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**Open schools: effects on parental engagement  
and information asymmetry in early childhood  
education**

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Dissertação apresentada ao Programa de Pós-Graduação em Economia – Área de Concentração: Economia Aplicada, da Faculdade de Economia, Administração e Contabilidade de Ribeirão Preto da Universidade de São Paulo, para obtenção do título de Mestra em Ciências. Versão corrigida. A original encontra-se disponível na FEA-RP/USP.

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Cecília Dutra Carolino

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# Abstract

**Title:** Open schools: effects on parental engagement and information asymmetry in early childhood education

Although the recent expansion of Early Childhood Education in Brazil suggests acknowledgement of the importance of this phase for human and socioeconomic development, the literature shows that having access to low-quality daycare centers can be detrimental to children. Moreover, the public understanding of what constitutes educational quality remains limited. Family-school relationships are typically characterized by the principal-agent problem, which leads to parental misinformation and affects their early investments on children. This work investigates whether greater school openness affects families' perceptions of educational quality and its distance from objective quality measures. Using novel data from eleven municipalities from the Brazilian state of Ceará, a school openness measure is computed through a split-sample approach to estimate logit and linear distance models. Results show that more openness reduces the probability of families' being satisfied with health and hygiene aspects, and tend to significantly decrease the distance between parental perceptions and real quality in terms of the visibility of children's activities and the quality of materials and toys. Further, caregivers who claim to be highly overloaded by motherhood have increased probability of being satisfied with most educational aspects. These findings suggest that policies aiming at improving parental engagement in schools can be considered as a potential mechanism to mitigate circular informational asymmetry issues.

**Key-words:** Parental engagement; Early childhood education; 3. Parental investments; School openness.

**JEL:** D91, I28, H52

# Resumo

**Título:** Escolas abertas: efeitos sobre engajamento parental e assimetria de informação na Educação Infantil

Embora a expansão recente da Educação Infantil no Brasil aponte para o reconhecimento da importância dessa etapa para o desenvolvimento humano e socioeconômico, o acesso a creches de baixa qualidade é demonstrado pela literatura como prejudicial à criança. Em paralelo, o entendimento público sobre o que significa qualidade educacional é ainda limitado. Relações família-escola são tipicamente caracterizadas pelo problema do agente-principal, o qual acentua a desinformação sobre educação por parte dos pais e afeta seus investimentos na primeira infância de seus filhos. Este trabalho investiga se maior abertura escolar afeta as percepções familiares de qualidade educacional e sua distância em relação a medidas objetivas de qualidade. Utilizando novos dados de onze municípios cearenses, uma medida de abertura escolar é computada a partir de uma abordagem de *split-sample*. Os resultados mostram que maior abertura reduz a probabilidade de um familiar se declarar satisfeito com aspectos de higiene e saúde, e tende a diminuir significativamente a distância entre a percepção parental e a qualidade real em termos de visibilidade das atividades das crianças e qualidade de brinquedos e materiais. Em adição, familiares que se autodeclararam muito sobrecarregados pelas responsabilidades de cuidado possuem maior probabilidade de sentir satisfação com a maioria dos aspectos educacionais avaliados. Estes achados sugerem que políticas voltadas a estimular o engajamento parental nas escolas podem ser consideradas como potenciais mecanismos para mitigar os efeitos da assimetria de informações na Educação Infantil.

**Palavras-chave:** Engajamento parental; Educação Infantil; Investimentos parentais; Abertura escolar.

**JEL:** D91, I28, H52



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# 1 Introduction

It is well established that early childhood years play a crucial role in human development, providing the base for learning and affecting future outcomes such as income and level of schooling by shaping cognitive and non-cognitive skills (Cunha et al., 2006; Heckman et al., 2014; Shonkoff et al., 2007). There is also evidence that enrollment in low-quality childcare centers can be harmful for children, shedding light on the importance of providing adequate environments for their development (Pinto et al., 2017). Nevertheless, in Brazil, school quality in this phase is still undervalued in comparison to school access: the pressure on authorities for opening new slots in public childcare centers and pre-schools is strong, partially due to its limited availability in the national territory and its influence on mothers' labor supply. According to Luz (2018), this repressed demand leads to a higher political value attributed to school access by politicians, once voters value the availability of childcare centers<sup>1</sup>.

This is also explained by the fact that, historically, access to daycare services in Brazil was considered primarily a social assistance concern. The country has acknowledged ECE's educational value in the last decades, by formalizing it as a part of basic education with the approval of the *Lei de Diretrizes e Bases da Educação Nacional* (Brazil, 1996), by setting enrollment in preschools as mandatory for all Brazilian children (Brasil, 2009) and by seeking attendance goals of 50% for ages 0-3 and of 100% for ages 4-5 (Brasil, 2014). This trajectory, alongside the absence of clear quality goals, contributes to the limited understanding of what constitutes good education for young children.

In this sense, a randomized experiment with 100 childcare centers conducted in Rio de Janeiro found zero correlation between school quality and family perceptions - in other words, when asked about the quality of the center in which their children were enrolled, parents' perception had no link with the reality evaluated by researchers *in loco* (Paes de Barros et al., 2011). As stated by Plank and Davis (2020), families face difficulties understanding the production process in education, which makes it hard for them to assess the quality of services provided to their children. This is particularly true during early childhood, when educational processes have increased relevance in comparison to inputs and results, and interactions between children and teachers can deeply shape learning (Burchinal et al., 2015; Magnuson & Duncan, 2016).

Additionally, schools usually do not welcome parental participation, a fact typically related to the principal-agent problem identified in family-school relationships, which emphasizes

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<sup>1</sup> Janke (2013) also shows, using data from the Brazilian 2007 fiscal year, that expenses related to early childhood education (ECE) affected politicians' reelection probabilities by a greater extent than other educational expenses.

parents' misinformation (Caucutt & Lochner, 2020; Figlio & Ladd, 2020). What makes this an alarming scenario is that, given the importance of parental investments in young children for their future outcomes, parents need to be informed about what matters the most for their development in order to make effective investments (Cunha & Heckman, 2010). Thus, the situation described above ultimately indicates that there is a waste of resources - both financial and non-financial, such as time allocation - employed by governments and families in children's education. The underlying hypothesis in this work is that this problem could be mitigated with the provision of adequate information concerning ECE to society, by increasing political pressure for school quality.

In fact, there is a growing set of literature focusing on the adoption of informational nudges in education (Damgaard & Nielsen, 2020; Greaves et al., 2023). Analyzing shifts in parental beliefs and their link to parental investments, List et al. (2021) demonstrate that beliefs are malleable and explain around 18% of the observed variation in children's language skills, finding a significant rise in investments after intensive programs aimed at changing families' beliefs<sup>2</sup>. Berlinski et al. (2021), after conducting an experiment that sent attendance, grade and behavior information to parents in low-income schools in Chile, found that the intervention was successful in increasing those rates among older children and that parents showed a positive willingness-to-pay to continue receiving the messages, arguing that this kind of program can reduce informational gaps and improve child outcomes in a scalable way. In this context, Bergman and Rogers (2017) illustrate that opt-out defaults are more effective at reaching less engaged parents than opt-in defaults, since parents who ask to receive the messages are usually already more involved.

These studies also relate to previous research on accountability in education, which highlights that accountability programs focusing on educational results are effective when attached to direct consequences for underperformers (Hanushek & Raymond, 2005). Parental participation in schools, then, can be seen as a kind of accountability related to processes, once families become more aware of what actually happens inside them. Following El Salvador's experience, where community-managed schools were instituted by the EDUCO program<sup>3</sup>, Guzmán et al. (2004) show that higher parental engagement led to increased monitoring of teacher's performances and to smaller dropout rates.

Facing asymmetric information as a circular problem - limited school openness would lead to small parental involvement, making families poorly informed about educational quality

<sup>2</sup> The authors examine two versions of such programs: the less intensive kind, based solely on showing parents educational videos about child development; and the intensive kind, which included home visits and the provision of feedback to parents (List et al., 2021).

<sup>3</sup> The Education with Community Participation (EDUCO) Program was established in 1991, with the decision of channeling education funds through newly created parents' organizations called Asociaciones Comunes para la Educación (ACEs). The initiative rapidly managed to achieve one of its goals - to expand educational coverage for poor children with quality - and provided training for parents to take on the administration of school processes, such as purchasing materials and hiring staff, representing a significant increase in parental engagement in children's education.

and therefore less demanding of improvements, restricting school incentives to be transparent - the importance of parental participation as a potential solution is made clearer. In Brazil, the decentralized administration of childcare centers, which are usually under municipalities' responsibility and directly affected by principal's management decisions, might be an opportunity to develop measures to tackle this issue. The adoption of the "democratic management" principle by Brazilian official documents and norms regarding educational quality, such as the PNQEI (Brazil, 2006) and the CAQi (Brazil, 2010), points to this direction by envisaging active parental participation in ECE.

Concretely, this work investigates the effects of parental participation in childcare centers on their level of satisfaction with the education received by children and on their knowledge about school quality. If a more accurate parental perception about childcare centers' characteristics is identified in centers where parents are allowed higher engagement, it will be a sign that family participation can be used as a mechanism to reduce information asymmetry. Therefore, this thesis aims at exploring possible externalities associated with parental involvement in ECE, adding up to the literature on behavioral economics in education (Damgaard & Nielsen, 2020) and political value of education (Luz, 2018).

This question is addressed by constructing a school openness measure using novel data from eleven municipalities of the Brazilian state of Ceará, collected through the application of two instruments - EAPI and EAPI-Famílias - in a partnership between LEP-ES/USP and FMCSV. While EAPI focuses on objective quality indicators for childcare centers, EAPI-Famílias is a questionnaire answered by children's families which provides rich information concerning their environment and beliefs. A split-sample approach is undertaken to compute the school openness measure, which is followed by the estimation of binary logit models, in which the dependent variables indicate an individual's "total satisfaction" regarding one school dimension, and of linear distance OLS regressions, where the outcomes are the standardized differences between the educational quality perceived by families and the objective quality measured by EAPI.

The results show that greater school openness reduce the probability of families' being satisfied with health and hygiene aspects by approximately 16pp, and tend to significantly decrease the distance between parental perceptions and real quality in terms of the visibility of children's activities (in 15 to 20%, on average) and the quality of materials and toys (in 25 to 30%, on average). It is also found that caregivers who claim to be highly overloaded by motherhood have increased probability of being satisfied with most aspects, which shows how an individual's emotional burden can affect their fair judgement.

The remainder of this work is organized as follows: section 2 presents the instruments used to collect the data; section 3 describes the dataset and its characteristics; section 4 explains the adopted empirical strategy; section 5 shows and discusses the results; section 6 provides robustness checks for the previous analysis; and the last section concludes.

## 2 Instruments

### 2.0.1 EAPI

The *Escala de Avaliação de Ambientes de Aprendizagens dedicados à Primeira Infância* (EAPI) is an instrument developed by the Laboratory for Studies and Research in Social Economics (LEPES/USP), in partnership with Maria Cecília Souto Vidigal's Foundation (FMCSV), that aims at measuring the quality of ECE environments for children aged from 2 to 5 years and 11 months. It is based on the MELE module of the MELQO instrument, an initiative of UNESCO, UNICEF, the World Bank and the Brookings Institution focused on providing evaluation criteria for ECE (UNESCO, 2017), which was adapted, expanded and validated to the Brazilian context for the construction of EAPI (Ferreira et al., 2021).

The instrument covers aspects related to educational inputs and processes at the classroom level. It is composed of three parts, reaching a total of 378 items: i. an itinerary observation of learning environments; ii. an interview with the classroom's teacher; iii. an interview with the school's principal. Ferreira et al. (2021) describe in details EAPI's key concepts, in accordance with Brazil's official Education documents. Here, a focus is put on its core dimensions and facets, which are displayed on Table 1.

The infrastructure, safety and mealtime dimensions are mostly related to educational inputs. The first two evaluate whether an adequate physical environment and pedagogical tools are provided to children and teachers, while the last combines aspects of logistic - for instance, checking if the observed meals correspond to the menu's original planning - and procedural aspects, such as the incorporation of pedagogical approaches to these moments.

In contrast, the curriculum, interactions and pedagogical practices, staff and management and functional diversities dimensions concentrate the majority of processes' indicators, highlighting the concept of having children as the center of their learning experience and investigating how teacher-child and personnel interactions take place. It is relevant to stress that a considerable share of staff and management's items are collected through the instruments interviews (ii and iii), being more subject to response biases. The other two dimensions are primarily based on the direct observation of classrooms by external applicants.

Taking these particularities into account and aiming at providing aggregate quality indicators from the data collected by EAPI, the instrument was standardized by attaching a punctuation to each possible value of 182 of its items. This was done by classifying responses according to their level of severeness, which was defined in each case by normative

and scientific evidences on what constitutes quality in ECE, with "severe", "medium" and "mild" as possible values; then, facet and dimension scores were calculated sequentially, evaluating severe items in the first place and the mild ones by the end of the process (Cipriano et al., 2022). The rule for advancing in punctuation is explained in Table 2.

Table 1 – EAPI’s dimensions and facets

<b>Dimension</b>	<b>Facets</b>
Infrastructure	Building structure
	Equipment
	Materials
Safety	-
Curriculum, interactions and pedagogical practices	Planning and curriculum
	Play-based learning opportunities
	Time, space and materials’ organization
	Personal care, well-being and health routines
	Emotional support and conflict management
Personnel and management	Pre-service training
	Motivation and engagement
	Common spaces for planning and discussions
	Working conditions
	Political-pedagogical project
	Employee support
Functional diversities	Physical
	Visual
	Auditive
	Staff training and overall structure
Mealtime	-

Source: author’s creation based on Ferreira et al. (2021).

Table 2 – EAPI’s punctuation criteria

<b>Level of severeness</b>	<b>Attained punctuation</b>	<b>Action</b>
Severe	Less than 1/3 of this level’s total points	Only this level’s items are summed to the final score
	1/3 or more of this level’s total points	The medium level’s items can be summed to the final score
Medium	2/3 or more of the severe level’s total points AND 1/2 or more of this level’s total points	The mild level’s items can be summed to the final score
Mild	-	-

Source: author’s adaptation of Castilho (2021).



An important feature of the resulting EAPI scores should be noted: environments that do not provide essential items to children cannot be rewarded in punctuation for offering less essential aspects (Cipriano et al., 2022). In other words, evaluated classrooms must cover at least 1/3 of severe-level items in order to be able to collect points from medium-level items.

The sum of all points conceded by each level of severeness was standardized to 1, in such a way that the total sum of points, considering all levels, equals a maximum of 3. This score leads to the final designation of quality ranges, which indicate how close or how far the observed situation is from reaching quality in ECE, as defined by official Education documents and scientific research (Table 3).

Table 3 – EAPI’s scores, interpretations and quality ranges

Score	Interpretation	Quality range
0.0 - 0.9	Risk to children’s integrated development	Unacceptable
1.0 - 1.4	Unacceptable aspects are surpassed, but basic aspects are still not covered	Inadequate
1.5 - 1.9	Partial coverage of basic aspects	Regular
2.0 - 2.4	ECE of adequate quality	Good
2.5 - 3.0	ECE of maximum quality in EAPI’s standards	Great

Source: author’s adaptation of Cipriano et al. (2022).

## 2.0.2 EAPI-Famílias

Following EAPI’s development, the lack of tools for analyzing educational inputs and processes in children’s familiar context - where they spend a considerable part of their time - became evident. As a response, researchers from LEPES/USP conducted group meetings with over 30 ECE professionals from multiple Brazilian municipalities to discuss and elaborate an instrument focused on mapping Family-School relationships. Debates concerning its possible applications, its relevance and its items’ semantic were held, as well as the study of other tools directed to similar audiences, in an effort to make an instrument as comprehensible as possible. Details about this process can be found in Fuzzari et al. (2022).

The *PNAD Contínua* survey, conducted by the Brazilian Institute of Geography and Statistics, was taken as a base for formulating questions regarding families’ socioeconomic characteristics. The questionnaires developed by the *Primeira Infância para Adultos Saudáveis* (PIPAS)<sup>1</sup> project and the São Paulo State Department of Education<sup>2</sup> to

<sup>1</sup> More information at <https://www.projetopipas.com.br/resumo.asp?id=3&idpage=520>.

<sup>2</sup> Available at [https://dados.educacao.sp.gov.br/sites/default/files/Saresp%202012\\_Quest\\_Pais\\_Alunos\\_3\\_5EF\\_0.pdf](https://dados.educacao.sp.gov.br/sites/default/files/Saresp%202012_Quest_Pais_Alunos_3_5EF_0.pdf).

investigate, respectively, infant development beliefs and parental perceptions and schooling were also used as references in this process. These sources were chosen due to their simple, objective way of approaching families.

The resulting product was an instrument called EAPI-Famílias, formed by 139 questions directed to children's caregivers, aimed at supplying researchers' academic interests besides aspects pointed by ECE professionals as key for public policy design. It is divided in six sections:

- I. Socioeconomic characterization;
- II. Family-school relationship;
- III. Intersectoriality;
- IV. Ethno-racial and functional diversities;
- V. Parental practices and beliefs;
- VI. Families and Covid-19.

Information about parental engagement on their children's education, family participation on school events, perceptions on school quality and teachers' openness are obtained in section II. In section V, caregivers were asked to report how they interacted with their children in different kinds of situations and also answered questions related to extended family support, division of housework and overload caused by parenting responsibilities. Hence, these sections, alongside section I, will be the most important for this work's analysis.

Finally, it is relevant to stress that EAPI-Famílias is fully anchored in self-reported measures. Extra caution should be taken when analyzing items that are school-related instead of family-related, making it pertinent to double-check answers among peers whose children attend the same educational center.

## 3 Data

This work's sample was obtained through the application of the two instruments described in the previous section, EAPI and EAPI-Famílias, in eleven municipalities located in the Brazilian state of Ceará. All data were collected from September 2021 to May 2022, in a partnership between LEPES/USP, FMCSV and Ceará's State Department of Education. All of EAPI's applicants participated in a one-week training led by the instrument's researchers on how to properly collect the information required, followed by a test on the same subject, which they had to pass in order to be eligible for field work.

For gathering family data, an online version of the instrument's questionnaire was sent by school principals on virtual groups maintained with the families, being filled remotely by one of the child's relatives. Each child is represented no more than once in the database. It is important to mention that not all families replied to the questionnaire, leading to a self-selection bias in the sense that schools with higher rates of family engagement might have been overrepresented in the sample. To mitigate that bias, it was chosen not to use information concerning families from centers with response rates to the questionnaire smaller than 30%, which accounted for 35.6% of schools.

The resulting dataset after applying this filter and merging family responses to EAPI-Famílias with EAPI evaluations, both identified by the child's classroom in each school, consisted of 2825 observations in a total of 126 schools. In the following subsections, descriptive statistics on the sample's characteristics and initial evidence on parental perceptions and its link to measured quality and parental engagement are provided.

### 3.0.1 Descriptive statistics

Table 4 presents a description of participants' profiles. The vast majority of respondents were women (94%) and non-white (86%), which includes the *pardo* category. About one quarter of them were the child's only caregiver, meaning they had no support from a partner or extended family for care responsibilities, and 7% strongly agreed to being highly overloaded by motherhood. Their average age was 31 years old, while the average number of household residents was 3.1, slightly below the state's average<sup>1</sup>.

Only 16% of the sample had family income above the minimum age and almost 60% were unemployed or out of the labor force, indicating a considerable degree of economic vulnerability. In addition, 46% of participants had not completed high school. Street

<sup>1</sup> Calculating the number of household residents in the last quarter of 2021 in Ceará, using data from IBGE's *PNAD Contínua* and considering only households with children aged between 0 and 6 years old, an average of 4,4 residents was found.

infrastructure was also limited for most households, which can be seen from the low averages of respondents living in paved streets and with sewage collection; over 30% of families did not have access to piped water or waste management.

Table 4 – Descriptive statistics

Statistic	N	Mean	St. Dev.
Women	2,815	0.94	0.23
Non-white	2,767	0.86	0.35
Only caregiver	2,798	0.25	0.43
Age	2,657	31.02	7.00
High-school completion	2,825	0.54	0.50
Employed	2,510	0.42	0.49
Income > minimum wage	1,771	0.16	0.36
Non-white child	2,776	0.77	0.42
Overloaded by motherhood	2,167	0.07	0.26
N <sup>o</sup> of residents	2,773	3.12	1.36
Paved street	2,665	0.30	0.46
Piped water	2,665	0.69	0.46
Sewage collection	2,665	0.13	0.34
Waste management	2,665	0.62	0.48

*Note:* In cases where participants chose the option "I'd rather not answer this question", their response was treated as a missing value, which explains the decrease in N according to the item's sensitivity. Source: author's own creation.

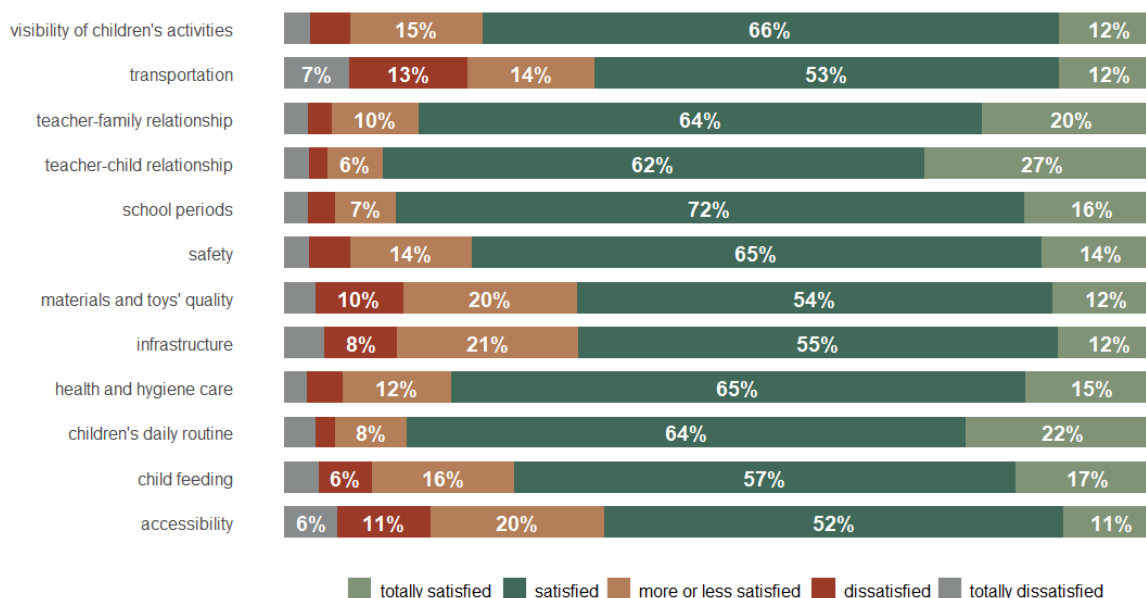
Families were asked to report their level of satisfaction<sup>2</sup> towards 12 aspects: children's daily routine at school; teacher-child relationship; teacher-family relationship; child feeding; transportation; school periods; infrastructure; materials and toys' quality; accessibility; visibility of children's activities; health and hygiene care; and safety. Figure 1 displays families' level of satisfaction for each aspect.

In all cases, over half of the respondents claim to be satisfied. As discussed in the introduction, it is likely that families' perceptions of quality are contaminated by their overall sympathy for the school, as well as by their lack of quality references and the feeling of gratitude for having access to free childcare. Nevertheless, it is interesting to note that satisfaction regarding transportation, materials and toys' quality, infrastructure, child feeding and accessibility is lower. Those features are more easily observable and objective and, as educational inputs, are also more related to the common sense perception of quality in ECE. On the other hand, regarding teacher-child relationships, which constitute

<sup>2</sup> Measured by a Likert scale consisting of the following 6 options: *totally dissatisfied*; *dissatisfied*; *more or less satisfied*; *satisfied*; *totally satisfied*; *I don't know or not applicable*. When the last option was chosen, the observation was treated as a missing value.

one of the main drivers of quality in educational processes, almost 90% of participants consider themselves satisfied or totally satisfied.

Figure 1 – Families' level of satisfaction by aspect



Source: author's own creation.

Some of those aspects have a direct corresponding item measured objectively in child-care centers by EAPI evaluators, while others do not. Comparisons were made between the reported level of satisfaction and the closest related aspect in EAPI. In cases where no similar matches were available, it was chosen not to make direct comparisons, since measurement errors would then be considerable. Table 5 presents the associations made between each survey's items.

Table 5 – Related variables in EAPI-Famílias and EAPI

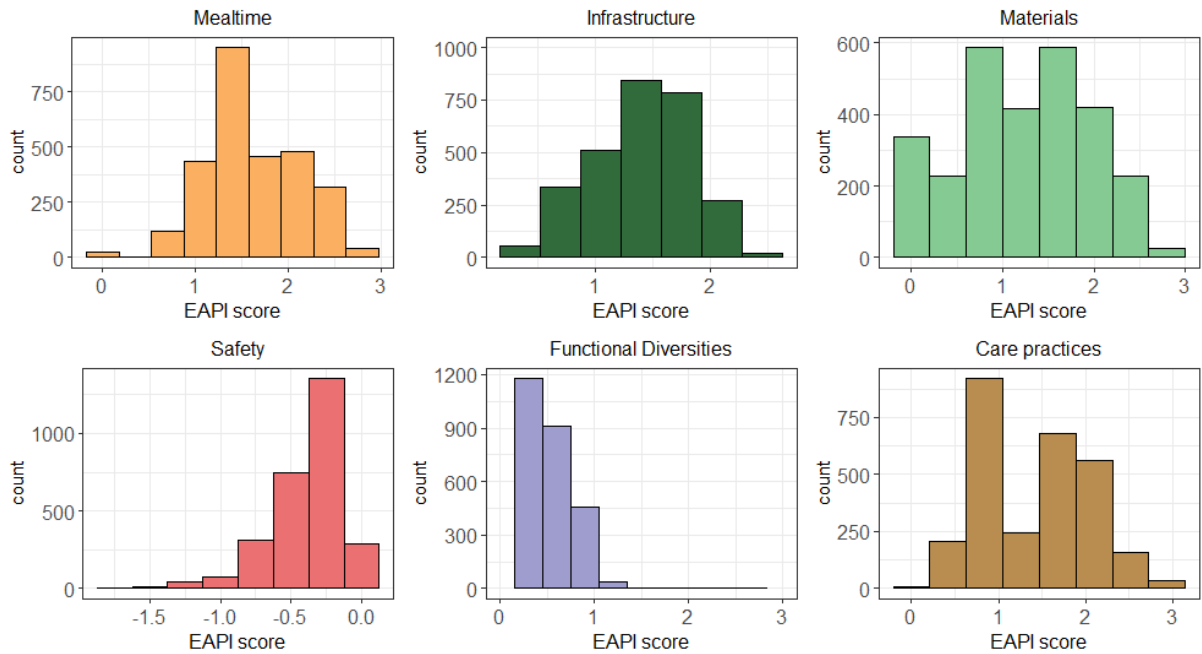
EAPI-Famílias variable	EAPI variable
Satisfaction towards teacher-child relationship	Score in "Emotional support and conflict management"
Satisfaction towards child feeding	Score in "Mealtime"
Satisfaction towards infrastructure	Score in "Building structure"
Satisfaction towards materials and toys' quality	Score in "Materials"
Satisfaction towards accessibility	Score in "Functional Diversities"
Satisfaction towards visibility of children's activities	Children's activities are exposed across the school
Satisfaction towards health and hygiene care	Score in "Care practices"
Satisfaction towards teacher-family relationship	Score in "Personnel and management"
Satisfaction towards safety	Score in "Safety"

Source: author's own creation.

The distribution of the six EAPI scores mentioned above is shown in Figure 2. While "Safety" scores are skewed to the right and "Functional Diversities" scores skewed to the left, the remaining dimensions start to resemble a normal distribution in the sense that scores concentrate around the mean. The distribution of scores in the other three

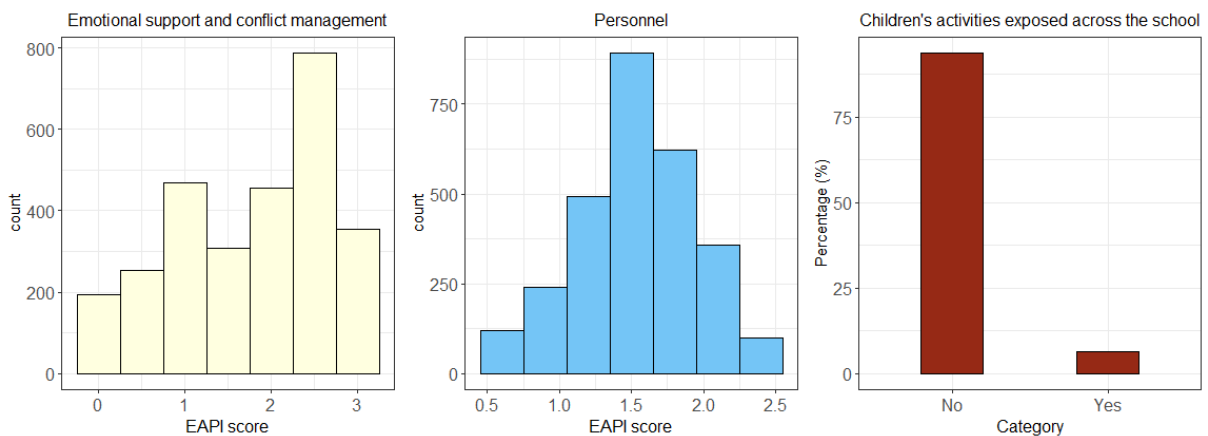
aspects can be seen in Figure 3, with "emotional support and conflict management" and "personnel" showing average scores higher than 1.5, and approximately 90% of schools not having children’s activities exposed in its environments.

Figure 2 – Distribution of EAPI scores by dimension



Source: author’s own creation.

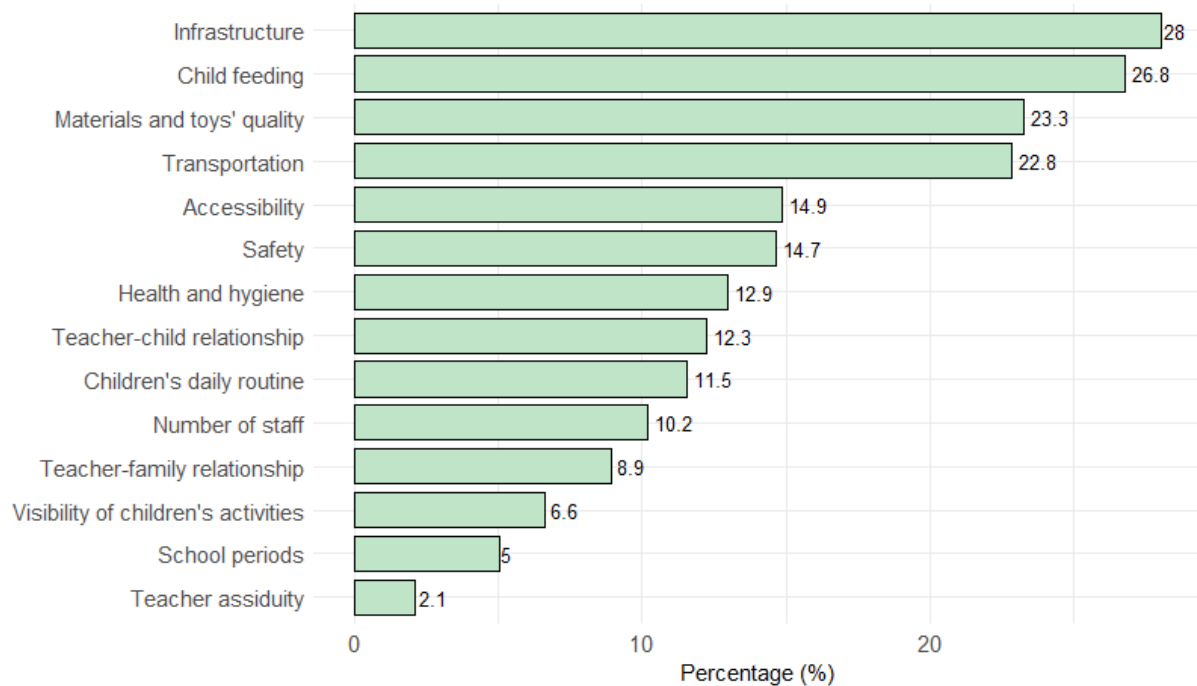
Figure 3 – Distribution of EAPI scores by dimension



Source: author’s own creation.

When asked about priorities for improvement in childcare centers, families mentioned infrastructure, child feeding, materials and toy’s quality and transportation in over 20% of cases (Figure 4). This also highlights the importance given to easily observable inputs. On the other hand, the fact that teacher assiduity and school periods were mentioned by 2.1% and 5% of participants, respectively, suggests families are satisfied with service provision, which can be related to the feeling of gratitude for having their children enrolled in public childcare.

Figure 4 – Families' priorities for improvement



Source: author's own creation.

### 3.0.2 Parental satisfaction and measured quality

Focusing on investigating links between parental satisfaction and objective quality, ANOVA tests were applied to check for differences in average EAPI scores (continuous variables) experienced by families from each level of satisfaction (categorical variables). A significant difference at the 1% level was found between groups in terms of EAPI scores in infrastructure, safety, materials, teacher-child relationship and functional diversities/accessibility - individuals who claimed to be more satisfied really did have their children enrolled in centers with higher scores in those aspects.

In contrast, no significant difference in EAPI scores was found regarding child feeding, visibility of children's activities and health and hygiene, indicating a lack of connection between parental perceptions and reality. It is also important to note that, even in aspects where variations were spotted, the significant differences occurred between the "satisfied" and "totally satisfied levels": taking this evidence alongside the ones highlighted in Figure 1, the emerging hypothesis is that families' default is to be satisfied, and providing actual quality aspects is what makes their perception shift to "totally satisfied". Figures 9 and 10 in Appendix A present graphically such relationships between EAPI scores and satisfaction levels for each item, estimated by multinomial logits in which dependent variables were the respective level of satisfaction.

Diving deeper into potential determinants of total satisfaction, Table 6 shows how the percentage of "totally satisfied" respondents varies according to their socioeconomic char-

acteristics for the six dimensions with closest parallels in EAPI. The main difference in terms of satisfaction was found between highly overloaded individuals and the rest of the sample: this group has significantly higher rates of total satisfaction across all aspects, leading to an additional hypothesis that overloaded caregivers are so overwhelmed by parenting responsibilities that they are unable to devote their attention to educational quality. This relates to Bettinger et al. (2022)'s discussion on parents' limited attention towards their children's education and the potential effect of salience interventions as mechanisms for change, and will be investigated further in this paper.

Table 6 – Average EAPI scores and percentage of "totally satisfied" families

Variable	Overloaded by motherhood	Non-white	White	<1 salary	Completed high school	Employed	Only caregiver
EAPI mean: Mealtime	1.59	1.65	1.61	1.65	1.66	1.66	1.64
EAPI mean: Curriculum	0.85	0.90	0.91	0.91	0.92	0.91	0.87
EAPI mean: Diversities	0.47	0.47	0.46	0.47	0.47	0.47	0.46
EAPI mean: Staff & Management	1.71	1.74	1.78	1.75	1.75	1.77	1.73
EAPI mean: Infrastructure	1.40	1.45	1.44	1.46	1.47	1.47	1.42
EAPI mean: Safety	-0.40	-0.39	-0.38	-0.38	-0.37	-0.37	-0.40
% totally satisfied: child feeding	31.1	17.0	14.1	16.6	16.5	17.9	16.1
% totally satisfied: teacher-child relationship	43.7	27.1	29.0	26.7	28.6	29.4	26.0
% totally satisfied: accessibility	25.5	12.7	11.6	12.1	13.0	13.0	13.9
% totally satisfied: teacher-family relationship	34.0	21.0	22.1	19.9	22.7	25.0	21.7
% totally satisfied: infrastructure	27.3	13.2	10.8	11.5	13.0	14.2	13.0
% totally satisfied: safety	30.0	14.2	12.7	13.4	13.7	14.8	15.7

Source: author's own creation.

Nonetheless, EAPI's average scores experienced by children of highly overloaded mothers were on average slightly slower, making the satisfaction level for this group even more dissonant from the rest. Additionally, white families were slightly more demanding regarding child feeding, which translates into a smaller percentage of white individuals who considered themselves totally satisfied with this aspect; and respondents with family income slower than minimum wage were less satisfied with teacher-family relationships, specially in comparison with employed caregivers, which might suggest that poorer individuals do not feel at ease at childcare centers or that there is some kind of discrimination towards them.

### 3.0.3 Parental engagement

In EAPI-Famílias' questionnaire, families were asked several questions regarding their participation in school activities and interaction with staff. Since this research aims at understanding in what measure family engagement affects outcomes such as satisfaction and knowledge about school quality, it is relevant to investigate patterns in school participation. With that in mind, a variance decomposition analysis was undertaken for participation-related items, calculating variance ratios in responses within classrooms, within schools and inter-schools.

The adopted approach follows Raudenbush and Bryk (2002), which proposes a three-level hierarchical model: the first level corresponds to individual (family) observations; the second, to classrooms; and the third, to schools. An unconditional model with no



covariates was estimated<sup>3</sup> in order to identify how variance is distributed across levels, allowing the calculation of each ratio (Raudenbush & Bryk, 2002):

- Inter-family variance ratio:  $\sigma^2/\sigma^2 + \tau_\pi + \tau_\beta$
- Inter-classroom variance ratio:  $\tau_\pi/\sigma^2 + \tau_\pi + \tau_\beta$
- Inter-school variance ratio:  $\tau_\beta/\sigma^2 + \tau_\pi + \tau_\beta$

Families' attitudes and preferences matter the most in the three last items - "family goes to school parties and cultural activities", "family knows the teacher" and "family considers parental engagement important" -, where its variance accounted for nearly 100% of total variance (Table 7). In all other aspects, response variance was driven by either classroom or school characteristics. It is particularly expected that information exchanges between teachers and families during pick-up time varies the most at the classroom level (99.9%), since this attitude may depend largely on each classroom's teacher. On the other hand, attending meetings and talking to other families about school was proven to depend on schools, which can be related to principals' efforts to engage parents and broader, community-related characteristics, such as residents' friendliness and mutual trust.

Table 7 – Variance decomposition for engagement items (%)

Item	Family-level variance	Classroom-level variance	School-level variance
Family talks to the teacher	<1	52.5	47.5
Family goes to school meetings	<1	<1	99.9
Family talks to other families about school	<1	<1	99.9
Family is aware of the school's PPP	<1	72.1	27.9
Family participated in PPP construction	<1	60.8	39.2
Teacher-family exchange information during pick-up time	<1	99.9	<1
Family goes to school parties and cultural activities	99.8	<1	<1
Family knows the teacher	98.7	1.3	<1
Family considers parental engagement important	99.9	<1	<1

Source: author's own creation.

Another key point in this subject is identifying childcare centers' openness to parental engagement. For this work, a measure of openness was constructed by classifying as "open to parental participation" the schools that offer/allow all of the following:

- Dialogue or guidance groups;
- Visits from child relatives during school periods;
- Teachers that talk to families about child development "always" or "almost always";
- School staff that tries to meet children's families.

<sup>3</sup> The ordinal nature of response variables was taken into account for model estimation when necessary, by adopting *clmm* models (Schmidt, 2012).

Let real school openness be represented by  $A$ . What is observed in the database is the individual perception of school openness,  $\tilde{A}_i$ , which might not be an accurate measure of  $A$ . This challenge will be addressed in the Empirical Strategy section. For the moment, attention will be given to describing  $\tilde{A}_i$  and its components, as well as how it varies across centers. The share of individuals whose responses meet the criteria above is of 21.4%.

The number of individuals that perceive their children's school as open is slightly higher (above 23%) between those that are highly overloaded or employed - probably the ones with less availability to engage in school activities, or even notice if their participation is welcomed (Table 8). This difference can also be noticed in families' responses to the items that compose the openness indicator. Other socioeconomic characteristics did not seem to affect perceptions as much, with the exception of being the child's only caregiver, which on average meant a little smaller agreement (50%) to the visit authorization statement.

Table 8 – Average of "open to parental participation" variables, by groups

Variable	Overloaded by motherhood	Non-white	White	< 1 salary	Completed high school	Employed	Only caregiver
Offers dialogue or guidance groups	71.2	68.5	65.1	66.1	64.4	66.7	69.2
Allows visits during school periods	54.4	52.6	54.5	53.7	51.3	59.0	50.0
Teacher often talks about child development	56.3	58.0	54.8	56.9	54.9	59.0	55.0
School staff that tries to meet families	82.4	84.6	83.5	83.5	83.6	85.0	82.6
% of families that perceive school as open	23.7	20.9	19.4	21.6	18.1	23.3	19.7

Source: author's own creation.

As shown in Table 9, for all dimensions, the share of totally satisfied families is consistently higher among those who perceive their children's school as open. Differences between the two groups are all significant at the 1% level. It is useful to highlight the distance between them regarding "children's daily routine" and "teacher-family relationship", which are larger than 10 percentage points (pp) and are aspects directly related to what empirical research defines as educational quality (Burchinal et al., 2015; Magnuson & Duncan, 2016).

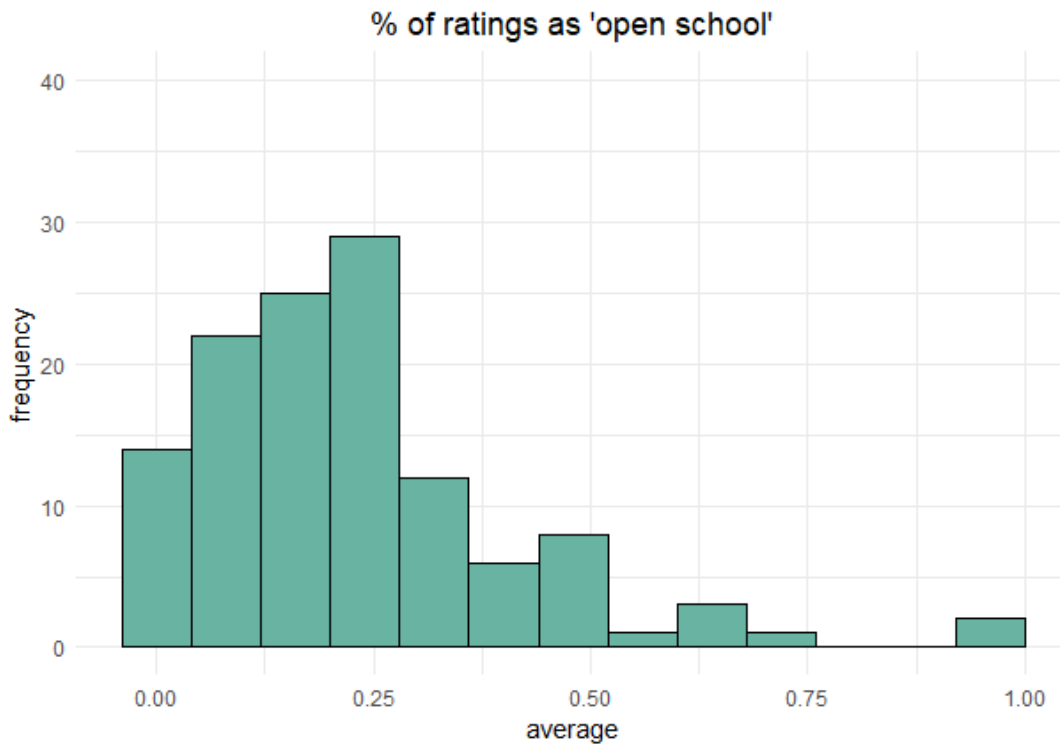
However, it is plausible that parents' perceptions of school openness,  $\tilde{A}_i$ , is influenced by other aspects that are correlated with satisfaction towards school: this would be the case if "open schools" are open to parental participation exactly because they have less to hide from families. On the other hand, it might be that more engaged parents actively reach out to schools more than the average, thus concluding that centers are open even when they are not. In order to mitigate this self-selection problem, the average perception of school openness per school was calculated, leading to one openness indicator per educational unit. The distribution of this indicator's values across the sample's schools is displayed in Figure 5, while the distribution of each variable that composes the item can be seen in Appendix A's Figure 11.

Table 9 – Total satisfaction rates according to school openness

Aspect	Totally satisfied families (%) - school perceived as open	Totally satisfied families (%) - school not perceived as open
Children's daily routine	30.4	19.8
Teacher-child relationship	35.3	24.4
Teacher-family relationship	30.4	17.2
Child feeding	21.8	14.9
Transportation	15.7	10.2
School periods	20.6	14.0
Infrastructure	17.8	9.9
Materials and toys' quality	17.6	10.7
Accessibility	14.1	10.0
Visibility of children's activities	16.6	10.1
Health and hygiene care	21.8	13.5
Safety	18.4	12.1
Teacher assiduity	20.5	13.3

Source: author's own creation.

Figure 5 – Distribution of average school openness ratings per school



Source: author's own creation.

## 4 Empirical Strategy

### 4.0.1 Computation of the school openness variable

In the previous section, initial evidence on the correlation between parental engagement and families' knowledge about school quality was presented, pointing out the possibility of endogeneity as a caveat<sup>1</sup>. This would be the case if open schools are friendlier to parental participation because they have less to hide, meaning these units do offer higher educational quality, or if intrinsic traits determine parents' perception of school openness, making this variable<sup>2</sup> correlated with the error term in simple OLS regressions.

In order to address this challenge and considering the cross-sectional structure of the dataset, a split-sample strategy was adopted. The sample was divided in half, generating two independent samples: the first was used to estimate the school openness variable for each educational unit; the second was used to run the regressions of interest with the school openness measure obtained from the other group as one of the explanatory variables. Thus, it is expected that the problem of having parents' intrinsic characteristics affecting their perception of school openness is mitigated when estimating the final regressions.

Concretely, consider the school openness measure reported by individual  $i$  defined by:

$$\tilde{A}_i = f(A, G_i, \eta_i) \quad (4.1)$$

Where  $A$  is the real value of the school openness measure, which is not fully perceived by families,  $G_i$  is the individual's affinity with the school and  $\eta$  is an error term. The outcomes of interest - parental satisfaction and parental knowledge about school quality - are represented by  $Y_i$  and subject to a different error term,  $u_i$ , as in:

$$Y_i = f(A, G_i, u_i) \quad (4.2)$$

Assuming a linear specification for  $\tilde{A}_i$  and that  $E[G] = E[\eta] = 0$ ,  $\tilde{A}_i$  can be rewritten as:

$$\tilde{A}_i = A + G_i + \eta_i \quad (4.3)$$

And, if  $\bar{\tilde{A}}$  is an unbiased estimator of  $A$ , we have that  $E[\bar{\tilde{A}}] = A$ . Using this estimator in equation 4.2, the resulting expression would be

$$Y_i = f(\bar{\tilde{A}}, G_i, u_i) \quad (4.4)$$

<sup>1</sup> The possibility of self-selection in the response - the case in which more engaged parents are overrepresented in the sample - was taken into account by only considering data from schools with response rates to the questionnaire higher than 30%, as discussed in section 3.

<sup>2</sup> Schools were classified as "open to parental participation" when all of the following were offered or allowed: dialogue or guidance groups; visits from child relatives during school periods; teachers that talk to families about child development "always" or "almost always"; school staff that tries to meet children's families.

Where  $\bar{A}_i$  and  $G_i$  are correlated, as can be seen by dividing equation 4.3 by  $N$ :

$$Y_i = f\left(\frac{A + G_i + \eta_i}{N}, G_i, u_i\right) \quad (4.5)$$

The adoption of the split-sample approach makes it possible to overcome this bias by using different samples to estimate equations 4.1 and 4.2, allowing the computation of

$$\hat{A}_j^{sp} = A + G_j + u_j \quad (4.6)$$

and

$$Y_i = f\left(\frac{A + G_j + \eta_j}{N}, G_i, u_i\right) \quad (4.7)$$

In which the terms of the  $f$  function are now uncorrelated. This work focuses on estimating equation 4.7 on one half of the sample by using, as a measure for school openness, the average school openness reported by the other half<sup>3</sup>. Therefore, from the full sample of 2825 variables, these steps are taken in sub-samples no larger than 1413 observations.

#### 4.0.2 Estimated models

After computing the school openness split-sample variable through the process above, the first models to be estimated are the satisfaction models. These are ran for all nine dimensions presented in Table 5, and have a dummy indicating "total satisfaction" regarding that dimension as dependent variable.

Formally, satisfaction models are specified as binary logits with the form<sup>4</sup>:

$$\ln \frac{P(TS_i^d = 1)}{P(TS_i^d = 0)} = \beta \hat{A}_j^{sp} + \gamma \mathbf{X} + \delta \mathbf{W} \quad (4.8)$$

In which  $\ln$  represents the natural logarithm,  $P(TS_i^d = 1)$  represents the probability of respondent  $i$  being "totally satisfied" with dimension  $d$ ,  $\hat{A}_j^{sp}$  is the school openness split-sample variable,  $\mathbf{X}$  encompasses socioeconomic characteristics of individual  $i$  and  $\mathbf{W}$  includes support-related indicators.

This specification captures the logarithm of the odds ratio between the probabilities of the individual being "totally satisfied" or not. By taking the logarithm of the ratio, the model linearizes the relationship between the probabilities and the explanatory variables (Cameron & Trivedi, 2005). The coefficients  $\beta$ ,  $\gamma$  and  $\delta$  account for the impact of the respective variables on the log-odds ratio and, subsequently, on the probability of total satisfaction.

<sup>3</sup> As a reminder, schools are considered open if they offer or allow dialogue or guidance groups; visits from child relatives during school periods; teachers that talk to families about child development "always" or "almost always"; and school staff that tries to meet children's families.

<sup>4</sup> Following the non-linear specification presented in Cameron and Trivedi (2005).

To quantify the difference between families' subjective perception of quality, i.e., their self-reported satisfaction, and the objective quality measure given by EAPI scores, the following distances are estimated through OLS regressions:

$$|Q_i^{S_d} - Q_i^{O_d}| = \alpha + \beta \hat{A}_j^{sp} + \gamma \mathbf{X} + \delta \mathbf{W} + \epsilon \quad (4.9)$$

Where  $Q_i^{S_d}$  is a numeric value for individual's  $i$  satisfaction towards aspect  $d$ ,  $Q_i^{O_d}$  is the EAPI score in aspect  $d$ ,  $\alpha$  represents the intercept and  $\epsilon$  is an error term and the other terms are the same as in the previous equation. Thus, the outcome variable is now the absolute distance between subjective and objective quality. Both  $Q_i^{S_d}$  and  $Q_i^{O_d}$  were standardized to range from 0 to 1.

Vector  $\mathbf{X}$  includes the individuals race; employment status; educational attainment; access to infrastructure in the home's street and neighborhood; and the child's age when first enrolled in the educational system. Vector  $\mathbf{W}$  brings information on the self-reported overload felt by mothers; the presence of supportive relatives and extended family; the level of satisfaction with motherhood; the belief that parenting is way too hard; the belief that parenting takes more time than the person is able to give; the perception of having limited control over their own life because of motherhood; optimism regarding the future; the presence of critic relatives; whether the person did not want children; whether care responsibilities are equally divided within family members; and residence in rural areas<sup>5</sup>. All of those are collected at the individual level, in order to assess how individual characteristics shape a person's perceptions.

Two different models were estimated for each outcome and dimension: a Socioeconomic Model, with only  $\mathbf{X}$ , and a Socioeconomic + Emotional Support Model, including  $\mathbf{W}$  as well. The main parameter of interest is represented by  $\beta_1$  in equations 4.8 and 4.9, which captures the effect of school openness in the analyzed outcomes.

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<sup>5</sup> Although the area of residence can be regarded as a socioeconomic variable, the idea here is that living in rural areas affects the support environment that families have around them, with usually higher levels of interaction between neighbors. In this sense, it may affect how information is spread within the community, which includes information regarding schools.

## 5 Results

Before running the models of interest, two analysis concerning our school openness measure were undertaken. First, a simple OLS regression of this measure against municipalities' dummies showed that school openness significantly depended on geographic location, which is consistent with the fact that a focus on engaging families in children's education is frequently led by local Departments of Education's guidelines or municipal policies. Therefore, municipality controls were included in all of the estimated models in this work.

In addition, it was checked whether the school openness indicator's value was mostly led by one of its components - presence of dialogue or guidance groups, of school staff that tries to meet children's families, of teachers that frequently talk to families about child development and the possibility of visiting during school periods. Both at the individual or school level, the indicator is almost equally distributed between its four components. Now, the results for the parental satisfaction and distance models will be discussed.

### 5.0.1 Parental satisfaction

Table 10 presents average marginal effects (AME) estimates on the probability of being "totally satisfied" with nine different aspects. The variables chosen to be displayed in this summary are our measure of interest, school openness, and the one that was proven to be the most relevant across all dimensions: a dummy indicating whether the respondent "totally agreed" to being overloaded by motherhood. The full models, including all controls, can be found in Appendix B.

It can be seen that school openness did not affect the probability of being satisfied in most aspects, with the exception of the "health and hygiene" dimension, where it is associated with a decrease of 14pp in said probability considering only socioeconomic factors (Socioeconomic Model), and of 15pp considering family support characteristics as well (Socioeconomic + Emotional Support Model). It also leads to a 16pp decrease in the probability of being satisfied with teacher-child relationship when Socioeconomic Model is run, but this effect ceases to be significant when other factors are taken into account. These results suggest that openness to parental participation does not seem to shape parental satisfaction by itself, but might lead, in some cases, to a deeper knowledge of school's problems, decreasing the reported level of satisfaction.

Stronger and clearer patterns are found regarding mother's self-reported overload, which is associated to a significant increase in the probability of being "totally satisfied" in all evaluated aspects. This is line with the limited attention hypothesis, according to which parental attention is a scarce resource, leading to some information about schools being

overlooked or forgotten (Damgaard & Nielsen, 2020); the more burdened caregivers are, the harder it is for them to assess what educational quality means.

This variable's highest AME estimates are also related to health and hygiene (16pp) and teacher-child relationship (15pp). It is interesting to note that those are typically harder to observe than aspects such as infrastructure and child feeding, indicating that families' characteristics seem to affect the most their subjective impression on quality.

Table 10 – Summary of results: average marginal effects on parental satisfaction

Outcome variable	Socioeconomic Model	Socioeconomic + Emotional Support Model	
	School openness	School openness	Overloaded by motherhood
Infrastructure	-0.10 (0.07)	-0.08 (0.07)	0.14** (0.06)
Child feeding	-0.08 (0.08)	-0.05 (0.08)	0.14** (0.06)
Safety	-0.08 (0.07)	-0.06 (0.07)	0.13** (0.06)
Teacher-child relationship	-0.16* (0.10)	-0.13 (0.10)	0.15** (0.06)
Visibility of children's activities	-0.09 (0.07)	-0.10 (0.07)	0.10* (0.05)
Health and hygiene	-0.14* (0.08)	-0.15* (0.09)	0.16*** (0.06)
Teacher-family relationship	-0.01 (0.09)	-0.00 (0.09)	0.10 (0.06)
Quality of materials and toys	-0.10 (0.07)	-0.10 (0.07)	0.09* (0.05)
Accessibility	-0.09 (0.08)	-0.10 (0.07)	0.14** (0.06)

*Note:* the number of observations ranged from 969 to 1071 for Socioeconomic Model estimations and from 904 to 994 for Socioeconomic + Emotional Support Model estimations; \*p<0.1; \*\*p<0.05; \*\*\*p<0.01.

Although not highlighted in the above summary, some other findings deserve to be mentioned. Being non-white was associated on average to a 5pp increase in the probability of being "totally satisfied" with school infrastructure (Socioeconomic + Emotional Support Model), as well as to decreases of 8pp regarding "teacher-child relationship" and of 7pp towards "visibility of children's activities" (Socioeconomic Model). Considering that non-white families are usually more economically vulnerable, it is possible that they have



lower standards for the quality of infrastructure (Firpo et al., 2020); on the other hand, their higher dissatisfaction towards the other two aspects could be seen as a sign of race discrimination on the part of school staff, but these effects cease to be significant when other aspects are taken into account.

Further, in cases where the respondent "totally agreed" that childcare responsibilities were equally divided between family members, there was a higher probability of being "totally satisfied" in most aspects. This counterintuitive result might be explained by the idea that, when childcare is a multiperson task, the knowledge detained by each of the child's relatives about schools' characteristics becomes even more limited if there is no adequate communication between them, enhancing the limited attention challenge discussed above.

### 5.0.2 Distance between parental perception and measured school quality

The results for the distance models are displayed on Table 11. School openness is a more relevant factor in explaining these outcomes in comparison to the satisfaction outcomes: a marginal change in its indicator is associated on average to a three-tenth (0.30) reduction in the distance<sup>1</sup> between perceived and measured quality regarding materials and toys, to a 0.15 reduction in the visibility distance and a 0.07 reduction in the infrastructure distance. These effects are significant at the 5% level at least, indicating that openness to parental participation can potentially be used as a mechanism to increase knowledge about quality in ECE environments, as pointed out by Guzmán et al. (2004).

The distance measures for the child feeding and accessibility dimensions must be considered with caution, either because it is highly likely that parents responded to a slightly different aspect than the one measured by the EAPI score or because of the limited overall knowledge about accessibility issues. Concerning child feeding, where a significant increase of around 0.08 in the distance measure was found, the instrument evaluates mealtime logistics and practices, while families probably focused on nutrition when answering. Thus, less attention will be given to these particular estimations.

As an additional highlight, having access to sewage and garbage collection - a measure of the street infrastructure faced by families in their homes<sup>2</sup> - was associated to decreases of up to 0.054 in the distance in terms of infrastructure (Socioeconomic Model), teacher-child relationship and teacher-family relationship (Models 1 and 2). This shows that children's socioeconomic background affects their parents' ability to judge the quality of schools, which in turn reflects on the type of investments they receive since an early age (Cunha & Heckman, 2010; Feijó et al., 2022).

<sup>1</sup> As explained in the empirical strategy section, both subjective and objective measures were standardized from 0 to 1. Therefore, the largest possible distance between them is 1, and 0.3 is a relatively large variation.

<sup>2</sup> It is worth reminding here that, due to a high number of missing values, the income variable was not directly included in the regression models.

Moreover, high-school completion was linked, on average, to a reduction of 0.03 in both visibility and health and hygiene practices distances; and being employed, to a distance decrease of up to 0.05 in safety, teacher-child relationship, health and hygiene practices and accessibility (see Appendix B). Those results emphasize the relevance of family traits in influencing children’s educational paths, a challenge when aiming at reducing inequalities (Feijó et al., 2022; Koslinski & Bartholo, 2020). Following the pattern identified in the satisfaction outcome models, having equally divided care responsibilities was associated to small, but significant, increases in the distance regarding safety (0.038), visibility of children’s activities (0.034), health and hygiene practices (0.030) and teacher-family relationship (0.030), as well as in the less precise accessibility dimension.

Table 11 – Summary of results: estimates for linear distance models

Outcome variable	Socioeconomic Model		Socioeconomic + Emotional Support Model	
	School openness	Sewage and garbage collection	School openness	Sewage and garbage collection
Infrastructure	-0.067* (0.034)	-0.025* (0.015)	-0.077** (0.037)	-0.021 (0.016)
Child feeding	0.075** (0.037)	-0.014 (0.016)	0.085** (0.039)	-0.009 (0.017)
Safety	0.011 (0.040)	-0.007 (0.018)	0.007 (0.042)	-0.014 (0.019)
Teacher-child relationship	0.024 (0.049)	-0.050** (0.022)	0.028 (0.052)	-0.054** (0.030)
Visibility of children’s activities	-0.151*** (0.046)	0.003 (0.020)	-0.150*** (0.048)	0.007 (0.021)
Health and hygiene	0.023 (0.048)	0.007 (0.021)	0.012 (0.050)	0.012 (0.023)
Teacher-family relationship	-0.009 (0.036)	-0.031* (0.016)	-0.002 (0.038)	-0.046*** (0.017)
Quality of materials and toys	-0.286*** (0.103)	0.030 (0.046)	-0.309*** (0.110)	0.043 (0.049)
Accessibility	0.012 (0.053)	0.034 (0.025)	0.025 (0.053)	0.021 (0.025)

*Note:* the number of observations ranged from 969 to 1194 for Socioeconomic Model estimations and from 904 to 994 for Socioeconomic + Emotional Support Model estimations; \*p<0.1; \*\*p<0.05; \*\*\*p<0.01.

Finally, it should be noted that the findings reported above do not represent causal effects estimates, even though a split-sample approach was undertaken to mitigate the endogeneity problem. In fact, they provide initial evidence on the relationship between school openness and knowledge about quality in ECE, confirming its potential to be considered as a mechanism for that goal.

## 6 Sensitivity Analysis

### 6.0.1 Distance measures

To begin with, one might be concerned about the accuracy of the distance measures used as outcomes in the estimated models, i.e., about the real relationship between subjective (perceived by families) and objective (measured by EAPI scores) school quality indicators, since families possess limited knowledge about what constitutes quality in ECE (Paes de Barros et al., 2011). However, as discussed in the Data section, there is a significant difference at the 1% level in terms of the EAPI scores faced by respondents of each satisfaction level.

Analyzing this question into further detail, the following model was estimated for each of the nine compared dimensions, specified as a multinomial logit:

$$Q_i^{S^d} = \beta_0 + \beta_1 Q_i^{O^d} + \varepsilon \quad (6.1)$$

Where  $Q_i^{S^d}$  is a categorical variable indicating the level of satisfaction towards dimension  $d$  reported by respondent  $i$ , ranging from "totally dissatisfied" to "totally satisfied" in a Likert scale,  $Q_i^{O^d}$  indicates the EAPI score in dimension  $d$  faced by respondent's  $i$  children and  $\varepsilon$  is an error term. The results are illustrated in Figures 9 and 10 in Appendix A.

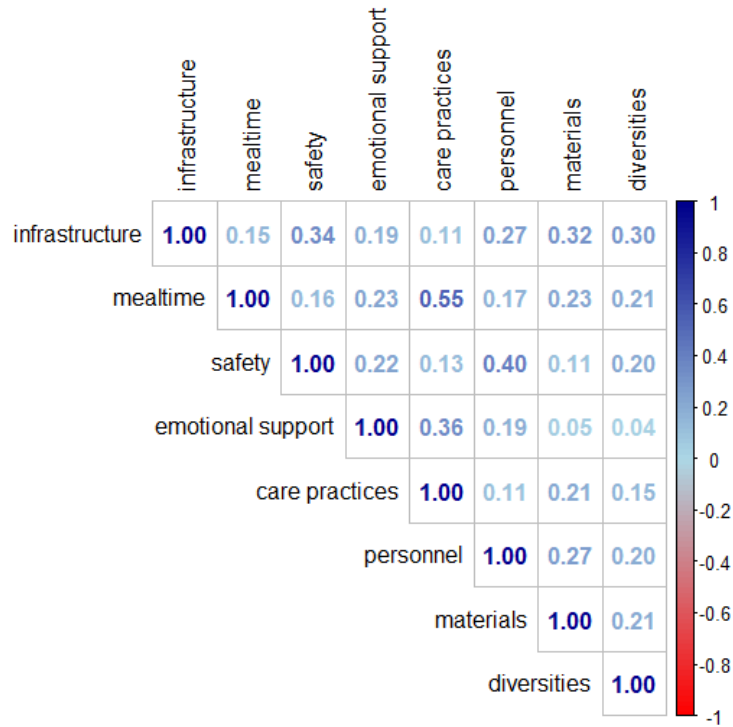
Now, attention will be given to analyzing how the perceived quality in one specific dimension is related to other dimensions' quality. This way, it is possible to investigate the hypothesis according to which better schools are probably better in all aspects, resulting in a strong correlation between EAPI scores.

As a first piece of evidence, Figure 6 shows that the correlation between EAPI scores is usually modest, being equal to 0.3 or less in around 80% of comparisons. The highest correlations are found between the dimensions of infrastructure and safety; mealtime and care practices; emotional support and care practices; safety and personnel. It is expected that scores follow similar patterns in these aspects due to their similar nature, and even in such cases, correlation does not exceed 0.55. Therefore, it is safe to say that the objective quality measures are different enough from each other.

In addition, equation 6.1 was adapted in order to estimate, for dimensions  $d$  and  $a$ :

$$Q_i^{S^d} = \beta_0 + \beta_1 Q_i^{O^a} + \varepsilon \quad (6.2)$$

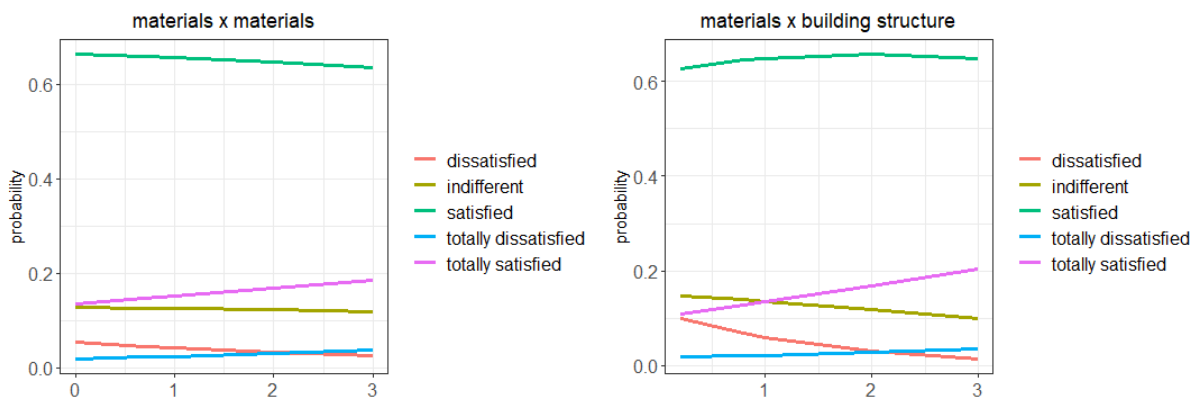
Figure 6 – Correlation plot between EAPI dimensions



Source: author’s own creation.

The results are in line with the pattern displayed above, indicating greater sensitivity in satisfaction to EAPI scores in similar dimensions. Since for most aspects there is a significant relationship between satisfaction and its EAPI score, in the cases where no such relationship was found, an effort was made to understand what aspects were affecting satisfaction the most. In particular, taking a look at satisfaction patterns towards "Materials", where unclear results were obtained in the original multinomial logit model, it can be seen that respondents often mistake quality infrastructure in terms of building structure with quality in terms of materials and toys (Figure 7).

Figure 7 – Multinomial logit plots: satisfactions towards quality of materials



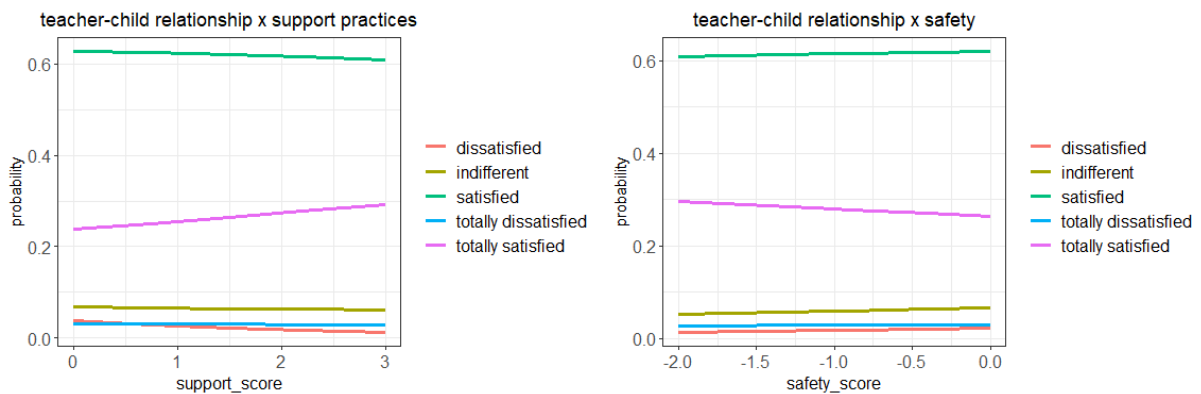
Source: author’s own creation.

It is precisely in this dimension where larger effects of our school openness measures are

found. Having a child enrolled in a school that welcomes parental participation can reduce parental misinformation by letting them have more access to the school's reality, and in this particular case, contributing to their judgement of material's quality, which is usually harder to perceive from a distance than building structure. Thus, these findings seem to make our models' results stronger.

On the other hand, in aspects where school openness did not significantly affect the distance between subjective and objective measures, the problem does not seem to be related to difficulties in distinguishing between different aspects, but to an absence of parameters of what might constitute quality in that specific dimension. For instance, taking the reported satisfaction towards "teacher-child relationship" and comparing it to alternative EAPI scores, it can be seen that other factors do not seem to be more related with parental perceptions than the emotional support and conflict management score, which was used to calculate the distance in our main model (Figure 8).

Figure 8 – Multinomial logit plots: satisfactions towards teacher-child relationship



Source: author's own creation.

## 6.0.2 Different split-samples

When adopting a split-sample strategy, it is convenient to repeat all analysis using alternative splits, so that model estimates obtained through the use of alternative measures will be compared. Since school openness variables were calculated using one half of the sample, by changing the observations included in this half the indicator's value is also altered. Thus, our satisfaction and distance models were estimated with different, randomly generated samples.

Table 12 presents a summary of the average marginal effects (AME) estimates for the satisfaction model. Comparing it to results, the school openness measured remains with a negative effect of approximately 16pp on the probability of being "totally satisfied" with the health and hygiene, but the effect on the satisfaction with "teacher-child relationship" ceases to be significant.

Instead, a reduction of 15pp in the probability of being "totally satisfied" with the visibility

of children's activities is now found - before, this decrease was estimated to be of 10pp, but with no statistical relevance (see Table 10). Respondents who totally agreed to being overloaded by motherhood also showed higher chances of being satisfied towards most aspects, and with similar magnitude than before.

Table 12 – Summary of results: robustness estimates for satisfaction models (AME)

Outcome variable	Socioeconomic Model	Socioeconomic + Emotional Support Model	
	School openness	School openness	Overloaded by motherhood
Infrastructure	-0.07 (0.07)	-0.09 (0.07)	0.15** (0.06)
Child feeding	-0.08 (0.07)	-0.07 (0.08)	0.14** (0.06)
Safety	-0.10 (0.07)	-0.10 (0.07)	0.09 (0.06)
Teacher-child relationship	0.01 (0.09)	0.03 (0.09)	0.18** (0.07)
Visibility of children's activities	-0.16** (0.07)	-0.15** (0.07)	0.06 (0.05)
Health and hygiene	-0.16** (0.08)	-0.16** (0.08)	0.16** (0.07)
Teacher-family relationship	-0.02 (0.08)	-0.00 (0.08)	0.14** (0.07)
Quality of materials and toys	-0.06 (0.06)	-0.10 (0.07)	0.07 (0.05)
Accessibility	-0.07 (0.07)	-0.11 (0.07)	0.08 (0.06)

*Note:* the number of observations ranged from 955 to 1060 for Socioeconomic Model estimations and from 882 to 978 for Socioeconomic + Emotional Support Model estimations; \*p<0.1; \*\*p<0.05; \*\*\*p<0.01.

The key finding regarding the distance model is that the school openness measure is confirmed to have a highly significant and large negative effect on the distance between parental perception and objective quality in terms of visibility of children's activities and materials and toys' quality (Table 13). The effect previously found regarding the infrastructure dimension (Table 11) does not hold in this case.

Having access to sewage and garbage collection is still a relevant factor in reducing distances in two dimensions, but, now, is not significant with respect to teacher-child relation-

ship. Either way, the effects associated to this variable are relatively small in magnitude in both estimations.

Table 13 – Summary of results: robustness estimates for linear distance models

Outcome variable	Socioeconomic Model		Socioeconomic + Emotional Support Model	
	School openness	Sewage and garbage collection	School openness	Sewage and garbage collection
Infrastructure	-0.007 (0.033)	-0.011 (0.016)	-0.022 (0.034)	-0.016 (0.017)
Child feeding	0.033 (0.034)	-0.009 (0.016)	0.038 (0.036)	0.001 (0.017)
Safety	-0.017 (0.038)	-0.008 (0.018)	-0.025 (0.039)	-0.010 (0.019)
Teacher-child relationship	-0.015 (0.046)	-0.019 (0.022)	-0.018 (0.049)	-0.019 (0.024)
Visibility of children's activities	-0.186*** (0.043)	0.005 (0.020)	-0.194*** (0.045)	0.010 (0.021)
Health and hygiene	0.054 (0.033)	-0.034** (0.016)	0.045 (0.035)	-0.031* (0.017)
Teacher-family relationship	0.031 (0.033)	-0.037** (0.016)	0.041 (0.034)	-0.048** (0.017)
Quality of materials and toys	-0.249*** (0.096)	-0.027 (0.047)	-0.259** (0.101)	-0.011 (0.051)
Accessibility	0.036 (0.047)	0.028 (0.024)	0.022 (0.047)	0.023 (0.024)

*Note:* the number of observations ranged from 955 to 1030 for Socioeconomic Model estimations and from 882 to 958 for Socioeconomic + Emotional Support Model estimations; \* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ .

In short, the undertaken analysis emphasized the relevance of school openness in explaining satisfaction towards health and hygiene, as well as in reducing the distance between parental perceptions and reality regarding the visibility of children's activities and the quality of materials and toys. Other effects do not seem to be robust to variations in samples. This exercise was performed using other randomly generated groups, and results remain similar to the ones presented in the tables above. It is important to note that such variation in the final estimates might be related to the relatively small sample size; if access to larger samples is provided, more robust estimations will be made possible to compute.

## 7 Conclusion

Families face difficulties in assessing the quality of education provided by childcare centers to their children due to limited knowledge about what constitutes quality in this phase, as well as to their misinformation caused by the principal-agent problem identified in family-school relationships (Caucutt & Lochner, 2020; Paes de Barros et al., 2011; Plank & Davis, 2020). Since early childhood investments can deeply shape children's future outcomes, overcoming these informational barriers arise as a relevant public policy challenge. This work was devoted to investigate whether greater school openness affects families' perceptions of educational quality and its distance to objective measures of childcare centers' quality, using novel data from the Brazilian state of Ceará and adding up to the behavioral economics literature regarding education.

The main findings are that more openness to parental engagement decreases by approximately 16pp the probability of a caregiver being satisfied with health and hygiene aspects, and it is associated with significant reductions in the distance between parental perceptions and externally-evaluated quality in respect to the visibility of children's activities (15 to 20%, on average) and to the quality of materials and toys (in 25 to 30%, on average). Overall, these results suggest that openness to families' participation does not seem to determine satisfaction levels by itself, but might lead to deeper knowledge of a school's reality in certain aspects, thereby decreasing parental satisfaction and the observed distances in some cases.

It is relevant to note that the three dimensions mentioned above are typically hard to observe without getting to know schools from the inside, i.e., it is necessary to actually visit the educational environment in order to judge their quality. Thus, the fact that school openness affects these aspects the most is understandable. In this sense, results show that school openness did not significantly affect satisfaction or distance measures regarding dimensions such as infrastructure or safety, which are more easily observed from the outside.

As additional highlights, it was found that mother's self-reported overload is associated with significant increases in their probability of being satisfied towards multiple educational aspects. This is in agreement with Damgaard and Nielsen (2020)'s discussion on the limited attention hypotheses, which postulates that parents tend to overlook or forget information regarding their children's school due to their scarce attention, since more burdened caregivers seem to have lower standards for quality.

The value of the school openness measure was proven to depend on geographic location significantly. As a result, municipality controls were included in all models. Such a pat-



tern is consistent with the fact that policies that aim at engaging families in children's education are frequently led by Departments of Education at the municipal level, making similarities in between schools from the same city expected in this point.

Moreover, non-white parents were on average more satisfied towards school infrastructure, and having access to sewage and garbage collection was linked to decreases of approximately 5.4% on the distance between subjective perceptions and measured quality in terms of infrastructure, teacher-child relationships and teacher-family relationships. These results confirm how families' socioeconomic traits might, even today, affect parent's ability to judge educational quality, which in turn affects the kind of investments they make in their children, as thoroughly discussed in the literature of education economics and skill formation (Cunha & Heckman, 2010; Feijó et al., 2022).

Limitations encountered by this work include its relatively small sample size due to the adoption of a split-sample instrumental variable approach to compute the school openness measure; the cross-sectional structure of the dataset, which excludes the possibility of undertaking longitudinal analysis on the outcomes of interest; and the risk of self-selection into the sample on the part of families, since it might have been the case that more engaged parents chose to engage more in the research. The chosen empirical strategy considered only information from schools with engagement rates of over 30% and used information from different halves of the full sample to estimate first stage and second stage parameters in order to mitigate these issues.

Nonetheless, the findings suggest that investing on policies that aim at allowing families greater school participation can be considered as a potential mechanism to reduce the information asymmetry problem regarding educational quality in ECE. Even if further research on this topic is welcomed, the fact that relevant effects were found regarding factors that are usually harder for families to perceive is considered a positive sign concerning the straightening of family-school bonds. By increasing their knowledge of what constitutes quality for a young child, it is expected that parental beliefs can be shaped in the sense of better investing on their children's future.

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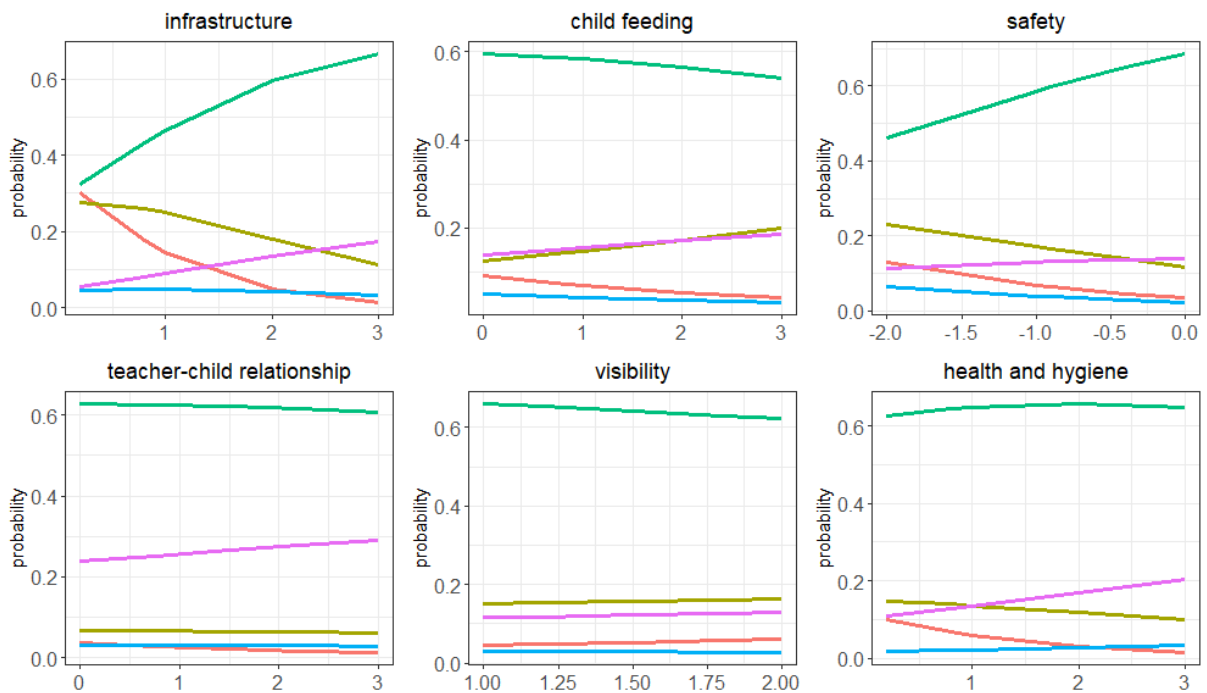
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# APPENDIX A – Figures

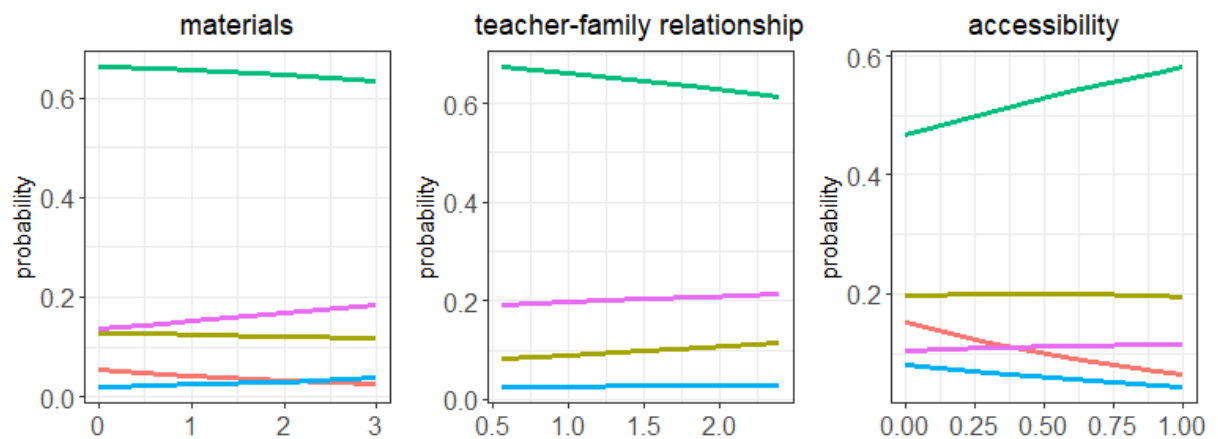
Figures 9 and 10 illustrate multinomial logit estimations for the nine dimensions in which direct comparisons between subjective and objective school quality were made. In all graphs, green lines represent "satisfied"; yellow lines, "indifferent"; pink lines, "totally satisfied"; red lines, "dissatisfied"; blue lines, "totally dissatisfied".

Figure 9 – Multinomial logits: subjective vs. objective quality



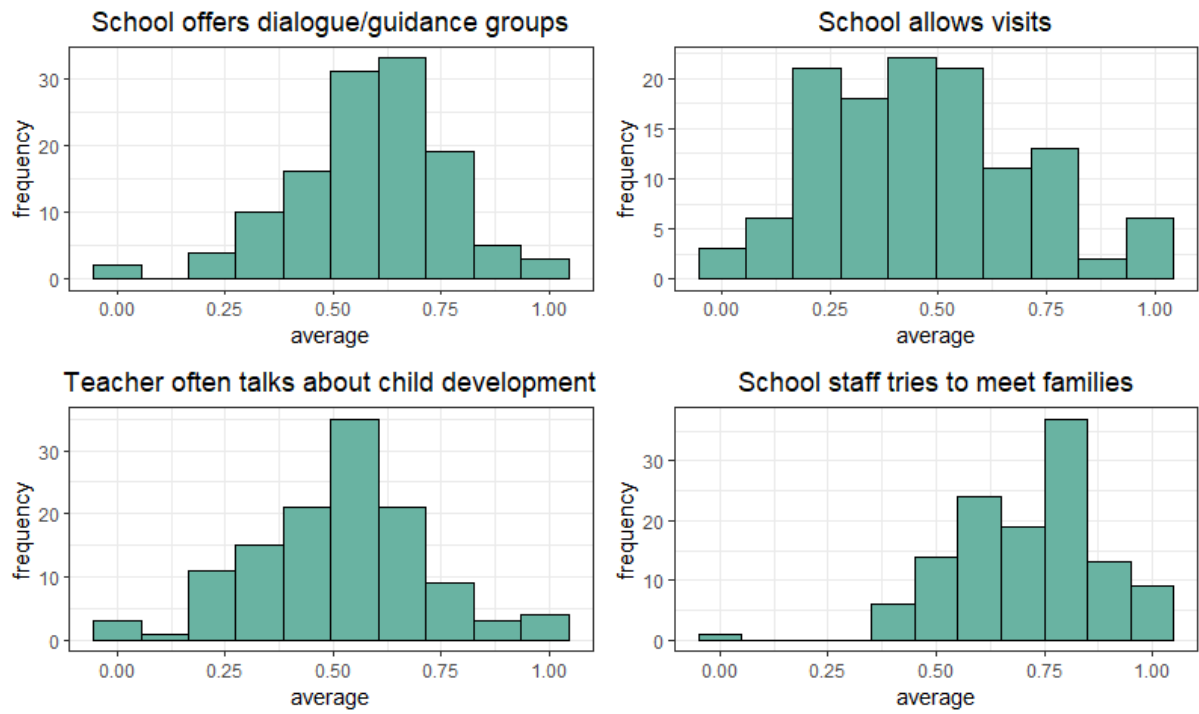
Source: author's own creation.

Figure 10 – Multinomial logits: subjective vs. objective quality



Source: author's own creation.

Figure 11 – Distribution of school openness variables per school



Source: author's own creation.

## APPENDIX B – Tables

All models and regressions include municipality controls, which were omitted from the tables. In all cases, these controls were highly significant.

Table 14 – Average Marginal Effects (AME): infrastructure

	Socioeconomic Model	Socioeconomic + Emotional Support Model
school openness	−0.10 (0.07)	−0.08 (0.07)
completed high-school	0.00 (0.02)	0.01 (0.02)
child entered in pre-school	−0.04 (0.03)	−0.03 (0.04)
sewage and garbage	−0.03 (0.03)	−0.03 (0.03)
currently studies	0.02 (0.03)	0.02 (0.03)
non-white	0.01 (0.03)	0.05** (0.02)
neighborhood leisure options	0.00 (0.03)	0.01 (0.03)
informally employed	0.01 (0.02)	0.01 (0.02)
formally employed	0.04 (0.04)	0.04 (0.04)
parenting takes too much time		0.00 (0.02)
parenting is too hard		−0.07*** (0.02)
equally divided care		0.05** (0.02)
supportive relatives		0.05** (0.02)
relatives criticize each other		0.03 (0.03)
optimistic		−0.04 (0.04)
overloaded by motherhood		0.14** (0.06)
didn't want children		0.05 (0.04)
rural area		0.01 (0.02)
limited control		0.14* (0.08)
satisfied with motherhood		0.01 (0.04)
AIC	745.03	675.76
Observations	1023	952
Log Likelihood	−354.51	−308.88

Note: \*\*\*  $p < 0.01$ ; \*\*  $p < 0.05$ ; \*  $p < 0.1$



Table 15 – Linear distance model: infrastructure

	Socioeconomic Model	Socioeconomic + Emotional Support Model
school openness	−0.067* (0.034)	−0.077** (0.037)
completed high-school	0.003 (0.010)	0.005 (0.011)
non-white	−0.002 (0.013)	0.004 (0.014)
currently studies	0.001 (0.016)	0.003 (0.017)
child entered in pre-school	0.004 (0.019)	0.008 (0.021)
informally employed	−0.003 (0.011)	−0.004 (0.012)
formally employed	−0.012 (0.016)	−0.019 (0.017)
sewage and garbage	−0.025* (0.015)	−0.021 (0.016)
neighborhood leisure options	−0.005 (0.013)	−0.001 (0.014)
overloaded by motherhood		−0.019 (0.021)
supportive relatives		−0.005 (0.014)
relatives criticize each other		0.008 (0.015)
equally divided care		0.010 (0.012)
parenting takes too much time		0.012 (0.011)
optimistic		0.006 (0.017)
didn't want children		0.040** (0.016)
limited control		0.047 (0.029)
satisfied with motherhood		−0.011 (0.019)
parenting is too hard		−0.008 (0.011)
rural area		0.016 (0.012)
constant	0.271*** (0.017)	0.247*** (0.027)
Observations	1,023	952
R <sup>2</sup>	0.030	0.048
Adjusted R <sup>2</sup>	0.014	0.019
F Statistic	1.828** (df = 17; 1005)	1.653** (df = 28; 923)

Note:

\*p&lt;0.1; \*\*p&lt;0.05; \*\*\*p&lt;0.01

Table 16 – Average Marginal Effects (AME): child feeding

	Socioeconomic Model	Socioeconomic + Emotional Support Model
school openness	−0.08 (0.08)	−0.05 (0.08)
completed high-school	−0.02 (0.02)	−0.01 (0.02)
child entered in pre-school	0.01 (0.04)	0.02 (0.05)
sewage and garbage	−0.06** (0.03)	−0.06* (0.03)
currently studies	0.03 (0.04)	0.05 (0.04)
non-white	−0.03 (0.03)	0.00 (0.03)
neighborhood leisure options	−0.00 (0.03)	0.01 (0.03)
informally employed	−0.01 (0.02)	−0.01 (0.03)
formally employed	0.06 (0.04)	0.04 (0.04)
parenting takes too much time		−0.02 (0.03)
parenting is too hard		−0.01 (0.03)
equally divided care		0.06** (0.03)
supportive relatives		0.05* (0.03)
relatives criticize each other		−0.00 (0.03)
optimistic		0.01 (0.04)
overloaded by motherhood		0.14** (0.06)
didn't want children		0.01 (0.04)
rural area		−0.00 (0.03)
limited control		0.17** (0.08)
satisfied with motherhood		0.04 (0.04)
AIC	925.89	849.17
McFadden R2	0.15	0.25
Observations	1071	994
Log Likelihood	−444.95	−395.59

\*\*\* $p < 0.01$ ; \*\* $p < 0.05$ ; \* $p < 0.1$

Table 17 – Linear distance model: child feeding

	Socioeconomic Model	Socioeconomic + Emotional Support Model
school openness	0.075** (0.037)	0.085** (0.039)
completed high-school	−0.010 (0.011)	−0.010 (0.011)
non-white	−0.022 (0.015)	−0.009 (0.015)
currently studies	0.020 (0.017)	0.027 (0.018)
child entered in pre-school	0.014 (0.020)	0.021 (0.022)
sewage and garbage	−0.014 (0.016)	−0.009 (0.017)
neighborhood leisure options	−0.009 (0.014)	−0.002 (0.015)
informally employed	−0.012 (0.012)	−0.015 (0.012)
formally employed	0.007 (0.017)	−0.012 (0.018)
overloaded by motherhood		0.029 (0.022)
supportive relatives		0.037** (0.015)
relatives criticize each other		−0.006 (0.016)
equally divided care		0.018 (0.013)
parenting takes too much time		−0.019 (0.012)
optimistic		0.002 (0.018)
didn't want children		0.023 (0.017)
limited control		0.016 (0.031)
satisfied with motherhood		−0.020 (0.020)
parenting is too hard		0.002 (0.012)
rural area		0.017 (0.013)
constant	0.275*** (0.019)	0.227*** (0.029)
Observations	1,012	942
R <sup>2</sup>	0.064	0.082
Adjusted R <sup>2</sup>	0.048	0.054
F Statistic	4.001*** (df = 17; 994)	2.908*** (df = 28; 913)

Note:

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Table 18 – Average Marginal Effects (AME): safety

	Socioeconomic Model	Socioeconomic + Emotional Support Model
school openness	−0.08 (0.07)	−0.06 (0.07)
completed high-school	−0.02 (0.02)	−0.01 (0.02)
child entered in pre-school	−0.04 (0.03)	−0.05* (0.03)
sewage and garbage	−0.01 (0.03)	−0.03 (0.03)
currently studies	0.02 (0.03)	0.03 (0.04)
non-white	−0.04 (0.03)	−0.03 (0.03)
neighborhood leisure options	−0.02 (0.03)	−0.03 (0.03)
informally employed	0.01 (0.02)	0.01 (0.02)
formally employed	0.03 (0.03)	0.02 (0.03)
parenting takes too much time		0.00 (0.02)
parenting is too hard		−0.06** (0.02)
equally divided care		0.05** (0.02)
supportive relatives		0.06*** (0.02)
relatives criticize each other		0.03 (0.03)
optimistic		−0.02 (0.04)
overloaded by motherhood		0.13** (0.06)
didn't want children		0.00 (0.03)
rural area		−0.01 (0.02)
limited control		0.14* (0.07)
satisfied with motherhood		0.02 (0.04)
AIC	797.83	731.67
McFadden R2	0.00	0.05
Observations	1071	994
Log Likelihood	−380.91	−336.83

\*\*\* $p < 0.01$ ; \*\* $p < 0.05$ ; \* $p < 0.1$

Table 19 – Linear distance model: safety

	Socioeconomic Model	Socioeconomic + Emotional Support Model
school openness	0.011 (0.040)	0.007 (0.042)
completed high-school	-0.004 (0.012)	-0.012 (0.012)
non-white	0.008 (0.016)	0.008 (0.017)
currently studies	-0.001 (0.019)	0.004 (0.020)
child entered in pre-school	-0.014 (0.023)	-0.022 (0.025)
sewage and garbage	-0.007 (0.018)	-0.014 (0.019)
neighborhood leisure options	-0.011 (0.016)	-0.010 (0.016)
informally employed	0.015 (0.013)	0.011 (0.014)
formally employed	-0.037** (0.019)	-0.047** (0.020)
overloaded by motherhood		0.048* (0.025)
supportive relatives		0.042** (0.016)
relatives criticize each other		-0.006 (0.018)
equally divided care		0.038*** (0.014)
parenting takes too much time		-0.015 (0.013)
optimistic		0.021 (0.020)
didn't want children		-0.011 (0.019)
limited control		0.058 (0.035)
satisfied with motherhood		0.050** (0.022)
parenting is too hard		-0.001 (0.013)
rural area		0.0001 (0.014)
constant	0.921*** (0.021)	0.803*** (0.032)
Observations	997	928
R <sup>2</sup>	0.034	0.089
Adjusted R <sup>2</sup>	0.018	0.060
F Statistic	2.049*** (df = 17; 979)	3.119*** (df = 28; 899)

Note:

\*p&lt;0.1; \*\*p&lt;0.05; \*\*\*p&lt;0.01

Table 20 – Average Marginal Effects (AME): teacher-child relationship

	Socioeconomic Model	Socioeconomic + Emotional Support Model
school openness	−0.16* (0.10)	−0.13 (0.10)
completed high-school	0.01 (0.03)	0.01 (0.03)
child entered in pre-school	0.04 (0.05)	0.04 (0.06)
sewage and garbage	−0.03 (0.04)	−0.02 (0.04)
currently studies	0.04 (0.05)	0.04 (0.05)
non-white	−0.08* (0.04)	−0.06 (0.04)
neighborhood leisure options	0.03 (0.04)	0.03 (0.04)
informally employed	−0.01 (0.03)	−0.03 (0.03)
formally employed	0.05 (0.04)	0.05 (0.05)
parenting takes too much time		−0.00 (0.03)
parenting is too hard		−0.04 (0.03)
equally divided care		0.07** (0.03)
supportive relatives		0.02 (0.04)
relatives criticize each other		−0.02 (0.04)
optimistic		−0.01 (0.05)
overloaded by motherhood		0.15** (0.06)
didn't want children		−0.05 (0.04)
rural area		0.01 (0.03)
limited control		0.25*** (0.09)
satisfied with motherhood		0.11*** (0.04)
AIC	1258.94	1158.99
McFadden R2	0.17	0.26
Observations	1071	994
Log Likelihood	−611.47	−550.50

\*\*\* $p < 0.01$ ; \*\* $p < 0.05$ ; \* $p < 0.1$

Table 21 – Linear distance model: teacher-child relationship/emotional support practices

	Socioeconomic Model	Socioeconomic + Emotional Support Model
school openness	0.024 (0.049)	0.028 (0.052)
completed high-school	-0.020 (0.015)	-0.019 (0.015)
non-white	-0.002 (0.020)	-0.002 (0.021)
currently studies	0.016 (0.024)	0.022 (0.025)
child entered in pre-school	0.045* (0.027)	0.054* (0.030)
sewage and garbage	-0.050** (0.022)	-0.054** (0.023)
neighborhood leisure options	0.011 (0.019)	0.015 (0.020)
informally employed	-0.034** (0.016)	-0.034** (0.017)
formally employed	-0.022 (0.023)	-0.025 (0.025)
overloaded by motherhood		-0.019 (0.031)
supportive relatives		0.006 (0.020)
relatives criticize each other		0.014 (0.022)
equally divided care		0.001 (0.018)
parenting takes too much time		-0.005 (0.017)
optimistic		0.013 (0.024)
didn't want children		0.037 (0.023)
limited control		0.016 (0.042)
satisfied with motherhood		0.020 (0.027)
parenting is too hard		-0.031* (0.017)
rural area		-0.0003 (0.018)
constant	0.369*** (0.025)	0.350*** (0.039)
Observations	1,056	982
R <sup>2</sup>	0.099	0.115
Adjusted R <sup>2</sup>	0.084	0.089
F Statistic	6.705*** (df = 17; 1038)	4.437*** (df = 28; 953)

Note:

\*p&lt;0.1; \*\*p&lt;0.05; \*\*\*p&lt;0.01

Table 22 – Average Marginal Effects (AME): visibility

	Socioeconomic Model	Socioeconomic + Emotional Support Model
school openness	−0.09 (0.07)	−0.10 (0.07)
completed high-school	−0.03 (0.02)	−0.03 (0.02)
child entered in pre-school	−0.01 (0.04)	−0.00 (0.04)
sewage and garbage	−0.04 (0.03)	−0.04* (0.02)
currently studies	0.04 (0.04)	0.04 (0.04)
non-white	−0.07** (0.03)	−0.05 (0.03)
neighborhood leisure options	0.03 (0.03)	0.04 (0.03)
informally employed	−0.01 (0.02)	−0.01 (0.02)
formally employed	0.07* (0.04)	0.07* (0.04)
parenting takes too much time		−0.02 (0.02)
parenting is too hard		0.00 (0.02)
divided care		0.02 (0.02)
supportive relatives		0.07*** (0.02)
relatives criticize each other		0.00 (0.03)
optimistic		0.01 (0.03)
overloaded by motherhood		0.10* (0.05)
didn't want children		0.01 (0.03)
rural area		0.00 (0.02)
limited control		0.26*** (0.09)
satisfied with motherhood		0.01 (0.04)
AIC	683.09	612.93
McFadden R2	0.00	0.09
Observations	969	904
Log Likelihood	−323.54	−277.47

\*\*\* $p < 0.01$ ; \*\* $p < 0.05$ ; \* $p < 0.1$



Table 23 – Linear distance model: visibility

	Socioeconomic Model	Socioeconomic + Emotional Support Model
school openness	−0.151*** (0.046)	−0.150*** (0.048)
completed high-school	−0.027** (0.014)	−0.034** (0.014)
non-white	−0.005 (0.018)	−0.010 (0.019)
currently studies	−0.031 (0.022)	−0.029 (0.023)
child entered in pre-school	0.028 (0.025)	0.029 (0.028)
sewage and garbage	0.003 (0.020)	0.007 (0.021)
neighborhood leisure options	0.008 (0.018)	0.008 (0.019)
informally employed	0.015 (0.015)	0.012 (0.016)
formally employed	0.009 (0.021)	0.003 (0.022)
overloaded by motherhood		0.024 (0.029)
supportive relatives		0.059*** (0.019)
relatives criticize each other		−0.022 (0.020)
equally divided care		0.034** (0.017)
parenting takes too much time		0.007 (0.015)
optimistic		0.005 (0.023)
didn't want children		0.004 (0.021)
limited control		−0.014 (0.038)
satisfied with motherhood		0.030 (0.025)
parenting is too hard		−0.008 (0.015)
rural area		0.006 (0.016)
constant	0.785*** (0.023)	0.680*** (0.036)
Observations	969	904
R <sup>2</sup>	0.098	0.139
Adjusted R <sup>2</sup>	0.081	0.111
F Statistic	6.050*** (df = 17; 951)	5.030*** (df = 28; 875)

Note:

\*p&lt;0.1; \*\*p&lt;0.05; \*\*\*p&lt;0.01

Table 24 – Average Marginal Effects (AME): health and hygiene

	Socioeconomic Model	Socioeconomic + Emotional Support Model
school openness	−0.14* (0.08)	−0.15* (0.09)
completed high-school	−0.03 (0.02)	−0.03 (0.02)
child entered in pre-school	0.01 (0.04)	0.02 (0.05)
sewage and garbage	−0.01 (0.03)	−0.01 (0.03)
currently studies	0.04 (0.04)	0.03 (0.04)
non-white	−0.04 (0.03)	−0.01 (0.03)
neighborhood leisure options	−0.01 (0.03)	−0.00 (0.03)
informally employed	−0.04* (0.02)	−0.04* (0.02)
formally employed	0.01 (0.04)	0.01 (0.04)
parenting takes too much time		−0.03 (0.03)
parenting is too hard		−0.01 (0.03)
equally divided care		0.07*** (0.02)
supportive relatives		0.08*** (0.03)
relatives criticize each other		−0.00 (0.03)
optimistic		−0.03 (0.04)
overloaded by motherhood		0.16*** (0.06)
didn't want children		0.00 (0.04)
rural area		0.03 (0.03)
limited control		0.28*** (0.09)
satisfied with motherhood		0.01 (0.04)
AIC	852.76	782.87
McFadden	0.08	0.18
Observations	1019	949
Log Likelihood	−408.38	−362.43

\*\*\* $p < 0.01$ ; \*\* $p < 0.05$ ; \* $p < 0.1$

Table 25 – Linear distance model: distance health and hygiene/care practices

	Socioeconomic Model	Socioeconomic + Emotional Support Model
school openness	0.023 (0.048)	0.012 (0.050)
completed high-school	−0.026* (0.014)	−0.028* (0.015)
non-white	−0.019 (0.019)	−0.011 (0.020)
currently studies	0.011 (0.023)	0.007 (0.024)
child entered in pre-school	0.030 (0.026)	0.032 (0.028)
sewage and garbage	0.007 (0.021)	0.012 (0.023)
neighborhood leisure options	0.001 (0.018)	0.008 (0.019)
informally employed	−0.022 (0.015)	−0.024 (0.016)
formally employed	−0.013 (0.022)	−0.025 (0.023)
overloaded by motherhood		0.040 (0.029)
supportive relatives		0.019 (0.019)
relatives criticize each other		−0.001 (0.020)
equally divided care		0.030* (0.017)
parenting takes too much time		−0.025 (0.016)
optimistic		−0.015 (0.023)
didn't want children		0.037* (0.022)
limited control		0.088** (0.040)
satisfied with motherhood		0.010 (0.026)
parenting is too hard		−0.021 (0.016)
rural area		0.021 (0.017)
constant	0.354*** (0.024)	0.319*** (0.037)
Observations	1,019	949
R <sup>2</sup>	0.032	0.059
Adjusted R <sup>2</sup>	0.015	0.031
F Statistic	1.936** (df = 17; 1001)	2.070*** (df = 28; 920)

Note:

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Table 26 – Average Marginal Effects (AME): teacher-family relationship

	Socioeconomic Model	Socioeconomic + Emotional Support Model
school openness	−0.01 (0.09)	−0.00 (0.09)
completed high-school	−0.00 (0.03)	−0.01 (0.03)
child entered in pre-school	0.04 (0.05)	0.03 (0.05)
sewage and garbage	−0.04 (0.03)	−0.03 (0.04)
currently studies	0.05 (0.04)	0.05 (0.04)
non-white	−0.04 (0.04)	−0.03 (0.04)
neighborhood leisure options	−0.02 (0.03)	−0.01 (0.03)
informally employed	0.04 (0.03)	0.02 (0.03)
formally employed	0.08* (0.04)	0.08* (0.04)
parenting takes too much time		−0.03 (0.03)
parenting is too hard		−0.03 (0.03)
equally divided care		0.10*** (0.03)
supportive relatives		0.10*** (0.03)
relatives criticize each other		−0.05 (0.04)
optimistic		−0.04 (0.05)
overloaded by motherhood		0.10 (0.06)
didn't want children		−0.01 (0.04)
rural area		−0.00 (0.03)
limited control		0.25*** (0.09)
satisfied with motherhood		0.01 (0.05)
AIC	1047.40	946.63
McFadden R2	0.17	0.27
Observations	1044	969
Log Likelihood	−505.70	−444.31

\*\*\* $p < 0.01$ ; \*\* $p < 0.05$ ; \* $p < 0.1$

Table 27 – Linear distance model: teacher-family relationship/personnel

	Socioeconomic Model	Socioeconomic + Emotional Support Model
school openness	−0.009 (0.036)	−0.002 (0.038)
completed high-school	0.002 (0.011)	0.003 (0.011)
non-white	0.011 (0.014)	0.013 (0.015)
currently studies	0.011 (0.017)	0.013 (0.018)
child entered in pre-school	0.025 (0.020)	0.025 (0.022)
sewage and garbage	−0.031* (0.016)	−0.046*** (0.017)
neighborhood leisure options	−0.013 (0.014)	−0.012 (0.014)
informally employed	0.003 (0.012)	−0.0003 (0.012)
formally employed	−0.006 (0.016)	−0.015 (0.017)
overloaded by motherhood		0.018 (0.022)
supportive relatives		0.028* (0.015)
relatives criticize each other		−0.008 (0.016)
equally divided care		0.030** (0.013)
parenting takes too much time		−0.006 (0.012)
optimistic		0.004 (0.017)
didn't want children		0.011 (0.017)
limited control		0.038 (0.031)
satisfied with motherhood		−0.017 (0.020)
parenting is too hard		0.006 (0.012)
rural area		−0.025* (0.013)
constant	0.331*** (0.018)	0.317*** (0.028)
Observations	1,044	969
R <sup>2</sup>	0.050	0.074
Adjusted R <sup>2</sup>	0.034	0.047
F Statistic	3.145*** (df = 17; 1026)	2.699*** (df = 28; 940)

Note:

\*p&lt;0.1; \*\*p&lt;0.05; \*\*\*p&lt;0.01

Table 28 – Average Marginal Effects (AME): materials and toys

	Socioeconomic Model	Socioeconomic + Emotional Support Model
school openness	−0.10 (0.07)	−0.10 (0.07)
completed high-school	−0.01 (0.02)	−0.01 (0.02)
child entered in pre-school	−0.04 (0.03)	−0.04 (0.04)
sewage and garbage	−0.00 (0.03)	0.01 (0.03)
currently studies	0.05 (0.04)	0.03 (0.04)
non-white	0.02 (0.03)	0.03 (0.03)
neighborhood leisure options	−0.00 (0.03)	0.00 (0.03)
informally employed	0.01 (0.02)	0.01 (0.02)
formally employed	0.03 (0.03)	0.05 (0.04)
parenting takes too much time		0.00 (0.02)
parenting is too hard		−0.04* (0.02)
equally divided care		0.02 (0.02)
supportive relatives		0.05* (0.02)
relatives criticize each other		0.06* (0.04)
optimistic		0.02 (0.03)
overloaded by motherhood		0.09* (0.05)
didn't want children		0.01 (0.03)
rural area		0.01 (0.02)
limited control		0.17** (0.08)
satisfied with motherhood		−0.02 (0.04)
AIC	773.68	718.81
McFadden R2	0.00	0.04
Observations	1071	994
Log Likelihood	−368.84	−330.40

\*\*\* $p < 0.01$ ; \*\* $p < 0.05$ ; \* $p < 0.1$

Table 29 – Linear distance model: materials and toys

	Socioeconomic Model	Socioeconomic + Emotional Support Model
school openness	−0.286*** (0.103)	−0.309*** (0.110)
completed high-school	−0.007 (0.031)	−0.003 (0.033)
non-white	−0.037 (0.041)	−0.041 (0.044)
currently studies	−0.053 (0.049)	−0.027 (0.052)
child entered in pre-school	−0.031 (0.058)	0.001 (0.063)
sewage and garbage	0.030 (0.046)	0.043 (0.049)
neighborhood leisure options	0.001 (0.040)	0.013 (0.042)
informally employed	0.053 (0.034)	0.048 (0.036)
formally employed	0.058 (0.048)	0.060 (0.051)
overloaded by motherhood		−0.003 (0.065)
supportive relatives		−0.050 (0.043)
relatives criticize each other		−0.004 (0.046)
equally divided care		−0.044 (0.038)
parenting takes too much time		0.063* (0.035)
optimistic		−0.028 (0.052)
didn't want children		−0.040 (0.049)
limited control		0.087 (0.088)
satisfied with motherhood		0.077 (0.058)
parenting is too hard		−0.035 (0.035)
rural area		0.050 (0.037)
constant	0.498*** (0.053)	0.484*** (0.083)
Observations	1,020	948
R <sup>2</sup>	0.211	0.222
Adjusted R <sup>2</sup>	0.197	0.198
F Statistic	15.746*** (df = 17; 1002)	9.342*** (df = 28; 919)

Note:

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Table 30 – Average Marginal Effects (AME): accessibility

	Socioeconomic Model	Socioeconomic + Emotional Support Model
school openness	−0.09 (0.08)	−0.10 (0.07)
completed high-school	−0.03 (0.02)	−0.04* (0.02)
diversidade	−0.02 (0.04)	−0.00 (0.04)
child entered in pre-school	−0.01 (0.05)	−0.01 (0.04)
sewage and garbage	−0.01 (0.03)	−0.03 (0.03)
currently studies	0.05 (0.04)	0.02 (0.04)
non-white	−0.01 (0.03)	0.01 (0.03)
neighborhood leisure options	0.05 (0.04)	0.07** (0.04)
informally employed	−0.01 (0.03)	0.00 (0.02)
formally employed	0.04 (0.04)	0.07* (0.04)
parenting takes too much time		0.03 (0.03)
parenting is too hard		−0.06** (0.03)
equally divided care		0.07*** (0.02)
supportive relatives		0.02 (0.03)
relatives criticize each other		0.04 (0.04)
optimistic		−0.03 (0.04)
overloaded by motherhood		0.14** (0.06)
didn't want children		−0.03 (0.03)
rural area		0.01 (0.03)
limited control		0.26*** (0.09)
satisfied with motherhood		−0.02 (0.04)
AIC	517.26	475.07
McFadden R2	0.00	0.03
Observations	751	741
Log Likelihood	−239.63	−207.53

\*\*\* $p < 0.01$ ; \*\* $p < 0.05$ ; \* $p < 0.1$



Table 31 – Linear distance model: accessibility

	Socioeconomic Model	Socioeconomic + Emotional Support Model
school openness	0.012 (0.053)	0.025 (0.053)
completed high-school	-0.011 (0.016)	-0.021 (0.016)
non-white	0.013 (0.022)	0.016 (0.021)
currently studies	-0.038 (0.026)	-0.039 (0.025)
child entered in pre-school	-0.008 (0.032)	-0.021 (0.032)
sewage and garbage	0.034 (0.025)	0.021 (0.025)
neighborhood leisure options	-0.005 (0.022)	-0.002 (0.022)
informally employed	-0.003 (0.018)	-0.008 (0.018)
formally employed	-0.043* (0.025)	-0.043* (0.025)
overloaded by motherhood		0.036 (0.032)
supportive relatives		0.064*** (0.022)
relatives criticize each other		0.023 (0.022)
equally divided care		0.048** (0.019)
parenting takes too much time		-0.017 (0.018)
optimistic		0.033 (0.027)
didn't want children		-0.023 (0.024)
limited control		0.139*** (0.043)
satisfied with motherhood		0.044 (0.029)
parenting is too hard		-0.030* (0.018)
rural area		-0.019 (0.019)
constant	0.527*** (0.029)	0.398*** (0.043)
Observations	751	741
R <sup>2</sup>	0.035	0.111
Adjusted R <sup>2</sup>	0.011	0.075
F Statistic	1.483* (df = 18; 732)	3.059*** (df = 29; 711)

Note:

"diversities" control omitted \*p<0.1; \*\*p<0.05; \*\*\*p<0.01