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Low weight, socioeconomics and behavioral issues: examining a population in the Northeast of Brazil

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ABSTRACT

Background: Preterm and low weight children at birth are exposed to higher risks and rates of motor, cognitive, behavioral and emotional problems. Being born under low socioeconomic conditions adds even more complexity to these children. This report describes the emotional and behavioral issues of a group of children who were born in low income families and had low weigh at birth in the Northeast region of Brazil.

Method: A total of 100 children (47 with adequate and 53 with low weigh) were assessed with the Child Behavior Checklist for behavioral and emotional problems, as well as with the Autism Behavior Checklist for autism symptoms.

Results: Results show no difference between the two groups (low and adequate weight) in terms of behavior problems or autism characteristics, however, it shows elevated clinical prevalence's of behavioral and emotional problems and more vulnerability for autism symptoms when compared to the general population. Data also showed the more years children spent in pre-school, the less internalizing problems they manifested.

Conclusion: This study indicates that the impact of low socioeconomics environment is more prominent in the development of behavioral and emotional problems than low weight at birth, in addition it points to the benefits of pre-school years for the emotional and behavioral adjustment of children from low income and with low weight at birth.

1. Introduction

Higher survival of preterm and low weight children increases the need for educational, medical and behavioral support for this group of children (Fan et al., 2013). In the US, for example, preterm represents 9.6% of all births and low weight babies represent 8% of them (Hamilton et al., 2016). In Brazil, this prevalence of preterm deliveries reach 11.7% (Silveira and Enumo, 2012). Preterm and low weight children at birth are exposed to higher risks and rates of motor, cognitive, behavioral and emotional problems (Linhares et al., 2000; Fan et al., 2013; Moreira et al., 2014; Hornman et al., 2016; Ribeiro et al., 2017). More specifically, the lowest behavior scores were obtained relative to attention problems, anxiety and depression and aggressive behavior (Fan et al., 2013). In terms of behavioral problemas, Hornman and cols. (2016) report higher rates for internalizing than for externalizing problems, however, they explain that the externalizing problems were more likely to emerge, and that the internalizing problems were more likely to resolve. Prenatal factors, such as low weight and preterm birth, be further linked with psychiatric disorders (Johnson and Marlow, 2011) and can be associated with autism as well (Pinto-Martin et al., 2011; Schieve et al., 2014). Following prospectively a population of preterm children, Pinto-Martin and cols. (2011), and as adolescentes 18.8% of these children screened positive for autism, which is a prevalence 5 times higher than in the general population. Risks of motor, cognitive, and emotional and behavioral problems may increase under low socioeconomic conditions. Emotional and behavioral issues may persist even upon school entry

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(Hornman et al., 2016), which in turn may influence children's school adjustment, development and learning. The authors defend that earlier detection of emotional and behavioral problems in preterm children could promote early interventions, which could increase the likelihood of successful school entry.

It is important to understand the implications of low weight and preterm births in low socioeconomic communities in Brazil in order to develop policies and practices to prevent and support the children and their development (Mallik and Spiker, 2017). The current report aims to describe the emotional and behavioral issues of a group of children who were born in low income families and had low weigh at birth in a capital of a state in the Northeast region of Brazil.

2. Methods

2.1. Participants

This study included a total of 100 children; 47 were born with adequate weight and 53 with low weight (<2500 g). The age of the children at time of the assessments ranged from 3 to 7 years. From the low weight group, 68% were premature, while in the adequate weight group the prematurity prevalence was only 12.7% (X^2 [3, N = 100] = 33.22, p < .001). Regarding income, most of the sample in both groups (81% of low weight children and 89% of the adequate weight children) live in households with a monthly income of less than U$750 (annual income of U$ 9,000), which is considered a low socioeconomic status.

2.2. Instruments

This study employs three main instruments: The Child Behavior Checklist (CBCL; Achenbach and Rescorla, 2001; Bordin et al., 2013) is a caregiver report form identifying behavior problems in children. It screens for emotional and behavioral problems including total score, internalizing problems (introversion, anxiety and depression), and externalizing problems (aggression, and attention problems). The Autism Behavior Checklist (ABC) is a questionnaire translated and validated in Brazil (Marteleto and Pedromônico, 2005). It can be used as a diagnostic tool, as well as it is used to determine a profile of characteristics related to autism both in a clinical and research settings with a cutoff score of 48 for an autism diagnosis. The Brazilian Questionnaire of Children's Environment (QBAI; Engel de Abreu et al., 2014) investigates socioeconomic information, such as family income, education and caregivers' profession. This instrument also contains questions about the mother's gestational period (i.e., use of alcohol, cigarettes and other drugs), child development, home stimulation (i.e., quantity of books and reading habits), and general family habits (i.e., family meals, park trips). The questionnaire has an item designated as "possessions" based on the Brazilian Economic Classification Criteria (Associação Brasileira de Empresas de Pesquisa, 2010), which provides information on socioeconomic status.

2.3. Procedures

The researcher examined the Brazil's Information System for Live Births (SINASC) for children born in a state on the Northeast region of Brazil, in a low-income neighborhood. After the selection of all children born between January 1st, 2008 and December 31st, 2014, community agents visited the mothers of the children to invite them to participate in the research. After the explanation of the research, if mothers accepted they filled the informed consent and the assessment sessions were scheduled. In one session, the mothers were interviewed using the ABC, the QBAI and the CBCL, the assessments included in the current study. This research was approved in the Mackenzie Presbyterian University Ethics' Committee under CAAE on November 29, 2016. All participant parents' gave written consent.

2.4. Analysis

Descriptive analysis was conducted for the demographic information data, chi-square analysis was conducted for the CBCL factors category and ABC categories to compare the distribution in each group of the instruments. Student t tests were conducted for the ABC score between the two groups. A Pearson correlation was carried between the ABC score and the CBCL factors. Also, linear regressions (stepwise method) were conducted to understand which effects of the environment could explain the variation in the CBCL factors. The data was analyzed using SPSS for Windows, v. 22.0.

3. Results

Demographic data revealed that, in terms of years in pre-school, 5 children in each group did not go to pre-school. From the total, 19.1% (N = 9) in the adequate weight and 35.3% (N = 18) with low weight went to pre-school for 1 year; 34% (N = 16) of adequate and 25.5% (N = 13) of low weight went for 2 years; 12% (N = 25) of adequate weight and 25.5% (N = 13) of low weight went for 3 years; and finally, 10.6% (N = 5) of children with adequate and 3.9% (N = 2) of children born with low weight went to 4 years of pre-school.

Regarding parents' education, most parents have had graduated high school: 66% (N = 31) of mothers in the adequate group and 56.9% (N = 29) in the low weight group studies up to 12th grade and in the father's group, 57.8% (N = 26) and 50% (N = 23) finished 12th grade. The average number of children per household for the adequate weight group is 1.9 children and for the low weight at birth group is 1.8 children. Statistical analysis revealed no significant differences between adequate weight and low weight groups in these demographic measures.

CBCL revealed an average for the total problem score of 46.22 (SD = 21.3) in the adequate weight group and 46.31 (SD = 21.25) in the low weight at birth group. There are no significant differences between these two groups when comparing these mean scores. The factors of the CBCL displayed on Table 1 demonstrate that the children with low weight show clinically relevant behaviors for more than 25% of the sample for total problems and internalizing behavior problems, which include the anxiety/depression, withdrawn and somatic complaints. The only factor that showed marginally significant difference between groups was internalizing behavior problems (p = .063).

Using the ABC to characterize the sample in terms of behaviors typical in children with autism, two children (4%) from the low weight group presented behaviors within the autism diagnosis range, while none in the adequate weight presented the same pattern of behaviors. Most of the individuals' scores fell in the "normal" range for behaviors: N = 43 for adequate weight and N = 47 for low weight at birth. According to chi-square distribution, there wasn't significant differences between the groups. The average score for the ABC in both groups was 23.74 (SD = 14.63), with low income and adequate weight group showing an average score of 22.40 (SD = 13.69) and low income and low weight group of

Table 1
Behavioral and emotional profile in the CBCL by group based on T scores.

CBCL scores		n (%)		p
		Low income and adequate weight	Low income and low weight	
Total Problems*	Normal	28 (60.9)	36 (69.2)	.151
	Borderline	7 (15.2)	2 (3.8)	
	Clinical	11 (23.9)	14 (26.9)	
Internalizing Problems*	Normal	27 (58.7)	35 (67.3)	.063
	Borderline	10 (21,7)	3 (5.8)	
	Clinical	9 (19.6)	14 (26.9)	
Externalizing Problems*	Normal	30 (65.2)	39 (75.0)	.471
	Borderline	8 (17.4)	5 (9.6)	
	Clinical	8 (17.4)	8 (15.4)	

* Sample loss = 1.

Table 2
Significant regression analysis of CBCL total problems, internalizing problems and externalizing problems with their predictors and coefficients.

	Beta	T	Correlation coefficients				
			Sig.	Zero-order	Partial	Semi-Partial	Tolerance
CBCL Total problems ($R^2 = .07$, adjusted $R^2 = .06$)							
Yrs. In pre-school	-0.268	-2.702	.008	-0.268	-0.268	-0.268	1.000
CBCL Internalizing problems ($R^2 = .12$, adjusted $R^2 = .11$)							
Yrs. In pre-school	-0.340	-3.504	.001	-0.340	-0.340	-0.340	1.000
CBCL Externalizing problems ($R^2 = .10$, adjusted $R^2 = .09$)							
N of children in the house	0.258	2.635	.010	0.252	0.264	0.258	0.999
Yrs. in pre-school	-0.214	-2.188	.031	-0.207	-0.221	-0.214	0.999

25.00 (SD = 15.48). There was no significative difference between those two groups, (t[95] = 0.872, p = .395) and the effect was of small size (d = 0.19). Also, there is a positive correlation between the ABC score with the CBCL total problems factor ($r = .51$, $p < .001$), internalizing problems factor ($r = .49$, $p < .001$), and externalizing problems factor ($r = .44$, $p < .001$).

Regression analysis revealed that the amount of years in preschool could predict 6.2% of CBCL's total problems factor and 10.6% of the internalizing behavioral problems factor. The number of children in the house and years in pre-school combined could predict 9% of the CBCL's externalizing behavioral problems (Table 2).

4. Discussion

Low income children in a northeast Brazilian state both with low and adequate weight at birth show elevated average of behavioral and emotional problems measured by a caregiver report. Despite the lack of statistical difference between our two groups the present report shows that the average for emotional and behavioral problems in both of our groups, 46.2 for adequate weight and 46.3 for low weight, surpass the average expected for a general population of children around the world, which is 21.6 (Rescorla et al., 2014). This lack of difference between our groups but difference with the general population scores might be attributed to specific demographic factors of both groups in this study, such as geographic and particularly socioeconomic status. This data is aligned with the literature reporting an increased risk for emotional and behavioral problems in children not only born with low weight, but in low socioeconomic conditions (Fan et al., 2013).

The current study also found association of behaviors in autism and low socioeconomics and low weight groups, seen with an elevated score on the ABC for both groups. In the adequate weight group, the average score was 22.4 and the average was 25 for the low weight group in comparison to an average score of 17 expected for a typically developing group (Marteleto and Pedromônico, 2005). Literature shows a 5% prevalence of autism in adults that were born low weight (Pinto-Martin et al., 2011). In our sample with low weight, the prevalence did not differ statistically from the adequate weight, but the data aligns with the literature since the current study found a prevalence of autism scores on the ABC in the autism range in 4% of our sample, 5 out of 53 children. In addition, the ABC scores correlated with CBCL scores, which means that the more clinically relevant emotional and behavioral problems were reported, the more behaviors relevant for the autism diagnosis were reported as well.

When analyzing demographics and other family characteristics, particularly in relation to emotional and behavioral problems, the data demonstrated that a higher number of children living in the household combined with fewer years in the pre-school, are directly related to more externalizing problems. In addition, the more years children spent in pre-school, the less internalizing problems they manifested, which is due to the negative beta coefficient, showing a negative correlation between years in pre-school and internalizing problems. The data also point out for a slight attenuation in the total problems. Therefore, this study indicates the benefits of pre-school years for the emotional and behavioral adjustment of children from low income and with low weight at birth.

5. Conclusions

This paper reveals high scores of behavioral problems in low income and low weight and low socio-economics groups of children in the Northeast of Brazil, and not a difference between these two groups. These characteristics reveal similarities between the two groups of children in terms of demographics in their vulnerability for emotional and behavioral problems and autism symptoms, which shows a higher impact of low socioeconomics than the low weight at birth. In addition, the negative impact of more children in the household and less years in pre-school predict the display of aggressive and rule breaking behaviors. Meanwhile, there is a positive impact of pre-school time in behavioral and emotional problems, such as depression, anxiety, somatic problems and withdrawn. Time in school becomes a protective factor for the children measuring against the development of behavioral and emotional problems related to being born with low weigh and be raised in low income communities. This data points to the importance of pre-school for children in vulnerable conditions to develop socioemotional skills and in consequence better adapt to their school and home, and other social environments.

Declarations

Author contribution statement

Maria de Jesus Torres Pacheco: Conceived and designed the experiments; Performed the experiments.

Fernanda T. Orsati, Paulo Laurence: Analyzed and interpreted the data; Wrote the paper.

Héron Máximo da Cunha Gonçalves, Talyta Garcia da Silva Ribeiro, Marcone Barbosa Pacheco, Maria Augusta Braghin Vantini, Patricia Botelho da Silva, Rute Cordeiro Tomás: Performed the experiments. Pascale Engel de Abreu: Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data. Elizeu Coutinho Macedo: Conceived and designed the experiments; Analyzed and interpreted the data; Wrote the paper.

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Competing interest statement

The authors declare no conflict of interest.

Additional information

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References

Achenbach, T.M., Rescorla, L.A., 2001. Manual for the ASEBA school-age forms & profiles. Research Centre for Children, Youth and Families, University of Vermont, Burlington.

Associação Brasileira de Empresas de Pesquisa, 2010. *Critério de classificação econômica* [Economic Classification Criteria]. Available at: http://www.abep.org/Servicos/Download.aspx?id=07.

Bordin, I.A., Rocha, M.M., Paula, C.S., Teixeira, M.C.T.V., Achenbach, T.M., Rescorla, L.A., Silvares, E.F.M., 2013. Child behavior checklist (CBCL), youth self-report (YSR) and teacher's report form(TRF): an overview of the development of the original and Brazilian versions. Cad. Saúde Pública 29 (1), 13–28.

Engel de Abreu, P.M.J., Abreu, N., Nikaedo, C.C., Puglisi, M.L., Tourinho, C.J., Miranda, M.C., Befi-Lopes, D.M., Bueno, O.F.A., Martin, R., 2014. Executive functioning and reading achievement in school: a study of Brazilian children assessed by their teachers as "poor readers". Front. Psychol. 5, 550.

Fan, R.G., Portuguez, M.W., Nunes, M.L., 2013. Cognition, behavior and social competence of preterm low birth weight children at school age. Clinics 68 (7), 915–921.

Hamilton, B.E., Martin, J.A., Osterman, M.J., 2016. Births: preliminary data for 2015. Natl. Vital Stat. Rep. 65 (3), 1–15.

Hornman, J., Winter, A.F., Kerstjens, J.M., Bos, A.F., Reijneveld, S.A., 2016. Emotional and behavioral problems of preterm and full-term children at school entry. Pediatrics 137 (5) e20152255.

Johnson, S., Marlow, N., 2011. Preterm birth and childhood psychiatric disorders. Pediatr. Res. 69 (5 Part 2), 11R–18R.

Linhares, M.B.M., Carvalho, A.E.V., Bordin, M.B.M., Chimello, J.T., Martinez, F.E., Jorge, S.M., 2000. Prematuridade e muito baixo peso como fatores de risco ao desenvolvimento da criança. Paidéia (Ribeirão Preto) 10 (18), 60–69.

Mallik, S., Spiker, N., 2017. *Programas eficazes de intervenção precoce para bebês prematuros nascidos com baixo peso* [Effective early intervention programs for preterm infants born with low birth weight]. Revisão do Programa de Saúde e Desenvolvimento do Bebê (Infant Health and Development Program – IHDP). SRI International Early Childhood Program Center for Education and Human Services, USA.

Marteleto, M.R.F., Pedromônico, M.R.M., 2005. Validity of autism behavior checklist (ABC): preliminary study. Rev. Bras. Psiquiatr. 27 (4), 295–301.

Moreira, R.S., Magalhães, L.C., Alves, C.R.L., 2014. Effect of preterm birth on motor development, behavior, and school performance of school-age children: a systematic review. J. Pediatr. 90 (2), 119–134.

Pinto-Martin, J.A., Levy, S.E., Feldman, J.F., Lorenz, J.M., Paneth, N., Whitaker, A.H., 2011. Prevalence of autism spectrum disorder in adolescents born weighing <2000 grams. Pediatrics 128 (5), 883.

Rescorla, L.A., Bochicchio, L., Achenbach, T.M., Ivanova, M.Y., Almqvist, F., Begovac, I., Bilenberg, N., Bird, H., Dobrean, A., Erol, N., Fombonne, E., Fonseca, A., Frigerio, A., Fung, D.S., Lambert, M.C., Leung, P.W., Liu, X., Marković, I., Markovic, J., Minaei, A., Ooi, Y.P., Roussos, A., Rudan, V., Simsek, Z., van der Ende, J., Weintraub, S., Wolanczyk, T., Woo, B., Weiss, B., Weisz, J., Zukauskiene, R., Verhulst, F.C., 2014. Parent–teacher agreement on children's problems in 21 societies. J. Clin. Child Adolesc. Psychol. 43 (4), 627–642.

Ribeiro, C.C., Pachelli, M.R.O., Amaral, N.C.O., Lamônica, D.A.C., 2017. Development skills of children born premature with low and very low birth weight. CoDAS 29 e20160058.

Schieve, L.A., Tian, L.H., Baio, J., Rankin, K., Rosenberg, D., Wiggins, L., Maenner, M.J., Yeargin-Allsopp, M., Durkin, M., Rice, C., King, L., Kirby, R.S., Wingate, M.S., Devine, O., 2014. Population attributable fractions for three perinatal risk factors for autism spectrum disorders, 2002 and 2008 autism and developmental disabilities monitoring network. Ann. Epidemiol. 24 (4), 260–266.

Silveira, K.A., Enumo, S.R.F., 2012. Riscos biopsicossociais para o desenvolvimento de crianças prematuras e com baixo peso. Paidéia (Ribeirão Preto) 2 (53), 335–345.