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Article

Behaviour Problems in Preschoolers with and without Prematurity. A Multi-Informant Longitudinal Study

Eva María Padilla-Muñoz, Alejandra Pereira-Cerro, María Merced Barbancho-Morant and María Dolores Lanzarote-Fernández
Universidad de Sevilla, Spain

Abstract

Data on the behavioral development of preterm infants are inconclusive. The aim of this study was to explore behavioral development during preschool years, considering prematurity, measurement time, gender, and informant. This is a prospective longitudinal analytical observational study, with a sample of 98 parents and 98 teachers of children aged 4, 5, and 6 years with and without a history of prematurity, who were evaluated by the Child Behavior Checklist and Teacher's Report Form. Parents and teachers of the preschoolers report average scores on all behavioral scales. We observed variability according to degree of prematurity, age, and informant. Teachers detected more attention difficulties in the very preterm group (VPTG) than in the born-at-term group at 4 years. Parents and teachers coincided in detecting greater withdrawal in the moderate and late preterm group (MTPG) compared to the born-at-term group and an increase in difficulties with increasing age. The General Linear Model revealed that moderate prematurity, the age of 6 years, and parental report have a greater risk of behavioral difficulties. The need for follow-up also in moderate preterm infants is emphasized, especially at 6 years of age and with multi-informants.

Keywords: behavioral problem; longitudinal research; multi-informant; prematurity; preschoolers

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Introduction

It is clear that the development of preterm infants has improved with advances in perinatal medicine and neonatology. However, neither the rate of preterm births nor the detection of associated morbidities has decreased. Preterm birth is defined as occurring before 37 weeks of gestation and is divided into extreme (< 28 weeks), very preterm (28–32 weeks), and MTPG (32 < 37 weeks) (World Health Organization, 2023).

The available data on the evolution of this large at-risk group are not consistent to date. As Fisher et al. (2024) point out, attention beyond the early years, with a preventive approach, is very scarce. In particular, studies on the behavior of PTG during the preschool stage are inconclusive. In the work by Narberhaus and Segarra (2004), the need for research to determine the long-term consequences of prematurity was already indicated. Thus, while some studies have indicated that, at 4–5 years of age, they did not display more behavioral problems than those born at term (O′ Meagher et al., 2019; Perez-Pereira & Baños, 2019), others stated that they occur more frequently (Johnson, 2007; Johnson et al., 2015; Scott et al., 2018). Buttha et al. (2002), who reviewed the literature on the behavior of PTG and adolescents between 5 and 14 years of age, observed that 81% of the studies showed a higher rate of internalizing and externalizing behaviors. Similarly, the results of Scott et al. (2018) indicate individual variation in the number of externalizing and internalizing problems over time. In other studies, preterm birth has also been associated with behavioral difficulties in the medium and long term (Arpi & Ferrari, 2013; García et al., 2012; Quesada et al., 2014; Salt & Redshaw, 2006; Schonhaut et al., 2012), and it constitutes a risk factor for their quality of life (Aparecida et al., 2016).

More specifically, an inverse relationship has been found between behavioral problems and gestational age at birth in preschoolers (Pallás Alonso, 2012). Cross-sectional studies show that extremely preterm infants at 2.5 years of age have behavioral outcomes within the mid-range, although there were more *Internalizing*, *Externalizing and Total Problems* than in full-term infants (Månsson et al., 2014). An increased risk of behavioral problems in the preschool stage has also been reported in very preterm infants. That is, both 3-year-olds (Delobel-Ayoub et al., 2006) and 4-year-olds (Jones et al., 2013) had poorer emotional and behavioral adjustment, as well as subtle social difficulties that could influence their relationships with others. Also at age 4, Kelly et al. (2023) observed higher scores on internalizing behaviors. At age 5, emotional and behavioral problems have been found to affect children academically (Reijneveld et al., 2006).

Even in the MPTG, at 4 years of age, it has been reported that there is a risk factor for emotional and behavioral disorders (Des Haan et al., 2019). Similarly, Johnson et al. (2015) found that birth before 36 weeks of gestation implies a specific risk of delayed social competence at 2 years of age. This may be indicative of an increased

Corresponding author: María Dolores Lanzarote Fernández; Email: lanzarote@us.es
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risk of emotional and behavioral disorders later in childhood. Labayru et al. (2021) also reported high percentages of clinically relevant scores in moderate preterm infants, as did Jin et al. (2020), who reported more executive, attention and memory deficits in this same group.

In contrast, at the beginning of primary school, studies have been more numerous, with more solid conclusions. It has been observed that both very preterm and preterm infants in general presented more behavioral and emotional problems compared to those born at term (Aarnoudse-Moens et al., 2009; Alcántara-Cabanal et al., 2020; Iriondo et al., 2006; Samuelsson et al., 2017). At later ages, this trend seems to continue (Johns, 2019; Klein et al., 2015), with internalizing symptomatology standing out in very preterm infants (Faure et al., 2017; Larsen et al., 2024; Samuelsson et al., 2017). In short, the findings on behavior problems in preterm preschoolers and, more specifically, in the ages evaluated, continue to be scarce and inconclusive, and most of the data are obtained through cross-sectional studies.

Significant differences in behavior have also been detected in terms of gender (Alcántara-Cabanal et al., 2020). Most studies show that boys present more difficulties than girls (Aparecida et al., 2016; Des Haan et al., 2019), which can be considered a risk factor for quality of life (Aparecida et al., 2016). In the same vein, Samuelsson et al. (2017) state that parents and teachers report more general behavioral problems in boys and more anxiety problems in girls born very preterm. Bul and van Baar (2012) stated that teachers also detected more problems in preterm boys.

Longitudinal studies covering this stage would be of interest (Loureiro et al., 2019; Rodríguez et al., 2008), as they would obtain information from different informants and instruments (Camerota et al., 2024), which could improve the detection of difficulties. In this respect, Allotey's meta-analysis concludes that it is important that parents, educators, health professionals, and policymakers take into consideration the added academic, emotional, and behavioral needs of those born with a history of prematurity (Allotey et al., 2018).

The literature reveals that there continues to be a lack of consensus on the behavior of preschool children with and without prematurity, recommending the consideration of different sources of information and other variables that could explain this variability. Thus, the main objective of this study was to evaluate the behavior problems of a group of preterm children (PTG) and a term group (TG) at 4, 5, and 6 years of age through the study of internalizing and externalizing problems, using the *Child Behavior Checklist (CBCL)* (Achenbach & Rescorla, 2001a, 2001b) and the *Teacher's Report Form (TRF)* (Achenbach & Rescorla, 2001a, 2001b). The gender of the children and the information provided by parents and teachers were taken into account, which improves the validity of the results. The first specific objective was to evaluate the behavior problems of children during the preschool years (4, 5 and 6 years) attending to prematurity, the prematurity level, and the informant. The second objective was to analyze the predictive capacity of these variables on the behavior of the preschoolers with and without prematurity.

Method

A prospective longitudinal observational analytical study was carried out with a case–control design. The study sample was selected by purposive, convenience, non-probabilistic sampling. It included a group of PTG without severe sequelae at 4 years and a non-premature group, both homogeneous in gender and chronological age. The sample consisted of 98 parents and 98 teachers of preschoolers born before 37 weeks of gestation without severe sequelae (i.e., presence of cerebral palsy, severe maturational delay and/or significant sensory deficits) and born-at-term preschoolers, both groups without clinical complications or educational gaps, at 4 years of age. At the time of the assessment, all of them were in the appropriate class for their age group.

Parents were contacted by the neonatology unit of a public hospital in Southern Spain to provide them with information about this study and to request their participation through the consent form developed for this study. The number of children born with less than 37 weeks of gestation, admitted to the NICU of a third-level hospital in a period of two years was 116, 14 of whom presented severe sequelae (defined above). The total sample consisted of 102 cases, 25 of whom did not agree to participate or could not be contacted, and another five eventually decided not to attend (data available on request). The sample is representative of the total population, with a total of 72 children included, with a margin of error of 0.05. The reference values for the sample size were taken: (α = 0.05), 95% confidence level (z = 1.96), and p = 0.2. The calculation of the p value was based on the work of Gómez et al. (2019), where the percentage of premature infants with transient sequelae was 20%. During follow-up, 23 cases had to be discarded due to missing data on various measures. The missing data for each variable in each measure (4, 5 and 6 years) were considered as Missing at Random (MAR), and the mean was used as an imputation criterion (Figure 1).

The research was approved by the Autonomous Community Biomedical Research Ethics Coordinating Committee (1188-N-16) and complies with the Declaration of Helsinki. The families who formed the preterm group gave the researchers authorization to contact their children's school to recruit the sample of full-term preschoolers (TG). There was therefore a similarity not only in gender and age, but also in sociodemographic characteristics and educational context.

They were presented with the research and informed consent. The group was formed with peers from the same class, matched for gender and age. Finally, the PTG children were grouped into a VPTG, made up of parents and teachers of children born before 32 weeks of gestation (23 < 32 weeks), and a group of moderate (N = 8) and late (N = 10) preterm infants, for children born between 32 and 37 weeks of gestation (Figure 2). Sociodemographic variables of the sample of premature infants are shown in Figure 3.

The evaluation of the groups was matched in gestational age at birth, gender, and time. Information was collected at three different points in time (4, 5 and 6 years; ± two months) from parents and teachers of the preschool groups. The behavior of the preschoolers was assessed by the CBCL (Achenbach & Rescorla, 2001a, 2001b) and the TRF (Achenbach & Rescorla, 2001a, 2001b). Two versions of each scale were used: one aimed at children between one-and-a-half and five years of age and the other between six and eighteen years of age, which differed in some scales. In total, data were obtained from 12 scales, with some differences according to age and context: *Emotional Reactivity, Anxiety and Depression, Somatic Complaints, Social Problems, Thought Problems, Withdrawal, Sleeping Problems, Attention Problems, Oppositional Conduct, Aggressive Behavior, Internalizing Problems, Externalizing Problems and Total Problems.* For all scales (criteria variables) the normal range is < 93 percentile. This test has been widely used with preterm infants at different stages (Fisher et al., 2024) and has recently been recommended as a screening test to detect all potentially needy preterm infants (Camerota et al., 2024).

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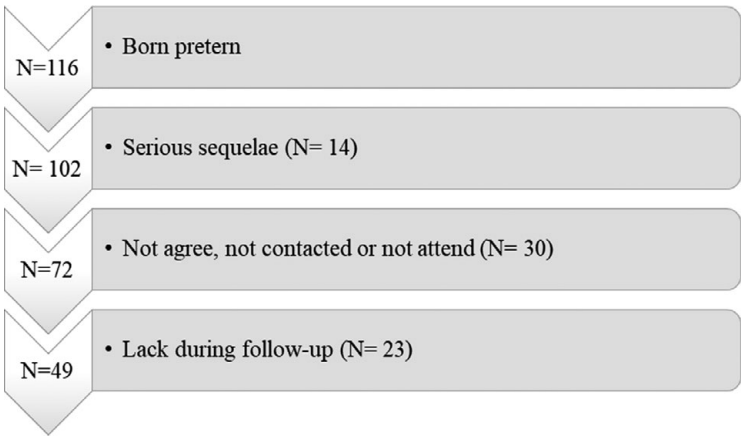

Figure 1. Preterm children born.

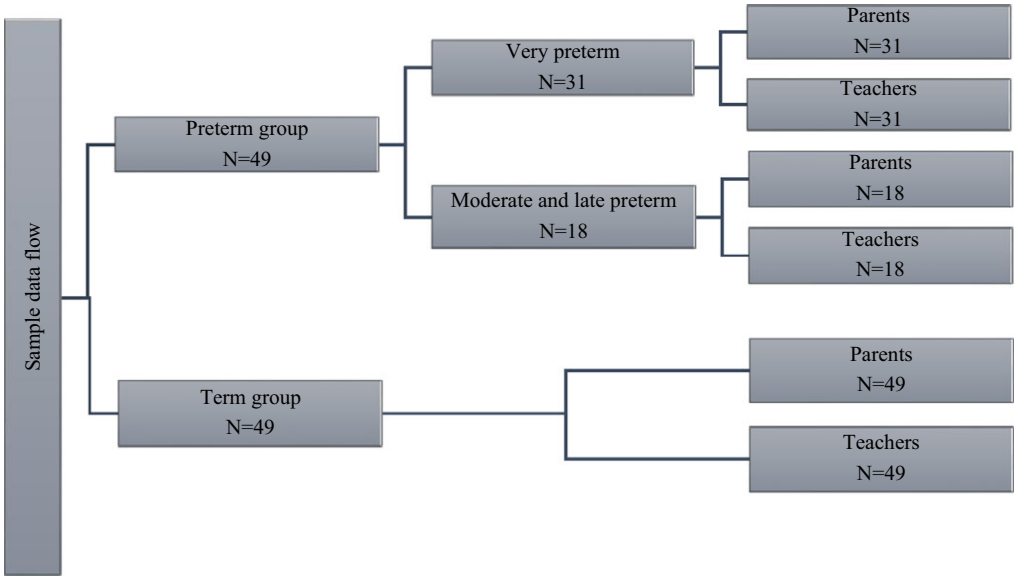

Figure 2. Sample data flow.

Based on Bono et al. (2010), the present study follows a mixed, quasi-experimental design, with no manipulation of variables, and the participants are evaluated at the same time point (cross-sectional component) and at three time points (longitudinal component). The analyses were performed using SPSS v. 25.0 for Windows. Three types of analyses were conducted: (1) Descriptive, both for the explanatory factors and for the criterion dimensions measured with the inventory. (2) Non-parametric comparative (Mann–Whitney U-test), to explore the relationships between the prematurity subgroups and the non-prematurity group, as a function of the measurement time and informants. (3) Multivariates; for those cases in which the normality and linearity criteria were not met, a General Linear Model was used to assess the effects of the independent variables (IV, prematurity, time, gender and informant) on each dependent variable (DV, dimensions of behavior) ($\alpha = .05$), and post hoc multiple comparisons in those non-categorical factors that were significant. That *n* represents the number of measurements taken for each variable. The partial eta squared values (η) to interpret the effect size were: .01 = small effect, .06 = moderate effect, and .14 = large effect. The observed power was considered to be adequate from a value of .08 (Cárdenas & Arancibia, 2019).

Results

Firstly, the descriptive analyses by groups (*PTG* and *TG*) and by degree of prematurity (*VPTG* and *MPTG*) (Supplementary Material, Figures 1–6) placed behaviors within the mean range in all groups and ages, both in parents and teachers.

Paired Mann–Whitney U-test was used between groups (*PTG* vs *TG*) and degree of prematurity (*VPTG* vs *TG, MPTG* vs *TG* and *VPTG* vs *MPTG*). When comparing the results of PTG and TG at age 4, significant differences were found in teachers in *Withdrawal* (*PTG: 56.94; TG: 55.06; p = .045; r = .203), Attention Problems (PTG: 54.29; TG: 52.78; p =. 009; r = .263), Aggressive Behavior (PTG: 53.63; TG: 52.78; p = .034; r = .214), Externalizing Problems (PTG: 49.20; TG: 48.53; p = .019; r = .237)* and *Total Problems* (*PTG: 49.73; TG: 48.51; p = .046; r = .202).* Also, between *VPTG* and *TG* in the

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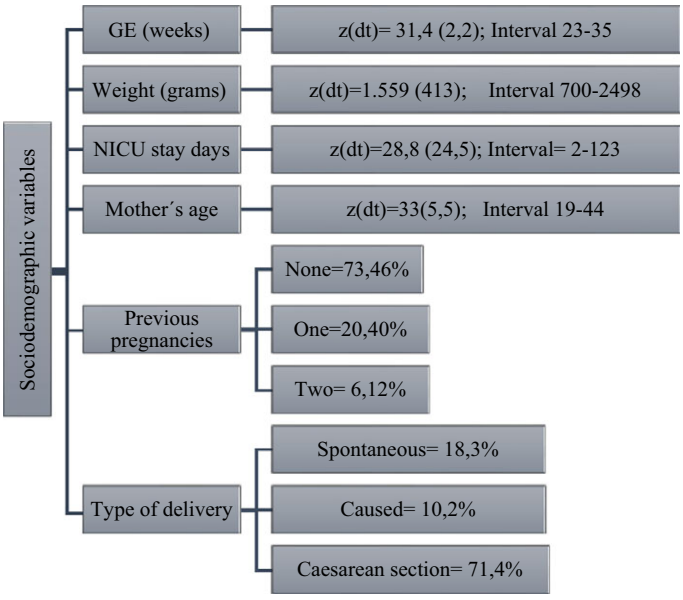

Figure 3. Sociodemographic variables of the sample of premature infants.
GE = Gestational Age; χ (dt) = mean and standard deviation; Interval = highest and lowest score; N (%)= group size and percentage of total; GE (weeks) = gestational age at birth by weeks.

same behavior with higher mean scores in the VPTG (*Withdrawal, VPTG: 55.65; TG: 52.35; p = .011; r = .285; Attention Problems, VPTG: x56.16; TG: 52.88; p = .001; r = .361; Aggressive Behavior, VPTG: 53.00; TG: 52.04; p = .013; r = .278; Externalizing Problems, VPTG: 51.78; TG: 46.92; p = .002; r = .351*, and *Total Problems, VPTG: 51.65; TG: 46.71; p =. 010; r = .288).* At 5 years were lower mean scores in *Somatic Complaints* in Very Preterm *(VPTG: 50.00; TG: 52.10; p = .002; r = .346; and* with *MPTG: 52.06; p = .0001; r = .528).* At age six, teachers identified a higher incidence of moderate preterm withdrawal (MPTG: 58.22; TG: 54.69; p = .029; r = .268) and internalizing problems (MPTG: 55.33; TG: 50.45; p = .012; r = .308) compared to those born at term.

It should be noted that parents do not report differences based on prematurity in general. However, parents of MPTG, at 4 and 5 years indicated more *Withdrawal* than Term parents *(MPTG: 58.28; TG: 55.06; p = .047; r = .24*; and MPTG: 57.94; TG: 53.88; p = .013; r = .305). Also, there are different at 5 years in Total Problems (MPTG: 51.28; TG: 46.08; p = .046; r = .244).

Finally, significant differences by parents were found according to the degree of prematurity (*VPTG-MPTG*). Thus, at 4 years of age, they observed more *Internalizing Problems (VPTG: 47.97; MPTG: 54.00; p = .025; r = .320)* and *Total Problems (VPTG: 48.23; MPTG: 52.33; p = .036; r = .299).* At 5 years of age, they showed differences in *Emotional Reactivity (VPTG: 51.81; MPTG: 55.44; p = .011; r = .364), Withdrawal (VPTG: 53.45; MPTG: 57.94; p =. 015; r = .346), Internalizing Problems (VPTG: 46.90; MPTG: 54.39; p = .013; r = .354)* and *Total Problems (VPTG: 44.94; MPTG: 51.28; p = .027; r = .316).* While at age 6 they only reported more *Social Problems (VPTG: 52.71; MPTG: 55.44; p = .041; r = .292).*

To respond to the second objective, a General Linear Model was carried out to evaluate the effects of the independent variables (IV: degree of prematurity, measurement time, gender and informant) on each dependent variable (DV: all the dimensions measured through CBCL and TRF (α = .05). Then, post hoc multiple comparisons were performed for the three-category factors that were significant. Next, we present the mean scores obtained, attending to the IV (Tables 1 to 4).

A total of seven valid models were obtained for the following dependent variables: *Somatic Complaints*, *Withdrawal*, *Attention Problems*, *Aggressive Behavior*, *Internalizing Problems*, *Externalizing Problems* and *Total Problems.* In all cases, a medium-large eta-squared (.089–.124) and adequate power (≥ .8) were obtained (Table 5).

Attending to the influence of each independent variable individually, gender was not significant on its own but only as part of the model.

Prematurity was identified as a significant predictor of *Somatic Complaints*, *Withdrawal*, *Attention Problems*, *Internalizing Problems* and *Total Problems.* That is, there were differences in all these dimensions as a function of the degree of prematurity. In all cases, the significance was <0.05, although *Attention Problems* and *Total Problems* did not have sufficient predictive power (< 0.08), and, in the others, the effect size was small. In the post hoc analyses, the moderately premature children presented greater scores in *Withdrawal* (p = .001), *Attention Problems* (p = .010), *Internalizing Problems* (p = .005) and *Total Problems* (p = .021), whereas the very premature children showed greater scores in *Somatic Complaints* (p = .001) and *Internalizing Problems* (p = .017).

The variable *Measurement Time* (4, 5 and 6 years) can also be considered a predictive variable for some of the analyzed emotional and behavioral dimensions, regardless of prematurity, gender, and informant. In this case, according to the post hoc analyzes, the children presented greater difficulties at the age of 6 years than at the age of 5 years in *Attention Problems* (p = .001), *Aggressive Behavior* (p = .001), *Internalizing Problems* (p = .001), *Externalizing Problems* (p = .001) and *Total Problems* (p = .001), as well as compared to the 4-year-old in *Aggressive Behavior* (p = .002). More difficulties were also observed at the age of 4 years than at the age of 5 years in *Externalizing Problems* (p = .049) and *Total Problems* (p = .042). The predictive power was adequate for all cases, except for *Somatic Complaints*, and the effect sizes were small and moderate.

Lastly, the independent variable *Informant* was detected as predictive of the dependent variables *Somatic Complaints*

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Table 1. Behavioral variables and prematurity

		n	*M*	*SD*
Emotional reactivity	Term	196	52.77	4.93
	Moderate and late preterm	72	53.82	6.32
	Very preterm	124	52.06	3.47
Anxiety depression	Term	294	53.41	4.92
	Moderate and late preterm	108	54.77	5.90
	Very preterm	186	53.25	4.43
Somatic complaints	Term	294	53.50	5.31
	Moderate and late preterm	108	54.74	6.43
	Very preterm	186	52.35	5.58
Withdrawal	Term	294	53.48	4.82
	Moderate and late preterm	108	55.77	6.34
	Very preterm	186	54.56	6.02
Sleep problems	Term	98	53.54	5.31
	Moderate and late preterm	36	55.58	6.83
	Very preterm	62	53.71	7.36
Attention problems	Term	294	53.13	4.29
	Moderate and late preterm	108	54.67	5.80
	Very preterm	186	54.10	4.98
Aggressive behaviour	Term	294	53.03	4.79
	Moderate and late preterm	108	54.15	5.86
	Very preterm	186	53.12	4.25
Oppositional conduct	Term	98	52.60	4.08
	Moderate and late preterm	36	54.44	5.69
	Very preterm	62	52.74	4.26
Internalizing problems	Term	294	48.53	9.24
	Moderate and late preterm	108	51.78	1027
	Very preterm	186	48.72	8.85
Externalising problems	Term	294	48.14	8.70
	Moderate and late preterm	108	50.11	9.34
	Very preterm	186	48.56	8.34
Total problems	Term	294	47.89	9.29
	Moderate and late preterm	108	50.62	9.91
	Very preterm	186	48.85	8.42

Note: n = number of measurements taken for each variable.

Table 2. Behavioral variables and time of measurement

		n	*M*	*SD*
Emotional reactivity	4 years	196	52.96	5.30
	5 years	196	52.52	4.35
	6 years	–	–	–
Anxiety depression	4 years	196	53.94	5.24
	5 years	196	52.60	4.21
	6 years	196	54.29	5.31
Somatic complaints	4 years	196	53.29	6.79
	5 years	196	52.77	4.79
	6 years	196	54.05	5.18
Withdrawal	4 years	196	54.67	5.73
	5 years	196	53.53	5.24
	6 years	196	54.53	5.70
Sleep problems	4 years	98	54.58	6.59
	5 years	98	53.36	6.01
	6 years	-	-	-
Attention problems	4 years	196	53.73	4.87
	5 years	196	52.82	4.15
	6 years	196	54.60	5.31
Aggressive behaviour	4 years	196	52.88	4.28
	5 years	196	52.37	4.26
	6 years	196	54.54	5.65
Oppositional conduct	4 years	–	–	–
	5 years	–	–	–
	6 years	196	52.98	4.50
Internalizing problems	4 years	196	49.02	9.67
	5 years	196	47.42	9.29
	6 years	196	51.13	8.86
Externalising problems	4 years	196	48.69	8.13
	5 years	196	46.66	8.91
	6 years	196	50.56	8.72
Total problems	4 years	196	48.81	9.41
	5 years	196	46.60	8.97
	6 years	196	50.69	8.74

Note: n = number of measurements taken for each variable.

(p = .001), *Aggressive Behavior* (p = .016), and *Internalizing Problems* (p = .002). The parents reported more difficulties than the teachers in these dimensions, regardless of prematurity, measurement time, and gender. The predictive power was not adequate for *Aggressive Behavior*, and the effect size was small in all three cases.

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Table 3. Behavioral variables and informant

		n	*M*	*SD*
Emotional reactivity	Parents	196	53.43	5.41
	Teachers	196	52.05	4.12
Anxiety depression	Parents	294	53.99	5.23
	Teachers	294	53.23	4.71
Somatic complaints	Parents	294	54.34	6.54
	Teachers	294	52.39	4.44
Withdrawal	Parents	294	54.56	5.58
	Teachers	294	53.92	5.56
Attention problems	Parents	294	53.81	5.07
	Teachers	294	53.62	4.63
Aggressive behaviour	Parents	294	53.62	5.27
	Teachers	294	52.91	4.38
Oppositional conduct	Parents	98	53.39	4.43
	Teachers	98	52.58	4.56
Internalizing problems	Parents	294	50.31	9.28
	Teachers	294	48.07	9.37
Externalising problems	Parents	294	48.59	9.48
	Teachers	294	48.69	7.91
Total problems	Parents	294	48.92	9.17
	Teachers	294	48.48	9.20

Note: n = number of measurements taken for each variable.

Table 4. Behavioral variables and gender

		n	*M*	*SD*
Emotional reactivity	Male	160	52.43	4.24
	Female	232	52.96	5.23
Anxiety depression	Male	240	53.46	4.76
	Female	348	53.71	5.15
Somatic complaints	Male	240	53.18	6.00
	Female	348	53.49	5.43
Withdrawal	Male	240	53.96	4.87
	Female	348	54.44	6.01
Sleep problems	Male	78	53.54	5.53
	Female	114	54.38	6.88
Attention problems	Male	240	53.90	4.98
	Female	348	53.59	4.76
Aggressive behaviour	Male	240	53.63	5.38
	Female	348	53.01	4.45
Oppositional conduct	Male	80	53.61	4.87
	Female	116	52.55	4.19
Internalizing problems	Male	240	49.51	8.14
	Female	348	48.97	10.16
Externalising problems	Male	240	49.41	8.74
	Female	348	48.10	8.69
Total problems	Male	240	48.91	8.83
	Female	348	48.55	9.43

Note: n: number of measurements taken for each variable.

Discussion

The group of preschool children born preterm without clinical complications or educational gaps had more behavioral problems, as assessed by teachers, than those born at term. The main differences are found at the age of 4 years, especially in the very preterm group. Teachers also observe more internalization problems at the end of the stage, at 6 years of age. However, in general, parents report fewer differences between preterm and non-preterm children. And they report worse results for moderately PTG than for very preterm children.

The teachers reported that, at 4 years of age, very preterm infants showed more difficulties with withdrawal and attention, among others, than term infants. This may indicate a greater risk of presenting behavioral, attention, and/or internalizing symptomatology problems at later stages, especially at school (Aarnoudse-Moens et al., 2009; Alcántara-Cabanal et al., 2020; Arpi & Ferrari, 2013; Kelly et al., 2023; Perez-Pereira & Baños, 2019; Samuelsson et al., 2017; Schonhaut et al., 2012).

On the other hand, we found that the preterm group showed more Withdrawal symptomatology in both contexts compared to those born at term. These data are in line with other studies (Bul & van Baar, 2012; Labayru et al., 2021; Samuelsson et al., 2017), which emphasize that preterm birth was associated with more behavioral difficulties and differed from those found by Scott et al. (2018). Furthermore, Perez-Pereira and Baños (2019) found no differences, concluding that behavioral problems are only characteristic of those born very or extremely preterm and not of premature babies in general.

When comparing the subgroups of preterm infants, the parents of the MTPG found more behavioral difficulties than the parents of the very preterm group, especially at ages 4 and 5. The teachers only reported more *Somatic Complaints* at 5 years of age in this subgroup. They were also associated with more behavioral and attention difficulties (Bul & van Baar, 2012), and they presented more affective, anxious, and somatic symptoms at school age; these data are consistent with our results at the end of the preschool stage. Recent studies are along the same lines, supporting the growing evidence of risk factors for emotional and behavioral disorders in the MTPG, such as male gender, perinatal infection, and maternal smoking (Des Haan et al., 2019). Thus, we concur with the work indicating that births after 32 weeks of gestation should be considered, not only because most of the complications of preterm birth are less frequent and less severe in this population, but also due to the larger number of births per year and their morbidity and mortality (Schonhaut et al., 2012).

Other studies report a greater likelihood of emotional and behavioral problems in very PTG (Aparecida et al., 2016; Delobel-Ayoub et al., 2006; Reijneveld et al., 2006; Samuelsson et al., 2017). These results may be due to a more focused follow-up in the very preterm children, as opposed to the moderate and late preterm, whose difficulties may not become apparent until later stages of schooling. In agreement with Arpi and Ferrari (2013), it is important to emphasize the importance of both long-term follow-up

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Table 5. Influence of prematurity, time of measurement, sex and informants on behaviour

DDVV		SC	W	AP	AB	IP	EP	TP
	sig	**.003****	**.0001****	**.0001****	**.004****	**.005****	**.001****	**.025***
Total	Eta^2	.105	.119	.124	.103	.101	.113	.089
	pow	.999	1	1	.999	.998	1	.994
	sig	**.002****	**.002****	**.029***		**.008****		**.048***
Prematurity	Eta^2	.022	.023	.013		.017		.011
	pow	.897	.903	.661		.798		.588
	sig	**.040***		**.0001****	**.0001****	**.001****	**.0001****	**.0001****
Time	Eta^2	.012		.029	.043	.026	.036	.034
	pow	.615		.960	.996	.942	.986	.982
	sig	**.0001****			**.016***	**.002****		
Informant	Eta^2	.029			.011	.017		
	pow	.982			.678	.869		

Note: DDVV = dependent variables; Total = Preterm, years, gender, and reporter; SC = Somatic complaints; W = Withdrawal; AP = Attention problems; AB = Aggressive Behaviour; IP = Internalizing problems; EP = Externalising problems; TP = Total problems; pow = power observed; Sig*: .05 y Sig**: .01.

programs and the aspects that may influence them, since behavioral problems in infancy predict more severe difficulties at later stages. This is necessary in both born very prematurely (Rodríguez et al., 2008) and moderately preterm infants, who have shown more behavioral problems than those born at term and very preterm infants.

The findings of the comparisons between prematurity categories, measurement time, and informants were supported by the multivariate analyses conducted. Thus, the linear models that were valid show that the measurement time is the factor with the greatest influence on emotional and behavioral problems in preschool children, followed by the variable *prematurity* and *informant.* That is, the results indicate that, at the age of 6 years, there is a greater risk of presenting difficulties in the preschool stage, that moderately premature children are the most vulnerable group, and that parents identify a greater risk than the teachers. On the contrary, the variable *gender* had no separate influence on behavior in preschool age, unlike what has been observed in previous studies (Alcántara-Cabanal et al., 2020; Aparecida et al., 2016; Bul & van Baar, 2012; Des Haan et al., 2019).

These manifestations are in line with the findings of Månsson et al. (2014). It is also noteworthy that, at 6 years of age, the teachers of the MTPG reported an increase in many of the behaviors assessed, including the three global scales. Therefore, both parents and teachers coincide in an increase in behavioral difficulties at the age of 6 years. This behavioral evolution could be related to an increase in demands due to the change of educational stage and to the existence of more silent periods in development, which has been pointed out by some authors (Arpi & Ferrari, 2013; Narberhaus & Segarra, 2004).

The comparison between parents' and teachers' views on behavior shows disagreements in the perception of behavior, which highlights the importance of including different informants and contexts. Our results are consistent with those of Bul and Van Baar (2012), who found subtle differences in behavior reported by parents and teachers. In addition, they found a greater presence of behavioral and attention difficulties in children born moderately preterm compared to those born at term. Moreover, Labayru et al. (2021) reported that moderate preterm infants are a more vulnerable population and need neuropsychological follow-up to identify emerging difficulties. They advise neurodevelopmental assessment beyond two years of age in this population.

On the other hand, parents experience more difficulties than teachers at the end of preschool and at the beginning of elementary school. We believe that parents could benefit from the support and guidance of professionals in this important transition period in the face of possible sequelae of prematurity in the medium and long term (Iriondo et al., 2006; Salt & Redshaw, 2006). Furthermore, Faure et al. (2017) point out the importance of maternal sensitivity in preventing long-term internalization problems in very preterm infants.

Finally, it should be noted that there is no clear agreement in the literature on the predominance of internalizing or externalizing behaviors in preterm infants (Buttha et al., 2002; García et al., 2012; Klein et al., 2015; Quesada et al., 2014). This lack of consensus is also observed in the case of very preterm infants (Johnson, 2007). Our findings highlight the presence of internalizing symptomatology in both contexts, which is related to those found in other studies (Aarnoudse-Moens et al., 2009; Alcántara-Cabanal et al., 2020; Samuelsson et al., 2017). More specifically, we can point out that, in agreement with other authors (Aarnoudse-Moens et al., 2009; Alcántara-Cabanal et al., 2020; Buttha et al., 2002), the main problems in preschoolers born preterm are associated with peer relationships and internalizing symptomatology in general.

Based on the results, we believe that the longitudinal assessment of behavior in preterm preschoolers through information from parents and teachers is essential for the early detection of possible difficulties. Both perspectives complement each other and facilitate a more adequate vision of the child, allowing for interventions adapted to the child's needs and developmental contexts. Furthermore, we can better understand how different health and educational interventions affect the later development of children born preterm through this type of research. According to Loureiro et al. (2019), it is clearly a challenge, although, like these authors, we believe it is essential to improve their developmental capacity and well-being in the context in which they live.

As the main limitation of this study, we found that the sample of the subgroups is small, especially that of moderately and late

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preterm children; thus, the results of this group should be interpreted with caution. It is also important to point out as a possible limitation that the sample of premature infants was recruited from a single hospital; therefore, the generalization of the results to the rest of the population born premature in this community cannot be established. Assessing the possible relationship between parents' emotional state and children's behavior (Perez-Pereira & Baños, 2019) would be another limitation.

As a proposal for future research, we consider it necessary to expand the sample of the group of moderately and late preterm infants, those born in other hospitals, as well as to assess the emotional state of the parents and their influence on the behavior of their children. For example, Salomäki et al. (2023) found associations between parental emotional health and social functioning in preterm infants before the age of 4 years. In this sense, we agree with Fisher et al. (2024) in that more intervention studies are needed to improve parenting and prevent future behavioral problems.

According to recent studies, the need to continue to support longitudinal studies that include the preschool stage and follow-ups up to 12 years of age is justified, since subtle social difficulties may appear in the preschool stage (Jones et al., 2013), mainly in the group of extremely preterm births (Larsen et al., 2024), since, as Samuelsson et al. (2017) state, this profile might be recognizable in adolescence. However, we found that both parents and teachers identified a greater risk of difficulties in the moderately premature children than in those born at term and even the very premature children. For this reason, the extension of follow-up to all preterm infants would facilitate the incorporation of specific self-reports and would allow us to delve further into the relationship between internalizing and externalizing behaviors, as well as into the possible influence of other variables, using other measurement instruments, in line with the recommendation of Camerota et al. (2024). Finally, studying the influence of contextual variables on the development of PTG is a line of research that should be emphasized, allowing families to express themselves and to be able to resolve their doubts and reduce their insecurity.

Supplementary material. The supplementary material for this article can be found at http://doi.org/10.1017/SJP.2025.7.

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