

Respiratory diseases in children attending kindergartens: Health-related variables and mothers' psychological, parental, and marital functioning

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Abstract

This study aimed to examine the differences between mothers of children with and without respiratory problems in variables related to psychological, parental, and marital functioning and to determine which contributed more to parenting stress, because there is a lack of information in this field. Participants were 459 mothers of children attending kindergartens, who accepted to participate. The instruments were The International Study of Asthma and Allergies in Childhood questionnaire, Hospital Anxiety and Depression Scale, Parenting Stress Index–Short Form, Parenting Stress Index–Long Form, and *Escala de Avaliação da Satisfação em Áreas da Vida Conjugal*. Anxiety, depression, and parenting stress were higher in the more symptomatic children and parenting stress was associated with anxiety, depression, and marital satisfaction. Findings support the relevance of children's respiratory-related variables to mothers' psychological, parental, and marital functioning.

Keywords

anxiety, child respiratory disease, depression, life stress, marital satisfaction, parenting stress

Introduction

Respiratory diseases are common early in life. They are associated with school absenteeism and are a main cause of hospital admission in children (Newacheck and Taylor, 1992; Rullo et al., 2009). For instance, recurrent wheezing during the first year of life is a major cause of respiratory morbidity worldwide (Mallol et al., 2010), and childhood asthma is the main chronic respiratory disease in childhood (e.g. Bousquet et al., 2010; Silva et al., 2014).

Furthermore, over recent years, the association between day care centers (DCC) attendance and respiratory diseases has been reported. Studies have shown that attending a DCC significantly increases the risk of upper respiratory infection in preschool children (e.g. Ball et al., 2002; Hagerhed-Engman et al., 2006; Lu et al., 2004).

Children's health problems may influence the psychological functioning of the parental figures and some

studies have demonstrated that there are higher levels of depression (Bartlett et al., 2004; Safa et al., 2012; Shalowitz et al., 2006) and anxiety symptoms (Safa et al., 2012; Shalowitz et al., 2006) in mothers when the child has respiratory disease. Childhood chronic health problems may also have an impact on the marital relationship

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(Berge et al., 2006; Kazak et al., 2003; Mullins et al., 2011). However, this domain has been under explored when the child has a respiratory disease. Northey et al. (1998) found that in families with childhood asthma, couples were less satisfied with their marriages than couples in the non-asthma group.

Parenting stress can be defined as the aversive psychological reaction to the demands of being a parent and is experienced as negative feelings toward the self or toward the child (Deater-Deckard, 1998: 315). Research has also shown that mothers of children with respiratory diseases such as asthma have higher levels of parenting stress compared to mothers of healthy children (e.g. Gupta, 2007; Hullmann et al., 2010; Thompson and Gustafson, 1996).

Although literature on the relationship between parenting stress and depression/anxiety in parents of children suffering from respiratory disease was not found, studies with different samples suggest an association between parenting stress and maternal psychopathology (Williford et al., 2007), particularly depression (Ardoino et al., 2015; Bailey et al., 2012; Leigh and Milgrom, 2008; Zajicek-Farber et al., 2012) and anxiety (Leigh and Milgrom, 2008; Murphy et al., 2010; Rezendes and Scarpa, 2011).

Positive and supportive marital relationships seem to have a protective role in battling mental health problems and promoting parenting efficacy (e.g. Shapiro, 2014). Although there are studies relating parenting stress to marital satisfaction (e.g. Benzie et al., 2004; Shapiro, 2014; Webster-Stratton, 1990), none was found in the context of respiratory disease.

It was suggested that experiencing stress associated with life events plays an important role not only in the etiology of several mental and somatic problems (e.g. Glaser and Kiecolt-Glaser, 2005; Priftis et al., 2009) but also in the stress experienced in the parenting role (Abidin and Santos, 2003; Ostberg and Hagekull, 2000; Puff and Renk, 2014). Nevertheless, other authors concluded that major life events are not predictive of parenting stress (Leigh and Milgrom, 2008).

In short, within the context of childhood respiratory disease, there is a general lack of research on the dimensions under study, and furthermore, the relationship of parenting stress with the other dimensions and with the disease variables has either not been addressed or has been insufficiently explored.

Along these lines, this study aimed (1) to analyze the differences between mothers of children with and without respiratory health problems in psychological (anxiety/depression), parental (parenting stress and life events), and marital (satisfaction) functioning, based on specific disease variables; (2) to determine which factors contributed to parenting stress considering anxiety, depression, marital satisfaction, life events, and a global child health indicator (GCHI).

Method

Participants

This study is part of a broader longitudinal research project, *Environment and Health in Children Day Care Centers* (ENVIRH), which set out to study the association between indoor air quality in DCC and the health of children attending them (Araújo-Martins et al., 2014). The ENVIRH project comprised two phases: (1) evaluation of the building characteristics, occupant respiratory health, and ventilation surrogates (45 DCCs); (2) evaluation of a DCC subgroup (20 DCCs) selected from Phase I through a cluster analysis (that considered CO₂ concentrations, temperature, and humidity at indoors, measured in Phase I) by a hierarchical model (Ward method). DCCs which were further apart in the dendrogram were chosen. During this phase, and in relation to Time 1, one DCC dropped out of the study. This study was integrated within the ENVIRH Phase II, with two evaluation points: Time 1—Spring/Summer and Time 2—Autumn/Winter. The results presented in this article refer to Time 1.

The data of this study were collected in 13 of the 20 DCCs participating in Phase II (those DCCs who accepted the invitation to participate in this part of the study). The inclusion criterion was mothers with a child aged between 6 months and 5 years old without congenital or chronic pathology (other than respiratory disease).

The questionnaires were distributed to the mothers by the DCC staff (education assistants and early childhood educators) and were then collected by our team members. The mothers who wished to participate signed an informed consent. In a universe of 1797 children, 532 adults answered the questionnaires and from this number 73 were excluded due to not being mothers.

The sample consisted of 459 mothers aged between 19 and 48 years ($M=34.98$ years; $SD=4.92$). The target children (children of the mothers characterized above) were aged 8–78 months ($M=44.74$ months, $SD=19.35$) and were mostly male (52.1%), only or youngest children in the sibling position (61.8%). Table 1 shows the mothers' socio-demographic characteristics.

The majority of mothers had completed higher education (50.5%), were employed (91.7%), and married or living in common law partnerships (70.1%).

Measures

Respiratory health assessment. To evaluate the children's respiratory health conditions, the Portuguese version of The International Study of Asthma and Allergies in Childhood questionnaire (ISAAC; Rosado-Pinto et al., 2011) was used. This questionnaire collects detailed data on wheezing and allergic diseases, absenteeism, respiratory infections, and past medical history, and it also includes environmental questions.

Table 1. Mothers' socio-demographic characteristics.

	<i>n</i>	%
Education		
9 years of schooling	73	15.9
Secondary school	120	26.1
University degree	232	50.5
No answer	34	7.4
Employment status		
Employed	416	91.7
Unemployed	34	7.4
No answer	9	2.0
Marital status		
Single	115	25.1
Married/common law partnership	303	66.1
Divorced	37	8.1
No answer	4	0.9

Parental assessment. The mothers' psychological (anxiety/depression), parental (parenting stress and life events), and marital (satisfaction) dimensions were evaluated by means of the following instruments: (1) The Hospital Anxiety and Depression Scale (HADS; Zigmond and Snaith, 1983; Portuguese version of Pais-Ribeiro et al., 2007) is a self-assessment instrument (in the form of a brief questionnaire). It includes an Anxiety subscale (HADS-A) and a Depression subscale (HADS-D), each one containing seven items answered on a 4-point response category (from 0—*Most of the time* to 3—*Never*), so the possible scores range from 0 to 21 for anxiety and 0 to 21 for depression. Higher scores indicate higher levels of anxiety and depression. (2) The Parenting Stress Index—Short Form (PSI-SF; Abidin, 1995; Portuguese version of Santos, 2011) is a self-report instrument that measures stress associated with the parenting role. The PSI-SF consists of 36 statements, with a 5-point Likert scale (ranging from 1 (*Totally disagree*) to 5 (*Totally agree*)). This instrument yields scores for three subscales (in addition to a Total Stress score): Parental Distress, Parent–Child Dysfunctional Interaction, and Difficult Child. Higher scores indicate higher levels of parenting stress; (3) The Life Stress Scale of the Parenting Stress Index—Long Form (PSI-LF; Abidin, 1995; Portuguese version of Abidin and Santos, 2003) aims to assess parents' life events over the past 12 months and answers are obtained in a dichotomous format (yes/no) for the occurrence of each life event; (4) The Scale for the Evaluation of Satisfaction in Areas of Couple Life (originally *Escala de Avaliação da Satisfação em Áreas da Vida Conjugal*; EASAVIC, Narciso and Costa, 1996) is a 44-item self-report measure answered on a 6-point Likert scale (ranging from 1 (*Totally unsatisfied*) to 6 (*Totally satisfied*)) that evaluates marital satisfaction. It is organized in two subscales, Marital Functioning (e.g. satisfaction with communication and conflict, family functions) and Love (e.g. sexuality, emotional intimacy) and allows scores for each subscale and a Total score (used in this study). Higher scores indicate higher levels of marital satisfaction. All the questionnaires

used in the parental assessment had adequate psychometric (validity and reliability) properties.

Socio-demographic information (e.g. age and child gender, mothers' age, marital status, employment status, and schooling) was also collected.

Procedure

Research protocol was handed out by the DCC staff from the 13 DCCs that agreed to participate. This protocol included the presentation of the study, instructions, and questionnaires (related to children's respiratory health assessment and parental assessment). Mothers who accepted to participate signed an informed consent. The participation was voluntary.

The ENVIRH project and this study followed the ethical procedures for research with humans and those proposed by the Code of Ethics of the World Medical Association (Helsinki Declaration) and were approved by the Ethics Committee of the NOVA Medical School.

Statistical analyses

Student's *t*-tests were used to compare groups as the distributions of the variables met the normality assumption. The bivariate associations between parenting stress and anxiety, depression, marital satisfaction, and life events were tested using Pearson's correlation coefficient. Multiple linear regression analysis was conducted to predict parenting stress, considering depression, anxiety, marital satisfaction, life stress, and a GCHI as independent variables. The GCHI was created to study the child respiratory health variables' influence, corresponding to the sum of 10 variables (presence of wheezing episodes, presence of respiratory infection episodes, otitis, antibiotic intake, going to the doctor because of wheezing episodes, going to the doctor for respiratory infection episodes, emergency room attendance due to wheezing episodes, emergency room attendance due to respiratory infection episodes, missed day care days due to wheezing episodes, and missed day care days due to respiratory infection episodes).

Variables with a *p* value <0.25 in the univariate analysis were included in the model. A significance level of $\alpha=0.05$ was considered. All data were analyzed using the Statistical Package for the Social Sciences for Windows version 22.0 (IBM Corp. Released 2013, IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp.).

Results

Differences in mothers' functioning based on child respiratory health

Differences between mothers of children with and without respiratory disease in terms of parenting stress, anxiety and depression, marital satisfaction, and life events were analyzed

Table 2. Number of wheezing episodes.

	None (<i>n</i> = 181)		One or more (<i>n</i> = 73)		<i>t</i>	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Anxiety	8.40	2.69	9.12	2.79	-1.909	0.057
Depression	3.60	3.01	4.67	3.56	-2.274	0.025
Parenting stress						
Parental distress	24.50	6.88	26.00	9.19	-1.259	0.211
Parent-child dysfunctional interaction	16.61	4.43	16.67	6.14	-0.088	0.930
Difficult child	21.88	6.93	20.74	6.32	1.208	0.228
Total	62.98	14.45	63.44	18.29	-0.211	0.835
Marital satisfaction	202.61	36.49	202.60	48.77	0.001	1.000
Life events	10.25	10.06	10.58	9.60	-0.226	0.821

Table 3. Emergency room attendance (number of times) for respiratory infections.

	None (<i>n</i> = 232)		One or more (<i>n</i> = 39)		<i>t</i>	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Anxiety	8.47	2.68	9.59	2.91	-2.391	0.017
Depression	3.85	3.24	4.62	3.48	-1.350	0.178
Parenting stress						
Parental distress	25.20	7.67	26.59	8.88	-1.022	0.308
Parent-child dysfunctional interaction	16.60	4.54	17.21	7.28	-0.691	0.490
Difficult child	21.86	7.03	21.61	6.15	0.214	0.831
Total	63.73	15.80	65.50	17.91	-0.628	0.531
Marital satisfaction	200.56	39.82	197.65	52.16	0.364	0.716
Life events	10.38	10.01	11.35	9.09	-0.531	0.596

as a function of specific disease variables—number of wheezing episodes, emergency room attendance (number of times) for respiratory infections, emergency room attendance (number of times) for wheezing episodes, and number of episodes treated with antibiotic intake.

Table 2 presents the results about the number of wheezing episodes.

Results show that mothers of children with one or more wheezing episodes had more depression symptoms ($p=0.025$) and more anxiety, although with lower strength of evidence ($p=0.057$).

Results related to emergency room attendance (number of times) for respiratory infections are presented in Table 3.

Mothers of children with one or more emergency room visits due to respiratory infections were shown to have more anxiety symptoms ($p=0.017$).

Concerning emergency room attendance (number of times) for wheezing episodes (Table 4), the results indicated that mothers of children with one or more emergency room visits due to wheezing episodes had more depression symptoms ($p=0.025$).

Table 5 shows the results regarding the number of episodes treated with antibiotic intake.

A statistically significant difference between the group with no episodes treated with antibiotic intake and the group with one or more episodes treated with antibiotic intake was observed for anxiety ($p<0.001$), depression ($p=0.003$), parental distress ($p=0.032$), and total parenting stress ($p=0.047$).

Associated factors with parenting stress

To determine the factors that contributed to parenting stress, a univariate regression analysis was performed for all the dimensions under study (anxiety, depression, marital satisfaction, life events, and GCHI). Table 6 shows the results obtained.

With the exception of the GCHI, all the variables under study proved to significantly contribute to parenting stress.

A multiple linear regression analysis was conducted considering these variables as predictors. The model assumptions were verified. The Durbin-Watson value was 1.95 (the residuals were independent and random) and the VIF (*variance inflation factor*) values were 1.57 for anxiety, 1.67 for depression, and 1.29 for marital satisfaction. Table 7 presents the results obtained in this final model, which explained 51 percent of the variance ($p<0.001$).

Table 4. Emergency room attendance (number of times) for wheezing episodes.

	None (<i>n</i> = 248)		One or more (<i>n</i> = 17)		<i>t</i>	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Anxiety	8.50	2.76	9.59	2.03	-1.597	0.111
Depression	3.82	3.20	5.65	3.71	-2.258	0.025
Parenting stress						
Parental distress	24.96	7.58	27.65	9.58	-1.387	0.167
Parent-child dysfunctional interaction	16.50	4.47	17.13	5.01	-0.533	0.595
Difficult child	21.67	6.90	22.80	7.51	-0.611	0.542
Total	63.18	15.55	66.67	17.61	-0.836	0.404
Marital satisfaction	202.21	39.48	191.07	68.01	0.627	0.540
Life events	10.09	9.99	12.44	10.55	-0.906	0.366

Table 5. Antibiotic intake.

	None (<i>n</i> = 198)		One or more (<i>n</i> = 79)		<i>t</i>	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Anxiety	8.23	2.55	9.75	2.81	-4.342	<0.001
Depression	3.66	3.10	4.97	3.68	-3.011	0.003
Parenting stress						
Parental distress	24.77	7.30	27.28	9.14	-2.167	0.032
Parent-child dysfunctional interaction	16.38	4.77	17.36	5.49	-1.384	0.169
Difficult child	21.39	6.40	22.62	7.69	-1.353	0.177
Total	62.52	14.77	67.29	18.51	-2.010	0.047
Marital satisfaction	202.92	39.15	195.23	48.26	1.175	0.243
Life events	9.96	10.19	11.32	9.40	-0.980	0.328

In short, the main results of this research were mothers of children with one or more wheezing episodes, with one or more emergency room visits due to respiratory infections or wheezing episodes, and with antibiotic intake had more depression and/or anxiety symptoms; and that anxiety, depression, and marital satisfaction proved to influence parenting stress.

Discussion

This study aimed to examine the differences between mothers of children with and without respiratory problems in variables related to psychological, parental, and marital functioning and to determine which contributed more to parenting stress.

One of the aims of this study was to analyze the differences between mothers of children with and without respiratory disease in the psychological (anxiety/depression), parental (parenting stress and life events), and marital (satisfaction) dimensions as a function of specific disease-related variables. The results showed that mothers' levels of depression and anxiety were higher in those whose children had more wheezing episodes (although the anxiety result was only marginally significant), and the same trend was observed

in those whose children took antibiotics more frequently. These findings are consistent with previous research, as several authors stated that children's health problems (not respiratory health problems) are related to mothers' psychological functioning and to higher levels of anxiety and depression symptoms (Lewin et al., 2005; Stevenson-Hinde et al., 2007; Thompson and Gustafson, 1996; Yilmaz et al., 2008). This is also the case for mothers whose children have a respiratory pathology (Bartlett et al., 2004; Safa et al., 2012; Shalowitz et al., 2006).

The results also point to more anxious and depressive symptomatology in mothers whose children needed to go to the emergency room due to wheezing episodes and higher levels of anxiety symptoms in mothers whose children needed to go to the emergency room due to respiratory infections. The findings for depression are in line with the study by Bartlett et al. (2001), who found higher levels of depression in mothers whose children had higher rates of emergency room attendance due to respiratory problems. As for anxiety, mothers with higher levels of anxiety possibly have a greater need to take their children to the emergency room not only due to the severity of the disease itself, but mainly because they feel more insecure and frightened by the situation.

Table 6. Associated factors with parenting stress—univariate regression analysis.

Predictor variables	B	β	t	p
Anxiety	3.10	0.53	13.05	<0.001
Depression	3.11	0.61	16.38	<0.001
Marital satisfaction	-0.24	-0.60	-14.84	<0.001
Life events	0.27	0.17	3.45	0.001
Global child health indicator	0.38	0.05	0.90	0.370

Table 7. Associated factors with parenting stress—multiple regression analysis.

Predictor variables	B	β	t	p
Anxiety	0.97	0.16	3.64	<0.001
Depression	1.68	0.33	7.23	<0.001
Marital satisfaction	-0.16	-0.39	-9.64	<0.001
R	0.72			
Adjusted R ²	0.51			
Model significance	F (3, 386) = 136.66; p < 0.001			

Results also showed that mothers of children with one or more episodes treated with antibiotic intake have higher scores in the parental distress subscale and in the parenting stress total score. These results are in line with those of Carotenuto et al. (2013), who reported higher parenting stress in the mothers of children with a chronic disease.

Results showed no variations in marital satisfaction as a function of the respiratory disease variables, thus differing from the study by Northey et al. (1998), which suggested that couples with a child with asthma were less satisfied with their marriages than non-asthma couples. Further research is needed concerning the association between marital satisfaction and respiratory disease.

Another goal of this study was to determine whether specific psychological, parental, marital, and disease variables were associated with parenting stress. The final model showed that only anxiety, depression, and marital satisfaction contributed to parenting stress. Higher levels of anxiety and depression and lower levels of marital satisfaction were associated with higher levels of parenting stress. These results are consistent with the results of other studies in relation to depression and anxiety (Leigh and Milgrom, 2008; Lewin et al., 2005; Murphy et al., 2010; Rezendes and Scarpa, 2011; Stevenson-Hinde et al., 2007; Williford et al., 2007), which also pointed to an influence of these dimensions on parenting stress. However, neither of these studies was related to respiratory diseases. There are a few studies linking parenting stress to marital satisfaction. Nevertheless, the findings of this study follow the same direction as those obtained by other authors (Benzies et al., 2004; Crnic and Low, 2002; Shapiro, 2014), who reported an inverse relationship between parenting stress and marital satisfaction, but once again, the target samples were not related to respiratory disease.

In this study, life events were not found to be related to parenting stress. This result contradicts the perspective of different authors (e.g. Abidin, 1995; Ostberg and Hagekull, 2000) but is in line with the study by Leigh and Milgrom (2008), which emphasized that major life events are not predictive of parenting stress.

The results showed that respiratory disease (GCHI) did not contribute to parenting stress. One possible explanation could be seasonal variations concerning respiratory disease. In fact, the data collection was performed in the Spring/Summer period, which is a season during which the incidence of respiratory infections is low (Boloursaz et al., 2013).

Conclusion

The results indicated that among the dimensions under study, only anxiety, depression, and parenting stress varied on the basis of child wheezing outcomes and antibiotic intake. This variation was more extensive for psychological dimensions (anxiety/depression). With regard to the associated factors of parenting stress, anxiety, depression, and marital satisfaction contributed to parenting stress. The absence of an association between parenting stress and respiratory health variables deserves further research.

Among the limitations of this study, the fact that data collection took place in a period with a low incidence of respiratory infections should be noted. Nevertheless, this study is part of a broader research project that intends to compare results from two different seasons (longitudinal study). Data corresponding to the Autumn/Winter season will be analyzed at a later stage in the near future.

Additionally, although all mothers were invited to participate, there is still a risk for selection bias, as it is not possible to know whether mothers who agreed to participate and those who did not accepted had the same characteristics (e.g. the latter could be more or less stressed).

Mothers may benefit from being enrolled in early preventive intervention programs that will help them adjust to motherhood, in reducing stress and anxiety and this will contribute to promote child health and well-being.

We hope that future research will provide useful answers to remaining questions about parenting stress and the processes that link it to children's health and well-being. Such research will hopefully give health care professionals a clearer understanding of the importance of the psychosocial and health factors involved when taking care of children with respiratory disease.

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References

- Abidin R (1995) *Parenting Stress Index (PSI) Manual* (3rd edn). Charlottesville, VA: Pediatric Psychology Press.
- Abidin R and Santos SV (2003) *Índice de Stress Parental. Manual do PSI* [Parenting stress index—PSI manual]. Lisboa: CEGOC-TEA.
- Araújo-Martins J, Martins P, Viegas J, et al. (2014) Environment and health in children day care centres (ENVIRH)—Study rationale and protocol. *Revista Portuguesa de Pneumologia* 20: 311–323.
- Ardoino GI, Queirolo EI, Barg G, et al. (2015) The relationship among depression, parenting stress, and partner support in low-income women from Montevideo, Uruguay. *Health Care Women International* 36: 392–408.
- Bailey K, Webster R, Baker AL, et al. (2012) Exposure to dysfunctional parenting and trauma events and posttraumatic stress profiles among a treatment sample with coexisting depression and alcohol use problems. *Drug & Alcohol Review* 31: 529–537.
- Ball TM, Holberg CJ, Aldous MB, et al. (2002) Influence of attendance at day care on the common cold from birth through 13 years of age. *Archives of Pediatric Adolescent Medicine* 156: 121–126.
- Bartlett S, Kolodner K, Butz A, et al. (2001) Maternal depressive symptoms and emergency department use among inner-city children with asthma. *Archives of Pediatric Adolescent Medicine* 155: 347–353.
- Bartlett SJ, Krishnan JA, Riekert KA, et al. (2004) Maternal depressive symptoms and adherence to therapy in inner-city children with asthma. *Pediatrics* 113: 229–237.
- Benzies KM, Harrison MJ and Magill-Evans J (2004) Parenting stress, marital quality, and child behavior problems at age 7 years. *Public Health Nursing* 21: 111–121.
- Berge J, Patterson J and Rueter M (2006) Marital satisfaction and mental health of couples with children with chronic health conditions. *Families, Systems & Health* 24: 267–285.
- Boloursaz M, Lotfian F, Aghahosseini F, et al. (2013) Epidemiology of lower respiratory tract infections in children. *Journal of Comprehensive Pediatrics* 3: 93–98.
- Bousquet J, Mantzouranis E, Cruz AA, et al. (2010) Uniform definition of asthma severity, control, and exacerbations: Document presented for the World Health Organization Consultation on Severe Asthma. *Journal of Allergy and Clinical Immunology* 126: 926–938.
- Carotenuto M, Esposito M, Di Pasquale F, et al. (2013) Psychological, cognitive and maternal stress assessment in children with primary ciliary dyskinesia. *World Journal of Pediatrics* 9: 312–317.
- Crníc K and Low C (2002) Everyday stresses and parenting. In: Bornstein M (ed.) *Handbook of Parenting*. London: Lawrence Erlbaum Associates, pp. 243–267.
- Deater-Deckard K (1998) Parenting stress and child adjustment: Some old hypotheses and new questions. *Clinical Psychology: Science and Practice* 5: 314–332.
- Glaser R and Kiecolt-Glaser JK (2005) Stress-induced immune dysfunction: Implications for health. *Nature Reviews Immunology* 5(3): 243–251.
- Gupta VB (2007) Comparison of parenting stress in different developmental disabilities. *Journal of Developmental & Physical Disabilities* 19: 417–425.
- Hagerhed-Engman L, Bornehag CG, Sundell J, et al. (2006) Day-care attendance and increased risk for respiratory and allergic symptoms in preschool age. *Allergy* 61: 447–453.
- Hullmann SE, Wolfe-Christensen C, Ryan JL, et al. (2010) Parental overprotection, perceived child vulnerability, and parenting stress: A cross-illness comparison. *Journal of Clinical Psychology in Medical Settings* 17: 357–365.
- Kazak A, Rounke M and Crump T (2003) Families and other systems in pediatric psychology. In: Roberts MC (ed.) *Handbook of Pediatric Psychology* (3rd edn). New York: Guilford Press, pp. 159–175.
- Leigh B and Milgrom J (2008) Risk factors for antenatal depression, postnatal depression and parenting stress. *BMC Psychiatry* 8: 1–11.
- Lewin AB, Storch EA, Silverstein JH, et al. (2005) Validation of the pediatric inventory for parents in mothers of children with type 1 diabetes: An examination of parenting stress, anxiety, and childhood psychopathology. *Families, Systems, & Health* 23: 56.
- Lu N, Samuels M, Shi L, et al. (2004) Child day care risks of common infectious diseases revisited. *Child: Care, Health and Development* 30: 361–368.
- Mallol J, García-Marcos L, Solé D, et al. (2010) International prevalence of recurrent wheezing during the first year of life: Variability, treatment patterns and use of health resources. *Thorax* 65: 1004–1009.
- Mullins L, Wolfe-Christensen C, Chaney JM, et al. (2011) The relationship between single-parent status and parenting capacities in mothers of youth with chronic health conditions: The mediating role of income. *Journal of Pediatric Psychology* 36: 249–257.
- Murphy DA, Marelich WD, Armistead L, et al. (2010) Anxiety/stress among mothers living with HIV: Effects on parenting skills and child outcomes. *AIDS Care* 22: 1449–1458.
- Narciso ISB and Costa MG (1996) Amores satisfeitos, mas não perfeitos [Satisfied, but imperfect love]. *Cadernos de Consulta Psicológica* 12: 115–130.
- Newacheck PW and Taylor WR (1992) Childhood chronic illness: Prevalence, severity, and impact. *American Journal of Public Health* 82: 364–371.
- Northey S, Griffin WA and Krainz S (1998) A partial test of the psychosomatic family model: Marital interaction patterns in asthma and nonasthma families. *Journal of Family Psychology* 12: 220.
- Ostberg M and Hagekull B (2000) A structural modeling approach to the understanding of parenting stress. *Journal of Clinical Child Psychology* 29: 615–625.
- Pais-Ribeiro J, Silva I, Ferreira T, et al. (2007) Validation study of a Portuguese version of the hospital anxiety and depression scale. *Psychology, Health & Medicine* 12: 225–237.
- Priftis KN, Papadimitriou A, Nicolaidou P, et al. (2009) Dysregulation of the stress response in asthmatic children. *Allergy* 64: 18–31.

- Puff J and Renk K (2014) Relationships among parents' economic stress, parenting, and young children's behavior problems. *Child Psychiatry & Human Development* 45: 712–727.
- Rezendes DL and Scarpa A (2011) Associations between parental anxiety/depression and child behavior problems related to autism spectrum disorders: The roles of parenting stress and parenting self-efficacy. *Autism Research and Treatment* 2011; 1–11.
- Rosado-Pinto J, Asher I, Pearce N, et al. (2011) ISAAC (International Study of Asthma and Allergies in Childhood): 20 anos em Portugal. *Acta Pediátrica Portuguesa* 42: S26–S48.
- Rullo VE, Arruda LK, Cardoso MR, et al. (2009) Respiratory infection, exposure to mouse allergen and breastfeeding: Role in recurrent wheezing in early life. *International Archives of Allergy and Applied Immunology* 150: 172–178.
- Safa M, Khalilzadeh S, Talischi F, et al. (2012) Correlation of anxiety-depression and sleep quality in mothers of children with cystic fibrosis and asthma. *Tanaffos* 11: 44–48.
- Santos SV (July, 2011) Versão portuguesa do Parenting Stress Index (PSI)—Forma Reduzida: Estudo com uma amostra de mães de crianças com idade inferior a 5 anos [Portuguese version of the Parenting Stress Index—Short Form: Study in a sample of mothers of children aged under 5]. In: *VIII iberoamerican congress of psychological evaluation and XV international conference of psychological evaluation: Forms and contexts*, Lisbon.
- Shalowitz MU, Mijanovich T, Berry CA, et al. (2006) Context matters: A community-based study of maternal mental health, life stressors, social support, and children's asthma. *Pediatrics* 117: 940–948.
- Shapiro D (2014) Stepparents and parenting stress: The roles of gender, marital quality, and views about gender roles. *Family Process* 53: 97–108.
- Silva CM, Barros L and Simões F (2014) Health-related quality of life in pediatric asthma: Children's and parents' perspectives. *Psychology, Health & Medicine* 14: 1–15.
- Stevenson-Hinde J, Curley JP, Chicot R, et al. (2007) Anxiety within families: Interrelations, consistency, and change. *Family Process* 46: 543–556.
- Thompson RJ and Gustafson KE (1996) *Adaptation to Chronic Childhood Illness*. Washington, DC: American Psychological Association.
- Webster-Stratton C (1990) Stress: A potential disruptor of parent perceptions and family interactions. *Journal of Clinical Child Psychology* 19: 302–312.
- Williford AP, Calkins SD and Keane SP (2007) Predicting change in parenting stress across early childhood: Child and maternal factors. *Journal of Abnormal Child Psychology* 35: 251–263.
- Yılmaz O, Sogut A, Gulle S, et al. (2008) Sleep quality and depression–anxiety in mothers of children with two chronic respiratory diseases: Asthma and cystic fibrosis. *Journal of Cystic Fibrosis* 7: 495–500.
- Zajicek-Farber ML, Mayer LM and Daughtery LG (2012) Connections among parental mental health, stress, child routines, and early emotional behavioral regulation of preschool children in low-income families. *Journal of the Society for Social Work and Research* 3: 31–50.
- Zigmond AS and Snaith RP (1983) The hospital anxiety and depression scale. *Acta Psychiatrica Scandinavica* 67: 361–370.