

Food Allergy and Anxiety and Depression among Ethnic Minority Children and Their Caregivers

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Objective To investigate the relationship between food allergy and symptoms of anxiety and depression among ethnic minority, low socioeconomic status (SES) children and their caregivers.

Study design Pediatric patients ages 4-12 years with and without food allergy and their caregivers were recruited from urban pediatric outpatient clinics. Statistical analyses were used to examine the prevalence of symptoms of anxiety and depression among patients and their caregivers with and without food allergy, adjusting for asthma.

Results Eighty patients ranging from ages 4 to 12 years, with a mean age of 8.1 years, and their caregivers participated in the study. Food allergy was associated with significantly higher *t* scores on the Multidimensional Anxiety Scale for Children (MASC) Total ($P = .007$), MASC Humiliation Rejection, ($P = .02$) and MASC Social Anxiety ($P = .02$) among pediatric patients, adjusting for asthma. Food allergy was not associated with child depression symptoms, nor was there a significant difference in anxiety or depression symptoms among caregivers of patients with and without food allergy.

Conclusions Food allergy appears to be associated with increased symptoms of social anxiety and higher levels of anxiety overall, but not depression, in ethnic minority children of lower socioeconomic status. This finding was not due to confounding by asthma. Food allergy was not associated with higher levels of depression or anxiety symptoms among caregivers of pediatric patients with food allergy. Future studies should investigate potential pathways between food allergy and anxiety that may be unique to children in underserved populations, and develop interventions to reduce anxiety in children with food allergy. (*J Pediatr* 2017;■■■:■■■-■■■).

The prevalence of food allergy appears to be rising among children in the US, with recent prevalence estimates of up to 8%.^{1,2} Avoidance of the specified food allergen, along with carrying an epinephrine auto-injector in case of exposure, is the primary recommended management strategy. In the event of exposure to the food allergen, antihistamines and/or epinephrine can be administered to treat allergic symptoms. Exposure to the food allergen can be life threatening in some cases.

There is some evidence from selected clinical samples to suggest that children with food allergy report increased anxiety,^{3,4} poorer quality of life,^{3,5,6} and increased frequency of teasing and bullying^{7,8} compared with their peers without food allergy. Yet, the generalizability of previous food allergy-mental health studies is limited, as these studies have typically sampled high socioeconomic status (SES), predominantly white non-Hispanic families.⁹ One study evaluated maternal anxiety in the context of a food challenge with a relatively diverse (45% minority) sample, yet beyond this, little is known about the experience of food allergy in ethnic minority, low SES youth.¹⁰ As recent data suggest lower levels of food allergy knowledge is associated with poorer food allergy-related quality of life, and lower levels of formal education are associated generally with lower levels of health knowledge. This may be a high-risk population for adverse impact of food allergy.⁹

A link between food allergy in children and reduced quality of life and increased anxiety in caregivers has also been documented. Child food allergy negatively impacts meal preparation and social activities, as reported by caregivers, and multiple food allergies are associated with even greater difficulty participating in family and social activities.^{11,12} Two studies have found that mothers of children with food allergy may experience higher anxiety and poorer quality of life, though fathers of children with food allergy do not report such elevations on average.^{4,13} Studies suggest that heightened anxiety in caregivers is specific to anxiety about food allergy and that global anxiety is not higher among caregivers of youth with food allergy compared with population rates.¹⁴ Young adults with food allergy, who have experienced anaphylaxis, reported that their caregivers

BAI	Beck Anxiety Inventory
BDI	Beck Depression Inventory
CDI	Children's Depression Inventory
MASC	Multidimensional Anxiety Scale for Children
SES	Socioeconomic status

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were more overprotective, compared with young adults with food allergy and no history of anaphylaxis.¹⁵ In qualitative work, caregivers of children with food allergy have expressed anxiety specifically related to the prevention of food allergy-related medical emergencies.¹⁶

Management of food allergy can be expensive both in terms of food shopping/meal preparation and the cost of epinephrine auto-injectors, which expire annually and each patient needs at least 2. These demands could result in higher levels of anxiety for those with fewer financial resources. Food often plays a cultural and social role and, thus, paying attention to and inquiring about ingredients at gatherings may further heighten anxiety symptoms in children and their caregivers.

Asthma is common among youth with food allergy,¹⁷ and anxiety and mood disorders are more prevalent among youth with asthma.¹⁸ Yet, prior studies on food allergy and mental health have not controlled for asthma. Because asthma is more prevalent¹⁶ among children with food allergy, and more common in low SES, minority children,^{19,20} this high-risk group is important to study. It is possible that the previously observed relationship between food allergy and anxiety is due to confounding by asthma. One goal of the current study was to examine whether the associations between food allergy and anxiety symptoms persist after controlling for asthma diagnosis in children.

To begin to address these gaps, first, the current study assessed symptoms of anxiety and depression among patients with and without food allergy in an urban pediatric setting serving an ethnic minority, low SES population. Second, the study compared levels of anxiety and depression symptoms in caregivers of pediatric patients with and without food allergy diagnoses. Asthma was adjusted for in estimating the relationships between food allergy and anxiety and depression symptoms. We hypothesized that pediatric patients with food allergy would endorse higher levels of anxiety and depression symptoms than pediatric patients without food allergy. We also predicted that caregivers of pediatric patients with food allergy would report higher levels of anxiety and depression symptoms than those without food allergy.

Methods

Caregivers and their children ranging from 4 to 12 years old with and without food allergy were recruited from outpatient medical clinics of an urban hospital in the Bronx, New York. Children with food allergy diagnoses were recruited through physician referral at a pediatric allergy outpatient clinic. Children without food allergy were recruited from either a general pediatric outpatient clinic or a pediatric outpatient asthma clinic. The patient population at the participating outpatient clinics primarily consists of lower SES and predominantly ethnic minority families.

Before initiating data collection, approval was obtained from the Albert Einstein College of Medicine and Queens College Institutional Review Boards. Both child and caregiver provided written assent/consent acknowledging that they were voluntarily participating in the study.

Children and their caregivers participated in the study on the day they presented for a clinic appointment. To meet criteria for inclusion in the food allergy group, the presence of a food allergy diagnosis was required, which was defined as medical chart documentation of a clinical reaction to food in the past 12 months and/or a positive skin test grade 3 or higher of food allergen specific serum IgE level indicating >90% probability of having a clinical reaction to food.²¹ For inclusion in the nonfood allergy group, caregivers confirmed the absence of food allergy history. Exclusion criteria for this study included neurologic disease, intellectual disability, and lack of proficiency in English.

Assessments were conducted at the clinic either before or after the participant's scheduled appointment. The self-report questionnaires took approximately 30-45 minutes to complete. Because of age restrictions on the child mental health outcome measures, children 7 years and older completed the Child Depression Inventory (CDI), and children 8 years and older completed the Multidimensional Anxiety Scale for Children (MASC). All caregivers completed the Beck Anxiety Inventory (BAI) and the Beck Depression Inventory (BDI). Research assistants read aloud the measures to both child and adult respondents. The child and caregiver interviews on psychological measures were conducted in separate areas to prevent the child and caregiver from listening to each other's responses. Caregivers of children ages 4-12 years completed self-report measures; only children age 7 years and older reported on themselves because of validated self-report measures for ages 4-6 years. Participants were remunerated in the amount of \$35 for their participation.

Demographics Questionnaire

The demographics questionnaire included questions on child and caregiver ethnicity and age, child sex, caregiver marital status, and family household income (multiple choice-format with intervals of annual caregiver income).

Child Anxiety Symptoms

The MASC is a 39-item self-report questionnaire that assesses anxiety in children ranging from 8-19 years of age.²² The MASC consists of 6 scales: (1) Somatic Autonomic (eg, "My heart races or skips beats"), (2) Humiliation Rejection (eg, "I worry about doing something stupid or embarrassing"), (3) Tense Restlessness (eg, "I feel tense or uptight"), (4) Perfectionism (eg, "I try to do things other people will like"), (5) Performance Fears (eg, "I get nervous if I have to perform in public"), and (6) Anxious Coping (eg, "I avoid things that upset me"). Respondents are asked to rate each item on a 4-point Likert scale: never true about me (0), rarely true about me (1), sometimes true about me (2), or often true about me (3). Certain scales are combined to calculate 5 indices: the Harm Avoidance Index, Social Anxiety Index, the Separation Panic Index, the Physical Symptoms Index, and the Anxiety Disorders Index. The MASC total is the sum of all items of the MASC, with higher scores demonstrating increased severity of anxiety symptoms. The MASC total, indices, and scales can be converted to *t* scores. The MASC scales evidenced good

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