

Family interaction and a supportive social network as salutogenic factors in childhood atopic illness

Gustafsson PA, Kjellman N-IM, Björkstén B. Family interaction and a supportive social network as salutogenic factors in childhood atopic illness.

Pediatr Allergy Immunol 2002; 13: 51–57. © 2002 Blackwell Munksgaard

The role of psycho-social factors in the development of allergy was studied prospectively in 82 infants with a family history of atopy. The family participated in a standardized family test when the children were 18 months old. The ability to adjust to demands of the situation ('adaptability'), and the balance between emotional closeness and distance ('cohesion'), were assessed from videotapes by independent raters. Families rated as functional in both of these aspects were classified as 'functional', otherwise as 'dysfunctional'. The social network, life events, atopic symptoms (based on postal inquiries regarding symptoms answered by the parents, and on physical examinations), psychiatric symptoms, and socio-economic circumstances of the families were evaluated when the children were 18 months and 3 years of age. The children were classified as atopic (asthmatic symptoms or eczema) or as non-atopic. All but two children with atopic disease at 3 years of age had atopic disease before 18 months of age, while 32 of 60 children with atopic disease at 18 months of age had no problems by 3 years of age. An unbalanced family interplay at 18 months was associated with a relative risk (RR) of 1.99 for continuing atopic illness at 3 years of age ($1.18 < RR < 3.37$, $p = 0.01$). There was a weak positive confounding effect for smoking (RR reduced by 7%), eczema on three or more localizations (RR reduced by 4.5%), and the amount of cat allergen in household dust (RR reduced by 3%). Recovery from atopic illness between 18 months and 3 years of age was four times as probable in families with functional interaction and a good social supportive network when children were 18 months of age, than in dysfunctional families with a poor social network (74% versus 20% $p < 0.01$). Children with asthmatic symptoms showed more signs of emotional distress than did healthy children ($p = 0.02$). Dysfunctional family interaction patterns were more commonly observed in families of children who at 3 years of age still had atopic symptoms, than in children who had recovered. The patterns included expression of emotion and reaction to the needs of others, alternating between total disinterest and over-involvement ($p = 0.02$), lack of support and rejection of offered support ($p = 0.01$), a greater number of individual decisions without regard to the other family members ($p = 0.04$), and indistinct 'generational boundaries' ($p = 0.04$). We conclude that psychosocial factors, such as family interaction and a supportive social network, play a significant role in the course of atopic illness in early childhood and that measures which enhance family interaction and the social network could influence the course of the disease favorably.

Per A. Gustafsson¹, N. -I. Max Kjellman² and Bengt Björkstén^{2,3}

¹Division of Child & Adolescent Psychiatry, University Hospital, Linköping, Sweden,

²Division of Paediatrics, Faculty of Health Sciences, Linköping, Sweden, ³Center for Allergy Research, Karolinska Institutet, Stockholm, Sweden

Key words: asthma; eczema; atopic disease; child preschool; family interaction; longitudinal study; predictive factors; psychosomatic; social network

P. A. Gustafsson, Division of Child & Adolescent Psychiatry, Department of Health & Environment, University Hospital, S-581 85 Linköping, Sweden
Tel.: +46 13 22 41 93
Fax: +46 13 22 42 34
E-mail: Per.Gustafsson@ihm.liu.se

Accepted 12 June 2001

Bronchial asthma is one of the most common debilitating diseases of childhood. The cumulative incidence in children up to 7 years of age in our area of Sweden is 11% (1). Similarly, prevalence rates of 10–15% have been reported for atopic dermatitis in Western Europe (2). Emotional factors seem to be important for both the development and the course of asthma, and the symptoms may be precipitated and exacerbated by stress in vulnerable individuals. Asthma and eczema both add to the difficulties of parenting, engaging parents and children into dysfunctional relationships. This adds to the stress and may also contribute to the deterioration of the disease, as part of a psychosomatic vicious circle (3–5).

The family and the informal social network constitute the most important environment for the child, from both a psychological and a social point of view. Dysfunctional family interaction patterns before the onset of illness do not seem to predict the development of wheezing in infants (6), although some studies suggest that early parental interaction and parenting difficulties may influence the course of asthma (7,8).

It is not known how psycho-social factors influence atopic symptoms. The psychoanalytic model considers the personality to be important for the development of psychosomatic illness. According to this model, individuals who have difficulty verbalizing their feelings often experience them as body tension, resulting in psychosomatic illness. Although empiric studies have revealed differences in personality between children with asthma or eczema, on one hand, and healthy children, on the other, there are no distinct differences as compared to children with other chronic disease. Thus, personality seems to be influenced by the disease, not vice versa (4).

According to the psychophysiological stress model, severe stressful life events (e.g. death of a close relative and illness in the family) influence the course of illness (9). Bronchospasm can be induced by discussion of anxiety-provoking topics (3,4). Finally, proponents of the interaction and systems approach stress the interplay among the individual and family members, other important persons, and the total life situation (4,10,11). Minuchin et al. (12), in their psychosomatic family model, proposed a relationship between family interaction patterns with too much closeness (enmeshment), too little flexibility (rigidity), diffuse roles and generational boundaries, and psychosomatic illness in the child. A relationship between family interaction and psychosomatic illness was verified in several studies (4,13,14). However, no uniform characteristics of these

families were found. In fact, family patterns with too little closeness (disengagement) and too much flexibility (chaotic interaction) were almost as common as the family types proposed by Minuchin.

The central dimensions in Minuchin's model, i.e. cohesion and adaptability, can be measured using the rating scales for family interaction developed by Olson et al. (15). This rating system has been used by us (6) and others (14) in research on psychosomatic illness. At the center of the model are the balanced, functional families. Their degree of cohesion is characterized by an equilibrium between intimacy and autonomy, which permits the family members to give and receive nurturance and support, but also to develop independently. Their degree of adaptability is characterized by a balance between stability and an ability to change. There is a combination of clear roles and rules of behavior, with a capacity to change during stress and according to different developmental needs. The disturbed (dysfunctional) family types are found at the periphery of the model. At one extreme, cohesion is enmeshed and characterized by over-involvement and over-protection, thereby giving little room for the development of independence and autonomy. At the other extreme is the disengaged family system, in which there is not enough involvement among the members. Each family member feels lonely and neglected, and the level of nurturance and support is low.

The extreme positions on the adaptability dimension are 'rigidity' and 'chaos'. The rigid family has fixed rules for behavior, roles, and modes of conflict resolution, which do not change even if a new situation calls for innovation in coping; the system thus has a low capacity for dealing with stress and ordinary change. The chaotic family, on the other hand, has not developed enough routines for everyday situations. The duties and privileges belonging to each family member are diffuse and transient. Such lack of structure is energy consuming and interferes with coping.

The personal social network is 'a specific set of linkages among a defined set of persons', and includes 'those people outside the household who engage in activities and exchanges of an affective and/or material nature with members of the immediate family' (16). Studies of social networks have two aspects, i.e. a structural and quantitative aspect, and a functional and qualitative aspect. The former describes relations in terms of 'how many', 'how often', and the latter what goes on in the interaction. The social network influences health and illness through two major pathways, i.e. direct effects and stress buffering. Social inte-

Table 1. Presence of allergic symptoms in the children during the first 18 months of life and between 18 months and 3 years of age

Status of child at 18 months– 3 years of age	Status of child up to 18 months of age				Psychiatric symptoms at 3 years of age Mean score (SD)
	Healthy	Eczema	Asthma	n	
Healthy	20	14	18	52	78 (72)
Eczema	1	11	7	19	100 (52)
Asthma	1	3	7	11	144 (94)
n	22	28	32	82	92 (74)

SD, standard deviation.

gration seems to reduce the risk for illness, regardless of stress level, while emotional support from the network reduces stress (17,18). The importance of social support for health and illness is well established in adults, but has been little studied in relation to children and not at all in relation to allergic disease (19).

In a prospective study we have tested the hypothesis that a dysfunctional family interaction may be associated with an increased likelihood for atopic illness in children with a family history of atopic disease. We have previously reported the findings in children up to 18 months of age (6). Here we present the findings during the first 3 years of life.

Materials and methods

Design and study population

Families with a history of atopic disease in both parents, or in one parent and a sibling, were invited to participate in the study. The details of the study design have been published previously (6). Briefly, out of 123 consecutive cases, 100 agreed to participate. At 3 years, 12 families had dropped out from the study and six video-recordings (see below) could not be rated for technical reasons, leaving 82 families for investigation. The index children were 40 boys and 42 girls.

A family history of allergy was verified by interviews with the mothers post-partum regarding atopic symptoms in themselves and in the fathers and siblings of the index child. Screening for immunoglobulin E (IgE) antibodies in serum was carried out using a mixture of common allergens (Phadiatop[™]; Pharmacia, Uppsala, Sweden) on blood samples obtained from the parents. Postal inquiries regarding symptoms in the index child, living and child-rearing conditions, smoking habits, and pets, were answered at the age of 3, 6, 9, 12, 18, 24 and 36 months, each questionnaire covering the period of time elapsed from the previous evaluation. A trained allergy nurse, assisted by one of us (B.B. or N.-I.M.K.), performed clinical examinations of the children when 6 and 18 months of age. On these occasions,

skin-prick tests (SPTs) with extracts of cow milk, egg, *Dermatophagoides pteronyssinus*, and (if present in the home) cat and dog, were performed. One or more positive SPTs were recorded in 27% of the children, and eight children (all with eczema) had two or more positive SPTs. Dust samples were collected from the beds and living rooms and analyzed for levels of the major cat allergen, Fel d 1, as described previously (20).

The children were classified into either 'atopic' (asthmatic symptoms or eczema) or 'non-atopic', based on clinical examinations, questionnaires, and case records (Table 1).

Asthma was defined as recurrent wheezing as reported in at least two of the questionnaires, and/or treatment with beta-stimulators and/or inhaled corticosteroids with the clinical diagnosis bronchial asthma. Eczema was recorded in 58% and positive SPTs in 19% of the children with asthma.

Eczema was defined as reports in at least two questionnaires of itching flexural dermatitis and/or an eczema diagnosed at least once at a physical examination and/or clinical diagnosis of atopic dermatitis. Positive SPTs were recorded in 36% of the children with eczema.

In the non-atopic group there were no reports of eczema or recurrent wheezing, either in the questionnaires or in the clinical records. The children were symptom-free at the clinical examinations. In this group, 18% had positive SPTs.

Psycho-social assessment

Family interaction evaluation. When the index child was 18 months old, the entire family participated in a standardized family test with structured tasks illuminating decision-making, cooperation, conflict-resolution and differences, following the model used by Minuchin et al. (12). All family members were present. Each task session comprised four chores:

- (1) Showing the index child how to use a pedagogical toy.
- (2) Solving a complicated puzzle.
- (3) Discussing how illness in the child would influence family life.

(4) Discussing certain aspects of family life that the different family members liked or disliked.

A test instructor presented each interaction task to the family and then left the family to solve the issue on their own, taking the time they felt necessary. In general, completion of four chores should have taken between 15 and 30 min. The task situations were video-recorded and the family interaction assessed according to the Swedish revision of the Clinical Rating Scale (CRS) for the 'Circumplex Model of Family Interaction' (15) from videotapes.

The raters were four experienced, trained family therapists working in pairs. They received 20 h of training before rating the videotapes. The raters were 'blinded', i.e. they did not know to which group the rated family belonged. Ratings were based on the whole videotaped task-session for each family. The time necessary for each rating was 1–2 h. Inter-rater reliability was 0.7 (Cohen's kappa). Families with rigid, chaotic, disengaged or enmeshed interaction were grouped together and called 'dysfunctional', while the mid-range (non-disturbed) families were called 'functional'.

Social networks interview. The social network of the mothers and fathers were investigated when the index child was 18 months of age, by using a semi-structured interview designed to map, describe, and analyze the personal network of parents with preschool children (16). The interview started with asking the parent for a list of individuals outside the immediate family 'who are important to you in one way or another' ('total network'). When the list of names was complete, the interviewer recorded information about each individual network member with regard to geographic proximity, frequency of contact, duration of relationship, type of contact (child-related support, practical support, emotional support, recreational activities). Also, the most important relationships, 'the people who mean the most to you', were identified ('primary network'). It could be argued that there is a qualitative difference between having very few members in one's network, compared to having an average number. Therefore a straightforward measure for a weak ('dysfunctional') compared to a 'good-enough' social support network was constructed. The social network was classified as dysfunctional if four or more of the eight variables were below one-third of the mean values for the group. This was the case for 25% of the sample.

Psychiatric symptoms interview. Psychiatric symptoms in the index child were investigated at 3 years of age through a semi-structured interview with the mother, which is widely used in Sweden. In a previous epidemiological study of 3-year-old Swedish children from the same area as our investigated children, the mean total symptom score was 130, with a standard deviation (SD) of 90 (21).

Socio-economic groups and life events. Socio-economic conditions were also evaluated. A straightforward, two-level measure of occupational status was used for assigning families to high or low socio-economic class. The father's occupation was used to determine a family's classification unless the mother's occupation had a higher classification. Blue-collar and non-skilled white-collar occupations were classified as 'low' social class, while medium-to-high white-collar occupations and private enterprise were classified as 'high'.

Stressful life events were evaluated in children at 18 months and 3 years of age by using a semi-structured interview based on a Swedish translation of the Coddington interview (9).

Statistical methods

The influence of different factors on the maintenance of atopic illness in children between 18 months and 3 years of age was calculated as relative risk (RR). Because of the moderate number of children, only bivariate stratified analysis of confounding factors was made. We first tested a group of covariates that themselves had a significant influence (RR between 1.56 and 2.88) on the maintenance of illness. They included parental smoking, factors describing the severity of illness during the child's first 18 months (SPT positive against two or more allergens, eczema in three or more localizations, both eczema and asthmatic symptoms) and the presence of >1.1 µg/g of cat allergen (Fel d 1) in household dust (upper quartile) at 1 year of age. Then, a second group of covariates without such influence were tested in order to explore whether the RR was homogenous over strata. They included the duration of breast-feeding, child's birth date in March–August versus September–February, number of wheezing episodes, gender, number of siblings, socio-economic status (low, high), stressful life events, the presence of pets at home, and problems with dampness in the home. The statistical software EpiInfo was used (22). In univariate analysis, Taylor Series 95% confidence limits for RR were calculated, and in stratified

analysis Mantel–Haenszel Weighted Relative Risks (MHRR). Inter-rater reliabilities of the family task ratings were analyzed using a Kappa coefficient for the designation of functional and dysfunctional. The chi-square test or, when more appropriate, the Fisher exact test, were used in the group comparisons. For the analysis of psychiatric symptoms the t-test (two-tailed), analysis of variance (anova), and the Tukey HSD test were used (23). The statistical software statistica (version 4.1; StatSoft, Inc., Tulsa, OK, USA) was used.

Ethical considerations

The study was approved by the Ethics Committee of the University of Linköping. Before entering the study, informed consent was obtained from the parents.

Results

At 3 years of age, children with asthmatic symptoms showed more signs of emotional distress than healthy children ($p = 0.02$, anova; $F=3.98$, Tukey HSD test; healthy versus asthma, $p = 0.02$; healthy versus eczema, $p = 0.24$; eczema versus asthma, $p = 0.50$; Table 1). Children in families with dysfunctional interaction and a dysfunctional social network had a significantly greater number of psychiatric symptoms compared to children in families where both interaction and network were functional (mean value 140 symptom score points, $SD=89$, as compared to 84, $SD=71$, $p = 0.04$, t -test). Similar differences were found in the asthma, eczema, and healthy groups, although the numbers in some cells were too small for statistical analysis.

Between birth and 18 months of age, 60 out of the 82 children had symptoms of atopic disease (asthmatic symptoms or eczema). The corresponding period prevalence between 18 months and 3 years was 30 out of 82, while 52 were non-atopic. Only two of the 22 children without symptoms of atopic disease before 18 months of age had such symptoms between 18 months and 3 years, as compared to 28 out of 60 (47%) in the

(a) Atopic

		Chaotic		Total
		4	0	5
Disengaged	9	13	1	23
	0	0	0	0
		Rigid		
Total	13	13	2	28

(b) Non-atopic

		Chaotic		Total
		2	2	4
Disengaged	1	25	0	26
	2	0	0	2
		Rigid		
Total	5	27	0	32

Fig. 1. Family interaction ratings at 18 months in children with (a; $n=28$) and without (b; $n=32$) atopic illness between 18 months and 3 years of age, in the 60 index children who had atopic symptoms at 18 months of age. The shadowed area represents functional interaction.

group with atopic symptoms during the previous period. Thus, the RR for atopic illness at 3 years of age was 5.13 ($1.33 < RR < 19.78$, $p = 0.001$) if the child had atopic symptoms between birth and 18 months.

Dysfunctional interaction patterns were recorded in 28 of 82 families (34%) at 18 months. Disengaged patterns were more commonly observed than enmeshed patterns, and chaotic patterns were more common than rigid patterns (Fig. 1a, 1b).

A functional family interaction at 18 months was associated with a significantly lower risk for continuing atopic illness at 3 years ($p = 0.02$, chi-square test; Table 2). Thus, 14 of the 19 children (74%) with atopic illness during the first 18 months of life, and who lived in a functional family with a functional social network, recovered from atopic illness, as compared to two of 10 (20%) of the children in dysfunctional families with a dysfunctional social network ($n=29$, $RR=0.27$, $0.08 < RR < 0.96$, $p = 0.008$).

Table 2. Family interactions at 18 months compared with atopic symptoms between 1.5 and 3 years of age, $p = 0.02$ (χ^2 analysis)

	Atopic symptoms between 1.5 and 3 years of age		n
	Yes	No	
Family interaction at 18 months			
Dysfunctional	15 (54%)	13 (46%)	28
Functional	15 (28%)	39 (72%)	54
n	30	52	82

In the 60 children with atopic illness at 18 months of age, a dysfunctional family interaction was associated with a RR of 1.99 for continuing disease at 3 years of age ($1.18 < \text{RR} < 3.37$, $p = 0.01$). When adjusted for parental smoking, the RR was 1.85 ($1.28 < \text{MHRR} < 2.67$). The RR was 1.90 ($1.35 < \text{MHRR} < 2.68$) after adjusting for eczema on three or more localizations, 1.99 ($1.30 < \text{MHRR} < 3.04$) after adjusting for the amount of cat allergen in household dust, and 1.92 ($1.30 < \text{MHRR} < 2.83$) after adjusting for the social network of the mother. If the mother's social network was dysfunctional, then the RR for continuing atopic illness in the child was 1.67 ($1.00 < \text{RR} < 2.76$, $p = 0.07$). Adding information of the father's social network to the analysis did not significantly influence the findings. A weak positive confounding effect was found for smoking (RR reduced by 7%), eczema on three or more localizations (RR reduced by 4.5%), and the amount of cat epithelia in household dust (RR reduced by 3%). The RR was homogenous for all the factors analyzed, except for the fact that dysfunctional family interaction showed a slightly higher RR for boys.

As shown in Fig. 1, dysfunctional patterns were more commonly observed in the families of children who at 3 years of age still had atopic symptoms ($n=28$), than in children who had recovered ($n=32$, $p = 0.01$, chi-square test). The patterns included expressions of emotions and reactions to the needs of others, alternating between total disinterest and over-involvement (16/28 versus 11/32, $p = 0.02$, chi-square test), lack of support, and rejection of offered support (16 out of 28 compared to eight out of 32, $p = 0.01$, chi-square test), a greater number of individual decisions with no regard to the other family members (16 out of 28 compared to 10 out of 32, $p = 0.04$, chi-square test), and indistinct 'generational boundaries' (12 out of 28 compared to six out of 32, $p = 0.04$, chi-square test).

Discussion

Ratings of family interaction before onset of illness in the infant were not predictive for disease during infancy (6). However, a functional family interaction and social network influenced the course of atopic disease and promoted recovery from illness. In the bio-psycho-social model of illness (10), the interaction between different life aspects of the sick person is stressed. Our findings indicate that dysfunctional interaction patterns do not cause disease, but rather influence the course of illness. Such dysfunctional patterns may create tension in the family, induce emotional

distress in the child, and may reduce the coping and problem-solving capacity, both in general terms and in relation to the management of the child's illness. The responsibility of parents and children for preventive measures and active medication are central aspects of modern treatment of atopic disease (24). Good problem-solving capacity and coping in the family therefore become crucial for successful treatment.

Chaotic interaction with too little closeness dominated among the dysfunctional families, while interaction patterns corresponding to Minuchin's (12) 'psychosomatic family model', with too much closeness (enmeshed) and too little flexibility (rigid), were uncommon. Illness has an impact on family life, but family interaction may also influence the predisposition to illness, its onset and course, and the compliance with treatment (10). Dysfunctional interaction patterns will reduce the problem-solving capacity and diminish the family's capacity to counter stress. On the other hand, illness also has a considerable impact on the patient and the family. The appearance of a disease could trigger a psychological crisis in the family, and certain families never reach a functional adaptation to the demands put on them by the illness. Most parents of children with atopic disease initially react with denial and rejection (25). Some parents never get beyond that stage, while others move to a complementary position of over-protection. With time, most parents achieve an adequate relationship with the child and their illness. The families in our study, who were identified early in the process of disease development, could be compared to the earliest phase in this model.

The families studied could be considered as representative for families with children at risk for developing allergic illness. The socio-economic conditions were somewhat higher in the investigated families than in the normal population and possibly the proportion of troubled families was higher among those who chose not to participate in the study.

The study was designed to address whether families of children who develop atopic disease show dysfunctional interaction patterns before the disease is manifest, or whether a disturbed family interaction is secondary to the disease. It would be equally interesting, however, to study the interaction in families who function well, and to identify factors enhancing health, rather than illness. Dysfunctional family interaction patterns and a weak social network seem to be risk factors for continuing atopic illness. Family therapy focused on problem-solving capacity and improved networks might therefore prevent the

development of serious disease. It is tempting to draw a parallel to the effects of family intervention in treatment programs for schizophrenia (26), where pedagogic and psychological methods are used to help relatives become a well-functioning support for their troubled child. Several studies have shown positive results in childhood asthma using similar approaches (27–30). We conclude that psychosocial factors, such as family interaction and a supportive social network, play a significant role in the course of atopic illness in early childhood and that support given to the family, together with measures enhancing the social network, could favorably influence the course of disease.

Acknowledgments

This study was supported by grants from The Swedish Foundation For Health Care Sciences and Allergy Research, The Heart and Lung Foundation, The Swedish Association against Asthma and Allergy, The National Institute of Public Health, The Swedish Medical Society/The Foundation of Söderström-Königskas Sjukhemmet, The Trygg-Hansa Insurance Company, The Foundation of Magnus Bergvall, The Foundation of Konsul Th Berg, The County Council of Östergötland, The Swedish Medical Research Council (MFR 08317), and The Foundation of the 1st of May Flower Annual Campaign. All interviews were conducted by child psychiatric nurse Ms Christina Lillman. Family interaction was rated by child psychiatric social workers Ms Gunilla Adler, BA, Ms Lena Banck, BA, Kari Markkula, BA, and Hans Norblad, BA. Statistical advice was provided by Anders Magnuson, BSc.

References

- ROEL E, OLSEN FARESJÖ Å, KJELLMAN N-IM, FARESJÖ T. Cumulative incidence of asthma diagnosis at the age of seven in a birth cohort. *Eur J General Prac* 1999; 5: 71–4.
- WÜTHRICH B. Clinical aspects, epidemiology, and prognosis of atopic dermatitis. *Ann Allergy Asthma Immunol* 1999; 83: 464–70.
- COTTERILL JA. Psychophysiological aspects of eczema. *Semin Dermatol* 1990; 9: 216–9.
- GUSTAFSSON PA, LASK B. Psychological factors. In: SILVERMAN M, ed. *Childhood Asthma and Other Wheezing Disorders*. London: Arnold, in press.
- HOWLETT S. Emotional dysfunction, child–family relationships and childhood atopic dermatitis. *Br J Dermatol* 1999; 140: 381–4.
- GUSTAFSSON PA, BJÖRKSTÉN B, KJELLMAN NIM. Family dysfunction in asthma: a prospective study of illness development. *J Pediatr* 1994; 125: 493–8.
- ASKILDSEN EC, WATTEN RG, FALÉIDE AO. Are parents of asthmatic children different from other parents? Some follow-up results from the Norwegian PRAD Project. *Psychother Psychosom* 1993; 60: 91–9.
- MRAZEK DA, KLINNERT M, MRAZEK PJ, et al. Prediction of early-onset asthma in genetically at-risk children. *Pediatr Pulmonol* 1999; 27: 85–94.
- CODDINGTON CD. The significance of life events as etiologic factors in the diseases of children. *J Psychosom Res* 1972; 16: 7–18.
- DYM B. The cybernetics of physical illness. *Fam Process* 1987; 26: 35–48.
- WAMBOLDT MZ, WAMBOLDT FS. Role of the family in the onset and outcome of childhood disorders: selected research findings. *J Am Acad Child Adolesc Psychiatry* 2000; 39: 1212–9.
- MINUCHIN S, ROSMAN B, BAKER L. *Psychosomatic Families*. Cambridge Massachusetts: Harvard University Press, 1978.
- BARON C, VEILLEUX P, LAMARRE A. The family of the asthmatic child. *Can J Psychiatry* 1992; 37: 12–6.
- WALLIN U, HANSSON K. Family function in anorexia nervosa. *Nord J Psychiatry* 1999; 53: 29–35.
- THOMAS V, OLSON DH. Problem families and the Circumplex model: observational assessment using the Clinical Rating Scale (CRS). *J Marital Family Ther* 1993; 19: 159–75.
- BISGAARD H, DALGAARD P, NYBOE J. Risk factors for wheezing during infancy. A study of 5,953 infants. *Acta Paediatr Scand* 1987; 76: 719–26.
- WRIGHT RJ, RODRIGUEZ M, COHEN S. Review of psychosocial stress and asthma: an integrated biopsychosocial approach. *Thorax* 1998; 53: 1066–74.
- PATTERSON JM, GARWICK AW, BENNETT FC, BLUM RW. Social support in families of children with chronic conditions: supportive and nonsupportive behaviors. *J Dev Behav Pediatr* 1997; 18: 383–91.
- MUNIR AK, EINARSSON R, KJELLMAN NIM, BJÖRKSTÉN B. Mite (Der p 1, Der f 1) and cat (Fel d 1) allergens in the homes of babies with a family history of allergy. *Allergy* 1993; 48: 158–63.
- CEDERBLAD M, HÖÖK B. The Östgöta study (in Swedish). Stockholm: Swedish Save the Children, 1991.
- DEAN JA, DEAN A, BURTON A, et al. EPI INFO. Atlanta, Georgia: Division of Surveillance and Epidemiological Studies, Epidemiology Program Office, Centers for Disease Control, 1988.
- HAYS WL. *Statistics*. New York: CBS College Publishing, 1988.
- MARTINEZ FD. Present and future treatment of asthma in infants and young children. *J Allergy Clin Immunol* 1999; 104: 169–74.
- PINKERTON P. Correlating physiologic with psychodynamic data in the study and management of childhood asthma. *J Psychosom Res* 1967; 11: 11–25.
- LEFF J, KUIPERS L, BERKOWITZ R, EBERLEIN-VRIES R, STURGEON D. A controlled trial of social intervention in the families of schizophrenic patients. *Br J Psychiatry* 1982; 141: 121–34.
- GODDING V, KRUTH M, JAMART J. Joint consultation for high-risk asthmatic children and their families, with pediatrician and child psychiatrist as co-therapists: model and evaluation. *Fam Process* 1997; 36: 265–80.
- GUSTAFSSON PA, KJELLMAN NIM, CEDERBLAD M. Family therapy in the treatment of severe childhood asthma. *J Psychosom Res* 1986; 30: 369–74.
- LASK B, MATTHEW D. Childhood asthma. A controlled trial of family psychotherapy. *Arch Dis Child* 1979; 54: 116–9.
- WEINSTEIN AG, CHENKIN C, FAUST D. Caring for the severely asthmatic child and family. I. The rationale for family systems integrated medical/psychological treatment. *J Asthma* 1997; 34: 345–52.