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ORIGINAL PAPER

The Role of Parenting on Child Socioemotional Development: Evidence from the 2015 Pelotas (Brazil) Birth Cohort Study

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Abstract

Background Parenting is a central pathway to child positive or dysfunctional outcomes. Evidence based on positive and negative parenting and its impact on child development is sparse in low- and middle-income countries creating a gap for the development of public policies and early interventions.

Objective Investigate the impact of positive (i.e., sensitivity) and negative (i.e., harsh) parenting on children's socioemotional development at age 4 using data from the Pelotas Birth Cohort.

Method Sample comprised 4,010 children (50.6% male; mean age = 45.5 months, SD = 2.6; 72.4% White, 27.4% Black, 0.2% other) and their mothers (mean age = 31.4 years, SD = 6.6). Parenting was assessed via the Parental and Family Adjustment Scale and observational tasks (Booksharing, Don't Touch, and Responsive Interactions). Child mental health was assessed using the emotional symptoms, conduct problems, and hyperactivity and inattention subscales of the Strengths and Difficulties Questionnaire.

Results Coercive parenting and poor parent-child interactions assessed via the PAFAS, were significant predictors of all three child outcomes (IRR ranging from 1.03 to 1.11). Coercive parenting assessed via observation significantly increased mean scores of child conduct problems (IRR = 1.06) and hyperactivity problems (IRR = 1.12). Higher scores in parental positive emotional tone significantly decreased mean levels of hyperactivity problems (IRR = 0.94).

Conclusion Exposure to parental coercive practices significantly impacts child mental health. The impacts are already evident in preschool children and are not restricted to conduct difficulties, but extend to attention and emotional outcomes.

Keywords Parenting · Socioemotional development · Cohort · Longitudinal

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Introduction

Mental health disorders such as hyperactivity and emotional problems affect between 10% and 20% of all children and adolescents worldwide (Polanczyk et al., 2015). Previous research has shown that children's emotional and behavioral problems have long-lasting effects on social, educational, and later mental health outcomes (Miller-Lewis et al., 2013; Sellers et al., 2019). This is of particular concern in low- and middle-income countries (Kieling et al., 2011) where healthcare support is scarce (Renwick et al., 2022) and exposure to chronic adversities is higher (Benjet, 2010).

A key environmental factor known to contribute to child mental health is parenting. Parenting is a broad dimension that encompasses patterns of attitudes and behaviours used to socialise the child and to encourage or discourage specific behaviours (Bornstein, 2013). Parenting, and in particular mother–child interactions, operates as a context for children's socio-emotional and cognitive development, directly affecting their emotion recognition and serving as a central mechanism in pathways to positive or dysfunctional outcomes (Phua et al., 2020). Parenting is typically assessed in two broad dimensions: positive parenting, such as sensitivity (Shin et al., 2008), and negative or poor parenting, such as harsh behaviour (Runyan et al., 2010).

Sensitivity is the ability to identify, understand, and contingently respond to the child's needs (Ainsworth et al., 2015). Sensitivity has been largely assessed through naturalistic or lab-filmed interactions between carer and child, with coding schemes that include overall scores of the dyad's interaction and specific behaviors expressed by the carer, the child, or the dyad (Mesman, 2010). Regardless of the scoring system used, maternal sensitivity has been associated with better outcomes like secure attachment (O'Neill et al., 2021), good emotion regulation skills (Samdan et al., 2020), better academic achievement (Raby et al., 2015), and lower rates of emotional symptoms and behavioral problems (Sulik et al., 2015) – even in adverse environments (Murphy et al., 2021). Specifically, maternal sensitivity when the child is young has been associated with lower rates of children´s externalizing (Bernier et al., 2021) and internalizing problems (Kok et al., 2013) during preschool years.

By contrast, harsh parenting refers to coercive acts and negative emotional expressions of parents towards their children. It comprises both verbal and physical aggression (Hinnant et al., 2015), which may negatively affect children's social and emotional development (Baydar & Akcinar, 2018; Berthelon et al., 2020). For instance, a meta-analysis using data from 971 studies found significant associations between harsh parenting and higher rates of child internalizing and externalizing symptoms, regardless of cultural differences in levels of acceptance of physical aggression (Pinquart, 2021).

Notably, several contextual factors may influence how parenting and maternal nurturing impact child mental health outcomes. Poverty, for instance, may impact parental resources or skills available to offer emotional support and responsive caregiving to offspring, as most parental efforts may be directed toward meeting basic survival needs, such as providing food. (Booth et al., 2018). A study with an at-risk Swiss sample revealed that risk factors such as lack of social support, low maternal education, and parental stress also contribute to lower levels of maternal sensitivity (Neuhauser, 2018). Finally, parenting (Bernard et al., 2018) and parental reports of child emotional and behavioral problems (Datta Gupta et al., 2018) may be affected by maternal mental health, especially maternal depression.

Although context is critical, most studies reporting the effects of parental sensitivity and harsh parenting on child mental health have been conducted in high-income countries. Evidence based on specific types of parenting and its impact on child development is sparse in Brazil and other low- and middle-income countries. Attempts to fill this gap have been carried out recently. Hurtado-Mazeyra et al. (2022) analyzed longitudinal data from the Young Lives project in Peru, conducted in a region where poverty rates range between 30% and 50%, and showed that early maternal sensitivity and play were both positively related to cognitive skills and socio-emotional competencies at ages 8 and 15 years. Results from the 2004 Pelotas Birth Cohort/Brazil revealed that harsh parenting assessed via the Conflict Tactic Scale at age six predicted emotional problems at age 11 (Bauer et al., 2022).

Nevertheless, the lack of studies focusing on preschool children—particularly those incorporating observational measures of parental practices alongside self-reports, poses a theoretical gap. Addressing this limitation is essential to provide robust and ecologically valid evidence, thereby strengthening the understanding of life course determinants of child mental health. Additionally, investigating determinants of behavioral and emotional problems in children in a context of poverty and inequality is particularly important as early behavioral and emotional problems might disrupt children's social interactions and learning processes, increasing risk for persistent aggression.

The current study investigated the impact of positive (i.e., sensitivity) and negative (i.e., harsh) parenting on children's socioemotional development at age 4 using data from the [Pelotas] Birth Cohort. Large studies of parenting rarely use observational measures, and this is the first large study using cohort data from a middle-income country to provide evidence on the associations between parenting and child socioemotional development using observational data and questionnaires. By identifying parenting practices affected by adversity and associated with child outcomes, the current study provides key evidence for early childhood initiatives designed to support vulnerable families in adverse environments. Three hypotheses were formulated: H1- Coercive parenting and poor parent-child interactions will be positively associated to emotional, conduct problems, and hyperactivity and inattention problems in children; H2- Caregiver sensitivity will be negatively associated to children's emotional, conduct, and hyperactivity and inattention symptoms; H3- The effects of parenting on children's emotional, conduct and hyperactivity and attention development will remain significant even when sociodemographic and maternal mental health variables are controlled for.y

Method

Study Design

This is an observational, cross-sectional study that used data from a longitudinal population-based cohort.

Study Population and Participants

The [Pelotas] Birth Cohort is a longitudinal, population-based study conducted in [Pelotas], a Southern Brazilian city with nearly 340,000 inhabitants. All women living in the urban

area who gave birth in the city's five maternity wards between January 1 and December 31, 2015, were invited to participate (around 99% of all births in [city anonymized]take place in these hospitals). In all, 4275 (98.7% of all live births of that year) children were enrolled in the cohort and have been followed in nine waves (perinatal, birth, three months, one year, two years, four years, five years, six/seven years and nine years). Out of the 4010 participants that took part in the study at the 4-year follow-up, 3997 children comprised the analytic sample of this study (50.6% males with a mean age of 45.5 months; 72.4% White, 27.4% Black, 0.2% others) for whom outcome data were available and their primary caregiver; 94.1% of caregivers were the child's mother.

Measures

Child Outcomes

Strengths and Difficulties Questionnaire (SDQ) (Goodman, 1999): The SDQ is a questionnaire used to assess child emotional and behavioral difficulties that can be administered to the parents of 2- to 17-year-old children, previously validated in Brazil (Fleitlich et al., 2000). The standard 25-item version is scored on a Likert-type scale ranging from 0 to 2 (0 = not true; 1 = somewhat true; 2 = certainly true) and was completed by the primary caregiver in this study. For analyses, continuous scores and dichotomous categories of the emotional symptoms, conduct problems, and hyperactivity/inattention problems subscales were used. For categorical analyses, to establish clinical risk, the original (Goodman, 1999) three-band categories were applied as follows: emotional symptoms ≥ 5, conduct problems ≥ 3, and hyperactivity/inattention ≥ 6.

Parenting

Parental and Family Adjustment Scale – PAFAS (Sanders et al., 2014): the 30-item original PAFAS consists of two domains [parenting practices (18 items) and family adjustment (12 items)]. The parenting practices domain is composed of four scales: parental consistency (5 items), coercive parenting (5 items), positive encouragement (3 items), and parent-child relationship (5 items). A validation study conducted by Martins et al. (2024) on the 18 parenting items indicated that four items did not show good fit in the current study cohort sample (two from the consistency subscales and one from positive encouragement). Therefore, this study used the parenting practices domain, adopting the reduced version proposed by Martins et al. (2024), which comprised 14 items (parental consistency = 3 items, coercive parenting = 4 items, positive encouragement = 2 items, and parent–child relationship = 5 items). The reduced version showed a good reliability coefficient (0.912). Each item is rated on a 4-point scale from 'not at all' (0) to 'very much' (3), and greater scores are associated with worse performance in all scales.

Book-sharing task (P. J. Cooper et al., 2014; Murray et al., 2016): This task aims to evaluate the mother's sensitive responses and engagement in reciprocal exchanges with the child while sharing a book. Mother and child were filmed for approximately 5 min without examiner interference while looking at a picture book together. The book used was "A day in the park" — a book with no text developed by the research staff to represent local activities and include content that may elicit dialogue of particular interest for the research project (e.g.,

children playing and conflict breaking out over toys in a sandpit). The coding was developed at the Winnicott Research Unit, University of Reading, and has been successfully applied in several previous studies (P. J. Cooper et al., 2014; Dowdall et al., 2021; Murray et al., 2016). The coding scheme assesses four dimensions: (A) child measures, (B) parent measures, (C) joint measures, and (D) specific book-sharing codes. Final scores are derived as either rating scales (usually 1–5) or event counts, with each dimension composed of specific sub-items. For the current study, parent measures of sensitivity and emotional tone were used – both scored in terms of overall behaviors during the task. Sensitivity refers to parental awareness of the child's direction of interest, behavioural cues, and appropriate and timely responsiveness. This dimension is coded on a 5-point scale: 1 (highly insensitive) to 5 (highly sensitive). Emotional tone refers to how happy and irritable the parent was during book-sharing and was also rated on a 5-point scale (1 = very unhappy to 5 = very happy).

Responsive Interactions (RI) task (Schneider et al., 2021): the RI task measures the overall construct of responsive interactions between carer and child, highlighting three interconnected skills of the caregiver: (i) communicative clarity (providing meaningful verbal/non-verbal inputs to the child and fostering of shared understanding of the goals of the task); (ii) mind reading (thinking about what the child knows and understands); and (iii) mutuality building (promoting reciprocity). The mother was instructed to sit and play with her child for five minutes in a semi-structured play activity that was video recorded. The mother and child were asked to construct a robot using play (Lego/Duplo type blocks) as per the pictures shown. The mother and child should start with only the mom touching the Legos colored X and Y, and the child only touching the Legos colored Z and W. The caregiver was instructed to teach her child if the child had any doubts. For video coding, coders watched the 5-minute video recording of the activity only once, applying codes to each of the 11 items using a 5-point Likert scale, ranging from 1 ('not at all true') to 5 ('very true'). Then, the mean result of the 11 items was calculated.

"Don't Touch" – prohibition – task (DTT) (Cooper, 2016; Kochanska & Aksan, 1995): the DTT aims to assess harsh parenting and child frustration. Mother and child are presented with boxes full of interesting toys. The examiner removes some toys from these boxes and puts them in front of the child, instructing that the child is not allowed to touch them (nor the mother). After approximately 2 min and 30 s, the child is allowed to play with only one toy. The task ends after a further 1 min. Scoring comprises one dimension of child behaviors and four dimensions of carer behaviors. For the current study, an overall score of coercive parenting was used. This was composed by the sum scores of coercive, harsh, control/discipline verbal (event count of verbal threat/coercive control for the whole period of the task) and coercive, harsh, control/discipline physical (scores range 0–3; degree of physical coercive control, rated for each 20 s time block with a score of 3 meaning that the carer shows at least one episode of clear directed aggression). The task had been previously adapted and used in the PIÁ trial in the same population as the current study (Murray et al. 2016, 2024a, b).

Covariates

Information on child sex (male, female) was obtained from the perinatal assessment. Maternal age (≤19, 20–34, ≥35), maternal schooling in years (0–4, 5–8, 9–12, ≥13), current maternal status of work (not working, working), father presence in the house (no father at home, biological father at home, social father at home) and maternal relationship status

(no partner, with partner) was obtained at 4-year data collection via a sociodemographic questionnaire.

Neighbourhood violence was measured using maternal reports on the frequency (0 = never to 3 = often) of the following types of violence in the neighbourhood in the last 6 months: fights with weapons, fights between gangs, robbery, and sexual violence. Scores were summed, and neighbourhood violence was classified in three categories (0–2, 3–7, and ≥8). Family income was assessed as a continuous variable and obtained by summing the monthly income of all household members and dividing the total into quintiles. Maternal alcohol drinking and drug use were assessed at the 4-year follow-up using the Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) (Humeniuk et al., 2008; WHO ASSIST Working Group, 2002). For the Brazilian validation of the ASSIST questionnaire, see Henrique et al. (2004). Drug use was characterized as the use of any illicit substance in the three months before the interview, and alcohol use was defined as daily drinking of any alcoholic beverage.

Maternal postnatal depression was assessed at 3 months postpartum using the Edinburgh Postnatal Depression Scale (EPDS), which was validated in a Brazilian population (Santos et al., 2007). Mothers with scores ≥ 13 were defined as depressed. Mother-partner relationship conflict was also assessed at the 3-month follow-up using two Likert-type questions about partners' criticism of each other (Hooley et al., 1986), ranging from 1 to 10 (low to high criticism). Questions assessed how critical the mother considered her partner and how critical she considered herself to be about her partner. Following Buffarini et al. (2021), each score was categorized as reflecting low (1–3), medium (4–6), or high (7–10) criticism, and then combined the two into a relationship criticism score coded as follows: low criticism (low-low or low-medium); medium criticism (medium-medium, or low-high), or high criticism (medium-high or high-high).

Procedures

The 4-year follow-up of the [Pelotas] Birth Cohort occurred between February and August 2019. Data collection took place at the University research clinic, lasted about 3 h, and was conducted by a team of trained research assistants. The SDQ and the PAFAS were administered in person by trained research assistants. All observational tasks were filmed. Coding was carried out by a team of graduate psychologists or undergraduate research assistants as follows: four coders for the Booksharing task, three coders for the Don't touch task, and three coders for the Responsive Interactions task. For the Booksharing and the Don't Touch coding, work was done by trained undergraduate psychologists under the supervision of a senior psychologist. Training involved presentation of the measures with examples and group coding of videos. Coders then received blocks of 10 videos to code, which the senior psychologist reviewed. Disagreements were discussed until an agreement of 80% or more was achieved. After initial training, the main coding proceeded with coders leaving notes with doubts discussed during the regular weekly supervision meetings. Additionally, the senior psychologist coded a random sample of 10% of the videos to ensure quality control and calculate reliability.

Inter-coder kappa coefficients were 0.97 and 0.99 for Booksharing Sensitivity and Don't Touch Coercion, respectively. For the Responsive Interaction task, training was conducted via the online platform and supervised by the instrument developer of the Brazilian ver-

sion. A gold standard coder who reached 100% agreement in the online training carried out regular checks of the coding procedures and quality control. The intraclass correlation coefficient for a random sample of 10% of the videos was 0.62.

Ethical Statement

Two approvals were obtained by the Research Ethics Committee of the Federal University of Pelotas (School of Physical Education #26746414.5.0000.5313 and Medical School #03837318.6.0000.5317) for perinatal and age four follow-ups. Caregivers provided written informed consent at each study follow-up. Further details of the [Pelotas] Cohort can be found elsewhere (Hallal et al. 2018; Murray et al. 2024a, b).

Conflict of Interest

The authors declare that there are no conflicts of interest.

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Statistical Analysis

This study developed a cross-sectional analysis. Descriptive analyses were used to summarize the sample characteristics, using absolute and relative frequencies for categorical variables and means and standard deviations for numerical variables. To improve the interpretability of the results, descriptive analyses for all variables were run, including only children with valid data for the study outcomes. The associations between parental exposures (PAFAS and observational parenting tasks) and child outcomes (SDQ) were examined using Negative Binomial Regression Models (NBRM), given the count characteristic of the outcomes. An Incident Rate Ratio (IRR) effect size was calculated by exponentiation of the NBRM regression coefficients. These represent the relative difference in the child outcome score for a unit increase in the parenting exposure variable. Both crude and adjusted NBRM models were run. The adjusted model included all parenting exposures and socioeconomic confounders (maternal scholarship, family income, maternal postnatal depression, and mother-partner relationship) with $p<0.20$. To improve the interpretability of the adjusted model, Pseudo R^2, p-value, Akaike's Information Criteria (AIC), and Bayesian Information Criteria (BIC) are presented. Additional sensitivity analyses were performed using adjusted logistic models, based on risk variables of the outcomes. For all models, 95% confidence intervals were presented. All analyses were conducted using STATA 16.0, with statistical significance set at 5%.

Results

Children's (mean age 45.5 months, SD = 2.6; 72.4% White, 27.4% Black, 0.2% other ethnicity) and mothers' characteristics (mean age 31.4 years, SD = 6.6) are presented in Table 1.

Table 2 presents descriptive statistics for child outcomes and parenting measures. Continuous child outcomes scores were inspected, and the highest means were observed for hyperactivity, followed by conduct and emotional subscale scores. Descriptive results for the parenting dimensions assessed by the PAFAS suggested low levels of poor parenting. Parenting dimensions assessed via filmed tasks revealed mean scores similar to each task's midpoint on the scale (e.g., mean 2.53 for the Responsive Interactions task with a range of 0–5).

Table 3 shows the unadjusted predictive model of child emotional, conduct, and hyperactivity problems, considering each parenting measure as an exposure. Parenting dimensions were significantly associated with child outcomes, except for coercive parenting assessed through the Don´t Touch task, which was not significantly associated with emotional problems.

As seen in Table 4, the models adjusting for all other risk factors retained parental poor consistency, the use of coercive parenting, and poor parent-child interactions, as assessed via the PAFAS, as significant predictors of all three child outcomes, with relative increases in child problem scores ranging from 1.03 to 1.11 for each unit increase in parenting exposures. Considering the PAFAS exposures, the strongest association was between coercive parenting and conduct problems, while in observational tasks, the largest effect size was between coercive parenting (measured by the Don't Touch task) and hyperactivity.

Also in Table 4, coercive parenting assessed via observation significantly increased mean scores of child conduct problems (IRR = 1.06; 95%CI: 1.02–1.09) and hyperactivity problems (IRR = 1.12; 95%CI: 1.08–1.16), whereas higher scores in parental positive emotional tone significantly decreased mean levels of hyperactivity problems (IRR = 0.94; 95%CI: 0.90–0.98). Interestingly, parental use of coercive practices seems to play an important role irrespective of the assessment method.

As expected, the three comprehensive models, including all parenting measures as predictors of each child outcome, were significant, with better AIC indices for the conduct problems model. Analyses revealed that, using Pseudo R^2, 6% of the variance in child conduct problem scores, and 3% of the variance of child emotional and hyperactivity problem scores were explained by the models.

When dimensions of parenting were explored as predictors of risk for a dichotomous status of child emotional, conduct, and hyperactivity problems, the effects of parental use of coercive practices stand out for all three child outcomes, even when adjusting for other potential risk factors (see Fig. 1). The chance of a child being classified as at risk for emotional problems increased by 15% for each additional point of parental coercive practices' subscore of the PAFAS, by 12% for each point increase in the parent-child relationship subscale score, and by 10% for each increase in the (in)consistency subscale. Increases in the coercive subscale are associated with a 29% greater chance of the child having a conduct problem, and higher scores in the (in)consistency subscale are associated with a 22% increase in chances of a child having a conduct problem. Finally, children of parents with higher coercive parenting scores in the Don´t Touch observational task have 19% more chance of being classified as at risk for conduct problems; 29% greater risk was associated

Table 1 Descriptive sample characteristics ($N=3997$)

	N (%)
Child sex	
Male	2024 (50.6)
Female	1973 (49.4)
Maternal age (at child 4y)	
<20	85 (2.1)
20–34	2641 (66.1)
≥35	1269 (31.8)
Maternal schooling (complete years) (4y)	
0–4	165 (4.1)
5–8	1054 (26.4)
9–11	1448 (36.2)
12+	1330 (33.3)
Family asset index (quintiles) (4y)	
Q1 (poorest)	790 (20.0)
Q2	790 (20.0)
Q3	841 (21.3)
Q4	762 (19.3)
Q5 (richest)	768 (19.4)
Marital status (4y)	
Single mother	806 (20.2)
With partner	3182 (79.8)
Current working (4y)	
No	1748 (46.6)
Yes	2005 (53.4)
Neighborhood violence (4y)	
0 to 2	2319 (58.3)
3 to 7	1342 (33.7)
8 to 12	320 (8.0)
Father lives with child (4y)	
No father at home	979 (24.7)
Biological father at home	2817 (71.0)
Social father at home	170 (4.3)
Mother-partner relationship (4y)	
Low criticism	1702 (53.8)
Low to medium criticism	814 (25.8)
Medium to high criticism	645 (20.4)
Maternal depression (3 months)	
No	3482 (88.9)
Yes	436 (11.1)
Daily maternal use of alcohol (4y)	
No	3169 (98.7)
Yes	40 (1.3)
Maternal use of illicit drugs (4y)	
No	3830 (96.4)
Yes	142 (3.6)

Table 2 Exposures and outcomes descriptives for 2015 Pelotas Birth Cohort participants at age 4

	Mean (SD)	Range
Parenting		
PAFAS		
Consistency[+] (*N*=3978)	2.00 (1.74)	0–9
Positive Encouragement[+] (*N*=3968)	0.79 (0.97)	0–6
Parent-child relationship[+] (*N*=3979)	1.30 (1.85)	0–12
Coercive Parenting (*N*=3978)	3.59 (2.08)	0–12
Filmed tasks		
Responsive Interactions (*N*=3868)	2.53 (0.83)	1–4.7
Emotional tone[+] (*N*=3870)	2.99 (0.70)	0–5
Sensitivity (*N*=3868)	3.62 (0.85)	1–5
Coercive Total (*N*=3859)	0.58(0.75)	0- 3
Child Outcomes		
Emotional problems (0–10)	2.38 (1.98)	0–10
Conduct problems (0–10)	2.49 (2.03)	0–10
Hyperactivity/inattention (0–10)	4.29 (3.06)	0–10
	n	%
Emotional problems		
Yes	586	14.7
No	3412	85.3
Conduct problems		
Yes	1216	30.4
No	2782	69.6
Hyperactivity/Inattention		
Yes	1038	26.0
No	2959	74.0

[+]Higher scores in Consistency, Encouragement, and Parent-Child Relationship depict a worse outcome
Higher scores in emotional tone depict a better outcome

with higher scores on the PAFAS coercive subscale, and 22% greater risk with the PAFAS (In)consistency subscale.

Discussion

This study aimed to shed light on the associations between parenting and child mental health (i.e., emotional, conduct, and hyperactivity problems). Positive and negative parenting dimensions were assessed using both questionnaire and observational data. A large sample from South Brazil provided unique data on parental dimensions and child outcomes in a developing country. Accordingly, this study fills a gap in research in low- and middle-income countries regarding parenting and child mental health in early childhood. Still, it also addresses a worldwide lack of evidence from population-based large studies on this theme, especially using observational data.

Using the Strengths and Difficulties Questionnaire, levels of child emotional, conduct, and hyperactivity problems found in the current study confirmed previous literature (Kieling et al., 2011), suggesting high rates of mental health problems even in preschool children. Notably, using Goodman's (1999) clinical risk threshold, approximately 15% of the sample

Table 3 Unadjusted associations between parenting and child mental health using negative binomial regression models

	Emotional problems		Conduct problems		Hyperactivity	
	IRR (CI95%)	*p*-value	IRR (CI95%)	*p*-value	IRR (CI95%)	*p*-value
PAFAS						
Consistency[+]	1.10 (1.09; 1.12)	<0.001	1.15 (1.13; 1.16)	<0.001	1.11 (1.10; 1.12)	<0.001
Positive Encouragement[+]	1.07 (1.04; 1.10)	<0.001	1.10 (1.07; 1.13)	<0.001	1.05 (1.03; 1.08)	<0.001
Parent-Child Interaction[+]	1.07 (1.06; 1.09)	<0.001	1.09 (1.07; 1.10)	<0.001	1.06 (1.05; 1.07)	<0.001
Coercive Parenting[+]	1.08 (1.07; 1.09)	<0.001	1.15 (1.14; 1.16)	<0.001	1.11 (1.10; 1.12)	<0.001
Filmed tasks						
Responsive Interactions	0.86 (0.84; 0.89)	<0.001	0.87 (0.85; 0.90)	<0.001	0.89 (0.86; 0.91)	<0.001
Emotional Tone[+]	0.89 (0.86; 0.93)	<0.001	0.88 (0.85; 0.92)	<0.001	0.88 (0.85; 0.91)	<0.001
Sensitivity	0.90 (0.87; 0.93)	<0.001	0.89 (0.86; 0.91)	<0.001	0.91 (0.89; 0.94)	<0.001
Coercive Total	1.01 (0.98; 1.04)	0.550	1.11 (1.07; 1.14)	<0.001	1.14 (1.11; 1.17)	<0.001

[+] For PAFAS, higher scores indicate more problematic parenting behaviours (e.g., less consistency)

For filmed tasks, higher scores indicate more positive parenting behaviors (e.g., more responsive interactions)

scored above the cut-off point for emotional problems, and rates of conduct and hyperactivity problems were up to 30%. High rates of conduct problems in Brazilian samples have been previously discussed in Murray et al. (2013) as related to various factors, including cultural bias in parental reports and exposure to environmental violence. Risk factors associated with young people's socioemotional difficulties include factors such as parental education, family income, maternal postnatal depression, and mother-partner relationship (Nolan & Smyth, 2021). In the present study, when those were considered, parenting remained significantly associated with child emotional, conduct, and hyperactivity problems. This finding reinforces the role of parenting, even in a low- and middle-income country.

Parenting dimensions retained in the model were those related to negative or harsh parenting. Poor parental consistency, the use of coercive parenting, and poor parent-child relationship assessed by the PAFAS and coercive parenting assessed via the Don't Touch task were important predictors of child socioemotional development. Previous studies have shown that sociodemographic risk factors such as family income and maternal mental health may compromise maternal ability to positively provide emotional support and contingently identify the child's needs (Booth et al., 2018; Neuhauser, 2018). This study showed that even when those factors are controlled for, the use of coercive or harsh parenting practices still plays an important role in children's socioemotional development.

Additionally, negative parenting practices seem to have an important and broad effect on child socioemotional development. In this study, parental use of coercive practices was a key predictor of child socioemotional problems, regardless of whether it was assessed via questionnaire or filmed observation. The concerning use of coercive practices by parents has been documented in Pinquart's (2021) review, and current results expand on those find-

Table 4 Adjusted associations between parenting and child mental health using negative binomial regression models

	Emotional problems		Conduct problems		Hyperactivity/Inattention	
	IRR (CI95%)	*p*-value	IRR (CI95%)	*p*-value	IRR (CI95%)	*p*-value
PAFAS						
Consistency[+]	1.04 (1.02; 1.05)	<0.001	1.08 (1.07; 1.10)	<0.001	1.06 (1.04; 1.07)	<0.001
Positive encouragement[+]	0.97 (0.94; 1.01)	0.17	1.02 (0.99; 1.06)	0.14	0.98 (0.95; 1.02)	0.34
Parent-child relationship[+]	1.04 (1.02; 1.06)	<0.001	1.04 (1.02; 1.06)	<0.001	1.03 (1.01; 1.04)	0.001
Coercive parenting[+]	1.05 (1.03; 1.06)	<0.001	1.11 (1.09; 1.12)	<0.001	1.08 (1.07; 1.10)	<0.001
Filmed tasks						
Responsive interactions	0.98 (0.94; 1.02)	0.31	0.99 (0.96; 1.03)	0.79	0.99 (0.96; 1.03)	0.77
Emotional tone	1.00 (0.95; 1.04)	0.91	0.98 (0.93; 1.02)	0.35	0.94 (0.90; 0.98)	0.007
Sensitivity	0.99 (0.95; 1.03)	0.64	0.99 (0.95; 1.03)	0.58	1.02 (0.98; 1.05)	0.35
Coercive total	0.98 (0.94;1.02)	0.31	1.06 (1.02; 1.09)	0.002	1.12 (1.08; 1.16)	<0.001
Model values						
p-value	<0.001		<0.001		<0.001	
Pseudo R^2	0.03		0.06		0.03	
AIC	11181.96		11009.34		14063.08	
BIC	11265.79		11093.17		14146.90	

*Adjusted for all parenting exposures and socioeconomic variables with $p<0.20$: maternal scholarship, family income, maternal postnatal depression, and mother-partner relationship

[+]For PAFAS, higher scores indicate more problematic parenting behaviours (e.g., less consistency)

For filmed tasks, higher scores indicate more positive parenting behaviors (e.g., more responsive interactions)

ings, suggesting that those effects are independent of other risk factors and levels of positive parenting behaviors. This finding may be of particular importance for the development of intervention programs in Brazil, given that previous research in Brazil has highlighted widely spread cultural beliefs that hitting a child or using harsh discipline is acceptable if parents want to teach something to the child (Murray et al., 2019).

A considerable proportion of mothers in the current study sample reported repeatedly and consistently using parenting practices that involve shouting, arguing, trying to make the child feel bad, and/or spanking or smacking. Even though mothers were aware of being filmed and observed during the observational tasks, the use of coercive practices still lasted. Across the globe, harsh parenting is associated with negative outcomes, but cultural moderators and nonlinear associations may operate in specific countries (Pinquart, 2021). In Brazil, the intergenerational problem of domestic violence is potentially mediated using harsh parenting, which leads to higher rates of conduct problems during childhood, which in turn are themselves associated with greater rates of violence, including domestic violence in adulthood (Coll et al., 2023). Therefore, potential impacts of the observed use of harsh parenting may go beyond the current assessed participants and extend to future generations.

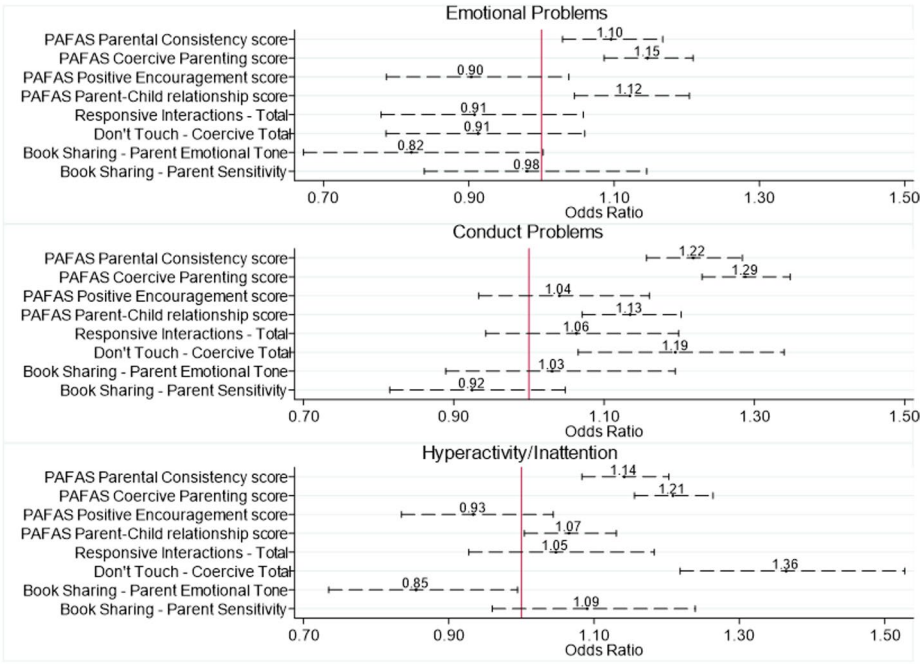

Fig. 1 Adjusted associations of parental characteristics and risk of emotional problems, conduct problems, and hyperactivity using Logistic Regression

When the specific dimensions of parenting effects were inspected, it is worth noting that in the unadjusted model, both questionnaires and observational tasks were significant; however, in the adjusted models, the most significant measures came from the PAFAS questionnaire. This may be related to the more general aspect of parenting assessed by the PAFAS, as opposed to a short time-slice of parenting behaviors observed in the tasks. Additionally, it could be that the PAFAS captures a broader picture of parental behaviors, whereas the observational tasks offer a more subtle version of parenting due to the presence of the observer and the specificity of the task itself. This is supported by the fact that coercive parenting assessed via the Don't Touch observational task, which indeed gives more scope for an explicit and broader harsh parental behavior, remained a significant predictor of conduct and hyperactivity problems even in adjusted analyses. These findings also support the use of various strategies to assess parental practices in future investigations. This approach enabled us to provide a broader picture of the specific effects of each parenting dimension.

Measures used in this study include questionnaires and observational tasks that have different ranges and hence unit changes have different applied implications; nevertheless, it is of note that parental consistency and parental use of coercive parenting were the strongest predictors of all three child outcomes: for every unit of increase, the child emotional, conduct and hyperactivity problems rate increased by 8–15%. Finally, when the different child socioemotional outcomes are inspected, it is notable that parenting had its strongest effects on behavioral difficulties, such as conduct problems and hyperactivity, with the best AIC indices observed for the conduct problems model. Rates of conduct and hyperactivity problems were also twice as high as those of emotional problems. This may be explained by

the child's age and the use of a parental report measure. The onset of emotional problems in children is more frequent at school age (Ogundele, 2018). In contrast, preschool children usually report behavioral difficulties earlier (Bagner et al., 2012). Bias and low child-parent agreement in parental reports of child difficulties have also been previously identified, with a tendency for parents to report more behavioral than emotional difficulties (van der Meer et al., 2008). Conversely, it is also plausible that behavioral problem rates are particularly associated with the observed high rates of coercive practices.

The present research used data from a city in South Brazil that could not account for the cultural diversity of the country. Additionally, this study used parental reports and not a clinical interview conducted by an independent clinician to establish rates of socioemotional problems. Also, observational tasks were part of a set of assessments, and children and mothers could be tired in some of the tasks. Finally, one of the major limitations is the cross-sectional character of the analyses, which limits the interpretation of the findings. Despite those limitations, the study provides unique data on parenting and child mental health with both questionnaires and observational measures from a large population study, which contributes to the understanding of child mental health pathways.

Understanding the links between parenting and offspring emotional and behavioural difficulties and providing evidence of the dimensions of parenting that are most strongly associated with child mental health are key requirements for understanding a pathway of non-optimal child development in which the role of parenting is a key. Supporting parents' interactions with their offspring represents a unique opportunity to potentially improve mental health, not only in today's families but also in generations to come. The findings presented in the current study show that parenting is a key mechanism linked to child mental health. Notably, the parenting dimension that was most importantly related to children's conduct, hyperactivity, and emotional problems was coercive parenting. This finding indicates that children exposed to vulnerable environments have an additional risk factor if coercive parenting practices are present. The impacts are already evident in preschool children and extend beyond conduct difficulties, affecting attention and emotion. The study highlights the importance of early attention to parenting practices and to early signs of children's mental health difficulties.

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Data Availability The data or code necessary to reproduce the analyses presented here are publicly accessible upon reasonable request to the authors. The analyses presented here were not preregistered. Joseph Murray takes responsibility for the integrity and accuracy of the data analysis.

Declarations

Conflict of interest The authors declare that there are no conflicts of interest.

Ethical Approval Two approvals were obtained by the Research Ethics Committee of the Federal University of Pelotas (School of Physical Education #26746414.5.0000.5313 and Medical School #03837318.6.0000.5317) for perinatal and age four follow-ups. Caregivers provided written informed consent at each study follow-up. Further details of the 2015 Pelotas Cohort can be found elsewhere (Hallal et al. 2018; Murray et al. 2024a, 2024b). This study was performed in line with the principles of the Declaration of Helsinki.

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