-.12	-			
5. Age of the child	.47***	.11	.03	-.04	-		
6. Sex of the child	-.17	.12	.08	-.34**	.01	-	
7. Educational level of the mother	.17	.33**	.29*	-.02	-.15	.02	-

Note. *$p < .05$; **$p < .01$; ***$p < .001$

Given the fact that there is theoretical and empirical evidence to analyze the predictions of early mathematics based on the parenting behavior and self-regulation variables, a predictive model was done then, using parenting behavior as an independent variable, self-regulation as a mediating variable and early mathematics as a dependent variable. Likewise, the age of the child and the educational level of the mother were included as covariables.

Since parenting behaviors are measured by two independent dimensions, two models were posed, with the only difference being the independent variable. Model 1 included the supportive/engaged dimension and model 2 the hostile/coercive dimension as independent variables.

Table 3 shows the results of the mediation analysis of the first model. The linear regressions significantly explain the variance in both cases: when the outcome is self-regulation, $R^2 = .53$, $R^2_{adj} = .49$, $F(4, 50) = 14.18$, $p < .001$, and when the outcome is early mathematics, $R^2 = .53$, $R^2_{adj} = .49$, $F(4, 50) = 14.18$, $p < .001$. Moreover, it has been demonstrated that self-regulation is a significant mediating variable, since the confidence interval did not include

zero (range = 0.08 – 0.32) when analyzing this model with the bootstrapping technique.

Table 3
Model 1: analysis of the mediating role of self-regulation in the relationship between supportive/engaged and early mathematics

	B	*SE B*	β	*t*	*p*
Outcome: self-regulation					
Constant	-92.78	43.22		-2.15	.037
Supportive/engaged	1.20	0.33	0.44	3.65	<.001
Age of the child	0.66	0.58	0.13	1.14	.261
Educational level of the mother	3.54	1.72	0.25	2.06	.045
Outcome: early mathematics					
Constant	-56.56	14.45		-3.92	<.001
Self-regulation	0.15	0.04	0.41	3.45	.001
Supportive/engaged	0.05	0.12	0.04	0.38	.702
Age of the child	0.95	0.19	0.50	5.06	<.001
Educational level of the mother	0.58	0.57	0.11	1.02	.314

Likewise, table 4 shows the results of the mediation analysis of the second model. The linear regressions significantly explain the variance in both cases: when the outcome is self-regulation, $R^2 = .15$, $R^2_{adj} = .09$, $F(3, 51) = 2.88$, $p = .045$, and when the outcome is early mathematics, $R^2 = .56$, $R^2_{adj} = .52$, $F(4, 50) = 15.57$, $p < .001$. However, it could not be demonstrated that self-regulation is a significant mediating variable, since the confidence interval did include zero (range = -0.12 – 0.04) when analyzing this model with the bootstrapping technique.

Table 4
Model 2: analysis of the mediating role of self-regulation in the relationship between hostile/coercive and early mathematics

	B	*SE B*	β	*t*	*p*
Outcome: self-regulation					

Constant	-36.53	50.98		-0.72	.477
Hostile/coercive	-0.27	0.26	-0.14	-1.08	.287
Age of the child	0.52	0.66	0.10	0.78	.440
Educational level of the mother	5.34	1.99	0.35	2.69	.010
Outcome: early mathematics					
Constant	-53.32	14.00		-3.81	<.001
Self-regulation	0.15	0.04	0.41	4.00	<.001
Hostile/coercive	-0.16	0.07	-0.22	-2.33	.024
Age of the child	1.00	0.18	0.53	5.46	<.001
Educational level of the mother	0.38	0.58	0.07	0.65	.516

Discussion

The general results of the direct scores from the Test of Early Mathematics Ability-3 in the children participating in the study indicate that, on average, the students tested are in the process of acquiring basic, informal mathematical abilities (arithmetic) expected for their age, which anticipates difficulties and insecurity when tackling future mathematical learnings, especially those of formal nature (Ginsburg & Baroody, 2007).

Regarding to self-regulation variable, the results obtained show very heterogeneous scores in students, with a tendency towards lower scoring for the age of the participants. More than a fourth of the children were unable to answer at least one item correctly, although instructions were repeated to them three times, which means that they were unable to focus their attention or process the information given correctly (McClelland & Cameron, 2012). This is really concerning, since these two executive functions are fundamental for learning.

The results of the scores in the Parent Behavior Inventory are quite different depending on the dimension evaluated. It was found that the supportive/engaged dimension has a higher score, which generally indicates that parents say their behavior shows high acceptance towards their children

through affection, shared activities and moral support. On the other hand, scores in the hostile/coercive dimension have a medium score, indicating that parents accept their behavior sometimes expresses negative affection or indifference towards their children and can use coercion, threats or physical punishment to have an influence in the behavior of their children (Lovejoy et al., 1999; Merino et al., 2004).

As for the relationships of the research variables regarding the sex of the participants, the only significant relationships found were in the hostile/coercive dimension of parenting behaviors, where it was found that parents reporting on their sons say they have more hostile behaviors when raising them than those reporting on their daughters. These results are consistent with those found by Rodríguez et al. (2009), where it was found that the upbringing of girls is characterized by higher levels of affection and communication, whereas the upbringing of boys is characterized by higher levels of hostility. Likewise, Kerr et al. (2004) explain that parents' behavior when raising their children tend to be more severe before transgressive behavior from boys in comparison to girls.

Regarding to first model posed, it was found that self-regulation is a significant mediating variable between the supportive/engaged dimension and early mathematics. Similarly to the research conducted by Lobo and Lunkenheimer (2020), it was found that supportive/engaged parenting behaviors positively predict self-regulation in children, which shows how important it is for parents to have a warm, affective and supportive interaction with their children in order to generate a more positive self-regulation development. Likewise, self-regulation positively predicts early mathematics, which coincides with different research (Gawrilow et al., 2013; McClelland et al., 2007; Sánchez-Pérez et al., 2015). This might be related to the fact that children with higher self-regulation tend to start more positive social interactions with others, follow instructions better, focus their attention better on different activities, collaborate with their peers, teachers and parents, all of which have a positive effect on their informal and formal learning processes (McClelland et al., 2018; Montroy et al., 2014).

In regards to the second model proposed, it was found that self-regulation is not a significant mediating variable between the hostile/coercive dimension and early mathematics. Specifically, it was observed that a hostile/coercive upbringing has a small, negative relationship with the development of self-regulation in children; however, this relationship is not statistically significant. This could be interpreted as if parenting behaviors that do not promote an adequate affectionate environment for interaction do not favor the development of personal and regulating abilities in children. These findings are somewhat similar to the results of previous research, such as Lobo and Lunkenheimer (2020); however, it is important to note that the social context of the participants is very different in this study and other variables involved, such as the cultural aspect, could be reducing the effect in this relationship (Jaramillo et al., 2017).

On the other hand, the hostile/coercive dimension does negatively predict the development of early mathematics. This means that the more behaviors of indifference, threats and physical punishment parents show with their children, the more deficient children's early mathematical abilities will tend to be. This could be due to the fact that more distant behaviors with their children generate less confidence and warm, fun spaces like games, which are very important to generate better informal learnings (Purpura et al., 2013).

The previous analysis reflects and confirms the important role of family and parents in particular, since in their closest everyday environment they provide preschool children with different tools for their development, generating informal mathematical learnings and forming their self-regulation when they have warm, affective interactions with their children. The results reveal that parenting behavior and self-regulation can be particularly relevant variables in settings such as the one in this research, characterized by a social and economic vulnerability that puts these children in Peru at academic risk (Cueto et al., 2016).

A limitation to this research could be the reduced number of participants and the incidental nature of their selection. Another important aspect worth mentioning is the lack of previous psychometric studies regarding measurement tools for self-regulation and informal and early mathematical ability in a Peruvian context. However, this research is considered to provide

a relevant contribution to generate future studies that complement the findings of this study. It is suggested to include other socio-emotional variables as possible predictors of early mathematics and carry out explanatory research including participants of 3 and 4 years old. Moreover, it would be very relevant to do comparisons with children living in rural areas or children who go to private preschools.

This research contributes to the development of a better understanding of the issue of low levels in mathematical competence from the perspective of educational and child psychology. Studying socioeconomic and personal variables of preschool children and knowing how these can predict mathematical learnings provides an important foundation to start making decisions, as well as propose and do interventions in educational policies that favor the cognitive and socio-emotional development in children, taking into account the great sociocultural diversity in Peru.

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