

# Peanut Allergy in Children: Relationships to Health-Related Quality of Life, Anxiety, and Parental Stress

Clinical Pediatrics  
XX(X) 1–7  
© The Author(s) 2011  
Reprints and permission: <http://www.sagepub.com/journalsPermissions.nav>  
DOI: 10.1177/0009922811412584  
<http://clp.sagepub.com>  


Kimberlee M. Roy, PhD<sup>1</sup>, and Michael C. Roberts, PhD, ABPP<sup>2</sup>

## Abstract

Peanut allergy prevalence appears to be increasing in the pediatric population and pediatricians need to be aware how it may affect children's psychological functioning. This study examined relationships between health-related quality of life, child anxiety, and parental stress in children with peanut allergy. A total of 51 families completed questionnaires regarding child anxiety, parenting stress, and quality of life. Child anxiety and parenting stress were found to significantly predict parent proxy report of their child's health-related quality of life. Child anxiety, parenting stress, length of diagnosis, and experiencing an epinephrine shot predicted self-report of health-related quality of life. Although many children with peanut allergy function well, a certain subset of children and families appear to experience high levels of parenting stress and high levels of child anxiety that can affect health-related quality of life and these children may require referrals for mental health treatment.

## Keywords

peanut allergy, psychosocial impact, health-related quality of life, mental health

The prevalence of peanut allergy is thought to be increasing. A survey in 1989 estimated the prevalence at 0.6% in the United States,<sup>1</sup> whereas more recent surveys place the US rate for pediatric allergy to peanuts and other nuts between 1.6% and 2.7%.<sup>2</sup> Branum and Lukacs<sup>3</sup> found that serum immunoglobulin E (IgE) antibodies to peanut were found in an estimated 9% of children in the United States. Peanuts are a difficult food to avoid because they are commonly added to many prepackaged food items or processed in the same manufacturing plants as other foods. Yu et al<sup>4</sup> found an accidental annual ingestion rate for children with previously diagnosed peanut allergy to be 14.3%. Given the physiological impact, increasing numbers of medical researchers are investigating peanut allergies.<sup>5,6</sup> However, despite this enhanced research on the physical and epidemiological characteristics of peanut allergy, less research has been conducted on the possible effects of having a peanut allergy in terms of these children's quality of life and psychosocial functioning. See Roy et al,<sup>7</sup> for a review of the impact of allergies on children.

Several recent studies have looked at the impact of food allergies on different patient populations to begin to understand the overall impact of allergy on daily life.

Lyons and Forde<sup>8</sup> interviewed young adults with diagnosed food allergies about their knowledge of food allergies. They found that the young adults who had food allergies and who reported feeling competent in managing their health also reported higher levels of anxiety. This higher level of reported anxiety was explained as an artifact of the food-allergic patient's need to constantly "scan" their environments for potential hazards. The higher anxiety scores found for this sample, although statistically significant, were only slightly higher than established norms and not clinically significant levels of anxiety.

Bollinger et al<sup>9</sup> asked the caregivers of children with food allergies what kind of impact their child's allergy had on their family. Half of the sample reported that their child's allergy significantly affected their family's social activities, including their children playing at friend's

<sup>1</sup>University of Utah School of Medicine, Salt Lake City, UT, USA

<sup>2</sup>University of Kansas, Lawrence, KS, USA

## Corresponding Author:

Kimberlee M. Roy, Primary Children's Medical Center, University of Utah School of Medicine, 100 North Mario Capecchi Drive, Mailbox 52, Salt Lake City, UT 84113, USA  
Email: [kimberlee.roy@hsc.utah.edu](mailto:kimberlee.roy@hsc.utah.edu)

houses, attending birthday parties and sleepovers, going out to eat, and parental relationships. Overall, 10% of the caregivers reported home schooling their children because of their child's allergy. Mandell et al,<sup>10</sup> conducted a survey of parents of children with documented anaphylactic reactions. Parents reported that, when their child was initially diagnosed with peanut allergy, they felt that they had been given insufficient information regarding peanut allergy and they were left feeling anxious, fearful, and unclear about how to safely manage their child's allergy. The study also found that parents initially felt high levels of anxiety over their child's anxiety which subsided as they felt that they had management strategies in place, while a high level of vigilance remained. Resurgences of anxiety were reported to occur whenever their child had another allergic reaction, when new information regarding mislabeling or new risk factors became known, or when their child reached a new developmental level which came with new experiences and new levels of independence. The study also found that parents restricted their child's independent activities long after other children were independent (eg, accompanying their children to parties, making preparatory phone calls). Primeau et al<sup>11</sup> reported that parents of children with peanut allergy reported more levels of disruption to their children's daily lives and more specific disruption in family and social interactions because of peanut allergy than parents of children with rheumatologic disease. Williams et al,<sup>12</sup> discovered that parents of children with food allergy reported mild to moderate levels of distress related to guilt, worry, unresolved anger and sorrow, and long-term uncertainty regarding their child's illness. They also found that parents who endorsed less distress also reported higher levels of perceived emotional resources and had children who did not have additional behavior problems. Given the variety of problems experienced by families whose children have peanut allergy, it stands to reason that quality of life may be affected in these children.

Whereas the broad definition of quality of life encompasses a wide variety of areas, including home, work, school, and environmental factors, health-related quality of life (HRQOL) refers to domains of a person's health that are potentially within the scope of the health care system.<sup>13</sup> Researchers and clinicians use quality of life measures to investigate total impact of illness on an individual as well as how the individual feels about their illness.<sup>14</sup> HRQOL combines the variety of experiences in different domains into an overall outlook of functioning in the face of illness. King et al<sup>15</sup> investigated HRQOL in children with peanut allergy and their parents and found that mothers of children with peanut allergy reported lower quality of life for themselves and reported a stronger impact of peanut allergy on their children than did their fathers or the children themselves.

The current study sought to look simultaneously at both child and parent psychosocial functioning and how it relates to a child's overall quality of life. It was hypothesized that compared to general population norms families with a child with peanut allergy would report higher levels of child anxiety, higher levels of parenting stress, and lower HRQOL. Second, it was hypothesized that these variables will be interrelated, such that child anxiety, parental stress, and the severity of illness reported would contribute to the overall reported HRQOL. It was hypothesized that children with more severe peanut allergy would experience higher levels of reported anxiety, that their parents would report higher levels of parenting stress, and that these variables will be related to low HRQOL as reported by parents and children. Although the study by King et al<sup>15</sup> previously looked at many of these same variables, they made no attempt to calculate the contribution of anxiety, stress, and other variables to HRQOL. This study takes one step further and investigates these contributions.

## Methods

Participants were 51 families with at least one school aged (6-12 years) child who had been diagnosed with an allergy to peanuts by a licensed physician or allergist. A total of 51 primary caretakers (50 mothers and 1 father) completed measures for the study. There were 48 children with peanut allergy who completed their own measures. Three children did not complete measures because their parents deemed the measures to be too stressful for their children (2 children) or because the child began experiencing anxiety symptoms while completing the measures (1 child). Analysis of demographic variables found that the 3 children who did not participate differed from the other child participants on one variable, social functioning on the Pediatric Quality of Life Inventory 4.0 (PedsQL), with their parents rating their social functioning as lower than other children who participated,  $F(1, 49) = 6.41, P = .015$ .

This study was reviewed and approved by the institutional review board at the university where the study was conducted using the following procedures. A general message asking for interested volunteers was posted on a peanut allergy support Web site (<http://www.peanutallergy.com>) instructing the volunteers to contact the researcher by e-mail if they were interested in participating. For recruitment from allergists, a search on the American Academy of Allergy and Immunology Web site was completed for allergists with specialties in children and food allergy and the first 2 allergists listed alphabetically were chosen for each state. Information regarding the study with a flyer was included in a mailing to each allergist. Allergists were asked to either post a flyer in their offices or hand out information to family's with

a child with a diagnosis of peanut allergy. The families were instructed to contact the researcher by e-mail. After an initial explanation of the study via e-mail, a packet containing parent consent form, child assent form, and questionnaires was mailed to the participant's homes by the principal investigator. The primary caretakers were asked to fill out several questionnaires about their child and family, including a demographic information page, the PedsQL 4.0, the Parenting Stress Index (PSI), and a list of quality-of-life questions geared specifically toward peanut allergy. The child participants were asked to fill out the PedsQL, the Revised Children's Manifest Anxiety Scale (RCMAS), and peanut allergy-specific questions. At the time of initial recruitment, many allergy-specific scales were being piloted for individuals with peanut allergy, but most lacked strong psychometric data and the decision was made to use more general measures for all aspects of the study. Out of the 90 packets that were mailed, 51 were returned, yielding a response rate of 56.67%.

The 23-item PedsQL 4.0 Generic Core Scales encompass 4 domains: physical, emotional, social, and school functioning.<sup>16</sup> A 5-point Likert-type scale is used for most self and proxy reports, except for the 5- to 7-year-old self-report version, which was simplified to a 3-point scale, by the authors of the test. All items are reverse-scored and transformed to a 0 to 100 point scale so that higher scores indicate better HRQOL, as indicated by the author of the test. The current study found overall reliability estimates ( $\alpha$ ) of .89 for the self-report and .87 for the proxy report.

The PSI is a 120-item questionnaire for parents of children 1 to 12 years old.<sup>17</sup> Most items require a response on a 5-point scale ranging from *strongly agree*, *agree*, and *not sure*, to *disagree* and *strongly disagree*. Items 102 to 120 require yes/no responses to a list of life events that may have occurred in the past 12-month period. The items assess a variety of areas, including child characteristics that may increase parental stress and parent characteristics that may increase stress. For the current study, a reliability coefficient of  $\alpha = .78$  was found for the entire scale.

The RCMAS is a 37-item scale for children 6 to 19 years old.<sup>18</sup> The scale is a dichotomous yes/no scale that assesses 3 factors of anxiety: physiological, oversensitivity, and fear/concentration aspects. It also contains a lie scale to assess whether the child is answering in a manner that suggests a need to portray their behavior as ideal. For the current study, the reliability coefficient for the whole measure was found to be  $\alpha = .71$ .

A series of specific peanut allergy questions were asked of both parents and child participants (questions available on request from the first author). For parent's feeling of control and fear, the 3 items yielded a Cronbach's  $\alpha$  of .76.

## Results

A total of 50 mothers and 1 father acted as respondents for their children (26 female and 25 male). The sample was 94.1% Caucasian, with the remainder identifying as Asian American (1 child) or biracial (2 children). Many of the families reported higher than average incomes (37.3% = \$100 000/year or more, 21.6% = \$80 000-100 000/year, 15.7% = \$60 000-80 000/year). Parental education was also higher than the general population (35.3% = graduate degree, 43.1% = bachelor's degree, 9.8% = associate's degree, 7.8% = some college, 3.9% = high school). The children in the study ranged from 6 to 12 years old ( $M = 8.1$  years,  $SD = 1.8$ ). The average age at which they were diagnosed with peanut allergy was 1.8 years (range = 1-5 years,  $SD = 1.1$ ). The average length of diagnosis was 6.4 years (range = 2-11 years,  $SD = 2.3$ ). The children in the sample had experienced an average of 2.3 reactions to peanuts (range = 0-5,  $SD = 1.5$ ).

Three of the children in the study had been diagnosed with a peanut allergy by a blood test or skin prick test and had never had a reaction outside the doctor's office since that diagnosis. In all, 35% of the children had an allergic reaction requiring treatment with a shot of epinephrine, and the average number of lifetime epinephrine shots was less than 1, between 0 and 3 ( $SD = 0.90$ ). The majority of the children attended public schools (72.5%), with some children attending private schools (17.6%) and some being home schooled (9.8%). Of the 51 participants, 35 were recruited through the Internet discussion group, 12 from allergists, and 4 from informal referrals. The different referral groups did not differ significantly on any of the major study variables or demographic variables.

The RCMAS was used to assess child anxiety. Total scores and subscale scores were compared with the population average  $T$  score of 50. A Bonferroni correction was made for the number of  $t$  tests, which required a difference of  $P \leq .01$  for statistical significance. Based on 48 child responses, the overall sample had a mean  $T$  score of 41.15 (range = 24-63,  $SD = 9.2$ ). This score was significantly less than the average  $T$  score of 50,  $t(47) = -6.67$ ,  $P < .001$ ). The same was true for the majority of the subscales on the RCMAS, which have an average scaled score of 10 with an  $SD$  of 3. Physical symptoms averaged a scaled score of 7.4 (range = 2-14,  $SD = 2.8$ ) and was significantly lower than average,  $t(47) = -6.46$ ,  $P < .001$ . Worry symptoms averaged a scaled score of 7.6 (range = 3-15,  $SD = 2.8$ ), again significantly lower than the average,  $t(47) = -5.89$ ,  $P < .001$ . Social Anxiety symptoms averaged a scaled score of 7.1 (range = 4-11,  $SD = 2.2$ ), significantly lower than the average scaled score of 10,  $t(47) = -9.06$ ,  $P < .001$ . The exception was for the Lie scale, which yielded a mean scaled score of 10 for the sample (range = 5-17,  $SD = 3.2$ ), which was not

**Table 1.** Child Report on the Peds-QL Versus Healthy Control Norms

|                      | M (SD)                        |                                                     | Comparison Result <sup>a</sup> |
|----------------------|-------------------------------|-----------------------------------------------------|--------------------------------|
|                      | Current Peanut Allergy Sample | Healthy Controls (Varni et al., 2003) <sup>19</sup> |                                |
| PedsQL Total         | 82.38 (11.64)                 | 83.91 (12.47)                                       | $t(47) = -0.92, P < .36$       |
| Peds QL: Physical    | 88.06 (11.67)                 | 87.77 (13.12)                                       | $t(47) = 0.18, P < .29$        |
| PedsQL: Psychosocial | 79.08 (13.03)                 | 81.83 (13.97)                                       | $t(47) = -1.48, P < .15$       |
| PedsQL: Emotional    | 73.89 (16.04)                 | 79.21 (18.02)                                       | $t(47) = -2.33, P < .02$       |
| PedsQL: Social       | 82.29 (15.60)                 | 84.97 (16.71)                                       | $t(47) = -1.19, P < .24$       |
| PedsQL: School       | 81.33 (14.90)                 | 81.31 (81.31)                                       | $t(47) = 0.01, P < .99$        |

Abbreviation: M, mean score; SD, standard deviation; PedsQL: Pediatric Quality of Life Inventory.

<sup>a</sup>No statistically significant comparisons at  $P \leq .008$ .

**Table 2.** Parent Proxy Report on the Peds-QL Versus Healthy Control Norms

|                      | M (SD)                        |                                                     | Comparison Result           |
|----------------------|-------------------------------|-----------------------------------------------------|-----------------------------|
|                      | Current Peanut Allergy Sample | Healthy Controls (Varni et al., 2003) <sup>19</sup> |                             |
| PedsQL Total         | 83.12 (10.47)                 | 82.91 (15.55)                                       | $t(50) = 0.57, P < .57$     |
| Peds QL: Physical    | 89.95 (11.63)                 | 84.08 (19.70)                                       | $t(50) = 3.6, P < .001^a$   |
| PedsQL: Psychosocial | 79.48 (12.04)                 | 81.24 (15.34)                                       | $t(50) = -1.05, P < .30$    |
| PedsQL: Emotional    | 70.49 (15.66)                 | 81.20 (16.40)                                       | $t(50) = -4.88, P < .001^a$ |
| PedsQL: Social       | 84.41 (14.41)                 | 83.05 (19.66)                                       | $t(50) = 0.68, P < .50$     |
| PedsQL: School       | 83.53 (14.05)                 | 78.27 (19.64)                                       | $t(50) = 2.67, P < .01$     |

Abbreviation: M, mean score; SD, standard deviation; PedsQL: Pediatric Quality of Life Inventory.

<sup>a</sup>Statistically significant comparisons ( $P \leq .008$ ).

significantly different than the average scaled score of 10,  $t(47) = 0.00, P = 1.0$ .

The PSI was used to assess overall parental stress, child-related stress, parental stress, and stressful life events. Scores were compared with the average percentile score of 50th percentile with a Bonferroni correction for the number of comparisons, requiring a difference of  $P \leq .0125$  for significance. For the PSI, the percentile for total parental stress averaged 45.8% (range = 1-99, SD = 29.2), the average for child-related stress was 46.7% (range = 3-99, SD = 33.4), the average for parent-related stress was 45.7% (range = 1-97, SD = 27), and the average for life event stress was 31.9% (range = 0-98, SD = 31.4). Compared with an average at the 50th percentile, total stress,  $t(50) = -1.0, P = .31$ ; parent-related stress,  $t(50) = -1.1, P = .26$ ; and child stress,  $t(50) = -.71, P = .48$ , were not significantly different from average stress levels. Average life stress percentiles were significantly lower than average,  $t(50) = -4.11, P < .001$ .

For the PedsQL 4.0, the average scores of healthy controls reported by Varni et al,<sup>19</sup> were used to compare

with the current sample (see Table 1). For the child report of HRQOL comparisons, a Bonferroni correction of  $P \leq .008$  was required for significance. Given this criterion for significance, none of the comparisons were statistically significant. The current sample had lower scores than healthy norms on emotional functioning, which trended toward significance but was not significant given stricter statistical criteria.

For the parent reports of child HRQOL comparisons, a Bonferroni correction of  $P \leq .008$  was required for significance. For the parent report, there were 2 comparisons that were statistically significantly different (see Table 2). The current sample of parents of children with peanut allergy reported higher scores for their children for physical functioning and lower scores for emotional functioning compared with published norms for healthy controls.<sup>18</sup>

Child age, gender, and ethnicity were not significantly correlated with any other study variables. Family income was positively correlated with parents feeling in control of their child's allergy ( $r = .34, P = .02$ ) and parents less

**Table 3.** Summary of Regression Analysis Testing Parent Report of Health-Related Quality of Life

| Variable                            | B      | P    | F     | R <sup>2</sup> | ΔR <sup>2</sup> |
|-------------------------------------|--------|------|-------|----------------|-----------------|
| Step 1                              |        |      | 0.007 | .000           |                 |
| Length of diagnosis                 | 0.040  | .94  |       |                |                 |
| Step 2                              |        |      | 0.968 | .042           | .042            |
| Number of allergic reactions        | −0.435 | .63  |       |                |                 |
| Step 3                              |        |      | 1.626 | .102           | .060            |
| Epinephrine shot ever               | 2.246  | .06  |       |                |                 |
| Step 4                              |        |      | 0.914 | .121           | .019            |
| Control over allergy                | 1.303  | .07  |       |                |                 |
| How often afraid                    | −0.536 | .49  |       |                |                 |
| How afraid                          | −0.099 | .89  |       |                |                 |
| Step 5                              |        |      | 3.071 | .355           | .234            |
| Parenting stress total <sup>a</sup> | −0.105 | .03  |       |                |                 |
| Step 6                              |        |      | 5.499 | .537           | .182            |
| Child anxiety total <sup>b</sup>    | −0.582 | .001 |       |                |                 |

<sup>a</sup>P < .05.<sup>b</sup>P < .001.

often feeling afraid that their child would have an allergic reaction ( $r = .30$ ,  $P = .04$ ). The type of school a child attended (public, private, home school) was correlated with a child's self-report of their physical functioning ( $r = -.32$ ,  $P < .03$ ) and parent report of their child's overall quality of life ( $r = -.279$ ,  $P < .05$ ). For both variables, the children who were home-schooled had lower average quality-of-life scores. The direction of this relationship is unclear, whether children who report more physical symptoms are more likely to be home-schooled or whether home-schooled children report more physical symptoms. The number of allergic reactions as reported by parents was positively correlated with how often their parent was afraid of their child having a reaction ( $r = -.35$ ,  $P = .01$ ; reverse-scored 1 = *always afraid*) and how afraid their parents were that they would have a reaction ( $r = -.38$ ,  $P = .007$ ; 1 = *very afraid*).

Despite the below average to average scores obtained by the group as a whole on a variety of the measures used, the ranges of the scores indicated variability in the sample with both high and low scores. A hierarchical multiple regression analysis was conducted with parental proxy report of child health-related quality of life as the outcome variable. Variables were entered in the following order: (1) length of diagnosis; (2) number of allergic reactions to peanuts; (3) whether or not the child had ever had a shot of epinephrine; (4) the 3 variables of how in control the parent felt about their child's allergy, how often and how afraid they were that their child would have a reaction; (5) parenting stress total score; and (6) child anxiety total score. The overall model explained 53.7% of the variance in HRQOL scores. The regression model

was significant,  $R^2 = .54$ , adjusted  $R^2 = .44$ ,  $F(8, 38) = 5.49$ ,  $P < .001$ . This model has a large effect size and a power estimate of 0.95 using GPower to calculate results. The significant predictors in the model included parenting stress and child anxiety, with very little contribution by the other predictors (see Table 3).

A second hierarchical multiple regression analysis was conducted using child-reported HRQOL as the outcome measure. Variables were entered in the following order: (1) length of diagnosis, (2) whether or not the child had an allergic reaction requiring a shot of epinephrine, (3) parenting stress, and (4) child anxiety. The regression model was significant,  $R^2 = .59$ , adjusted  $R^2 = .56$ ,  $F(4, 43) = 16.03$ ,  $P < .001$ . This model also yields a large effect size and has a power estimate of 0.98, using GPower. In the model, all the variables contributed significantly ( $B$  length of diagnosis = 0.225,  $B$  epinephrine required = 0.214,  $B$  parenting stress = −0.233,  $B$  child anxiety = −0.569; see Table 4). Children's HRQOL was negatively affected by their own anxiety and their parent's stress and positively affected by how long they had been living with their diagnosis and if they had not had a reaction requiring a shot of epinephrine.

## Discussion

Overall, the sample was highly variable in their reported experiences, with some families reporting multiple reactions to peanuts and multiple reactions requiring shots of epinephrine and subsequent hospitalizations and some families having only experienced a diagnosis of peanut allergy by blood or skin test and no reactions. As a result,

**Table 4.** Summary of Regression Analysis Testing Child Report of Health-Related Quality of Life

| Variable                            | B     | P    | F      | R <sup>2</sup> | ΔR <sup>2</sup> |
|-------------------------------------|-------|------|--------|----------------|-----------------|
| Step 1                              |       |      | 2.104  | .044           |                 |
| Length of diagnosis <sup>a</sup>    | 0.225 | .03  |        |                |                 |
| Step 2                              |       |      | 2.837  | .112           | .068            |
| Epinephrine shot ever <sup>a</sup>  | 0.214 | .04  |        |                |                 |
| Step 3                              |       |      | 7.555  | .340           | .228            |
| Parenting stress total <sup>a</sup> | 0.233 | .04  |        |                |                 |
| Step 4                              |       |      | 16.032 | .599           | .259            |
| Child anxiety total <sup>b</sup>    | 0.569 | .001 |        |                |                 |

<sup>a</sup>P < .05.<sup>b</sup>P < .001.

parental stress levels and child anxiety levels also varied. Although many of the *t* tests did not show significant differences for the peanut allergy group compared to population norms, this is most likely because of the high variability of scores on each measure. For each subscale, scores ranged from very low to very high, which when averaged together yielded means that were consistent with average population means. Although most measures did not show the sample as a whole to differ from a healthy population, this is most likely because of the variability in severity and experience of peanut allergy.

The relationships as described by the results of the regressions suggest that for children with peanut allergy, parental perceptions of their HRQOL are related to how much anxiety the child reports and how stressful parents perceive their lives to be. This study also found that children's perceptions of their own HRQOL are also related to how much anxiety (even subclinical levels) they feel and how stressful their parents perceive their lives to be. These parents likely feel more stress in their parenting role because of the level of vigilance required to keep their children safe. They must read all food labels, ensure that their child always has an epinephrine shot available, and arrange for an adult to be with the child who knows how to use the shot at all times. Also, more concretely, children's quality of life is also affected by how long they have had their diagnosis and if they have had to have an epinephrine shot to treat their allergic reactions. Self-injecting or having someone else inject epinephrine into one's body could be considered a medically traumatic event, as described by Kazak et al,<sup>20</sup> especially if the adults around the child are also experiencing high levels of stress and worry around the event.

Similar to many medical disorders that affect children (asthma, juvenile rheumatoid arthritis, cystic fibrosis, etc) peanut allergy can affect a child not only medically but also psychosocially. This disorder has the potential to disrupt psychological functioning, increase parenting

stress, and affect a child's entire family. As such, the impact of this ailment should not be underestimated by physicians or mental health professionals. Practitioners need to recognize the potential psychological effects of this kind of allergy on their young patients and families and be prepared to make referrals to qualified mental health professionals who have experience with children, families, and medical illness, such as pediatric psychologists.

### Limitations of the Present Study

The sample in this study was primarily Caucasian, highly educated, and had substantial incomes. These sample characteristics may be due in part to recruitment techniques which used internet-based support groups and recruitment through specialty clinics. A more ethnically, educationally, and income diverse sample of participants may be found in hospital emergency rooms and general pediatric clinics. Because of the relatively low prevalence of peanut allergy overall, multisite specific recruitment with a large number of hospitals and clinics likely will be required in the future. The study also relied on parental report of allergy, with no verification of the allergy required by a professional although the referrals from allergists were likely comprising our primary target group.

### Implications for Practice

For the average pediatric clinician, the take-home message is clear, peanut allergy is not only a life-threatening allergy for children, but it can also be a major life stressor for children and their parents. At this point in time, treatment still consists of strict avoidance of all peanut products, and education and information are the best way for pediatricians to treat their patients with peanut allergy, but pediatricians also need to be aware of the psychosocial and psychological impact of peanut allergy and be prepared to make referrals for mental health treatment even if the child's allergy has been well managed.<sup>7</sup> Good control can be a sign of hypervigilance or a level of anxiety that interferes with daily life. Pediatricians need to feel comfortable referring these families for therapy or at least screening. This requires a good working relationship with the mental health providers in the local area of practice and hopefully access to a pediatric or medical psychologist who specifically works with children with medical illnesses.

### Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article:

Kimberlee M. Roy has received grant funding from the Food Allergy Initiative (NFP44570) to support this project. Michael C. Roberts has no relationships to declare.

## References

1. Sampson HA, Mendelson L, Rosen JP. Fatal and near-fatal anaphylactic reactions to food in children and adolescents. *N Engl J Med*. 1992;327:380-384.
2. Sicherer SH, Muñoz-Furlong A, Godbold JH, Sampson HA. US prevalence of self-reported peanut, tree nut, and sesame allergy: 11 year follow-up. *J Allergy Clin Immunol*. 2010;125:1323-1326.
3. Branum AM, Lukacs SL. Food allergy among children in the United States. *Pediatrics*. 2009;124:1549-1555.
4. Yu JW, Kagan R, Verreault N, et al. Accidental ingestions in children with peanut allergy. *J Allergy Clin Immunol*. 2006;118:466-472.
5. Sampson HA. Peanut allergy. *N Engl J Med*. 2002;346:1294-1299.
6. Sicherer SH, Leung DYM. Advances in allergic skin disease, anaphylaxis, and hypersensitivity reactions to foods, drugs, and insects. *J Allergy Clin Immunol*. 2006;118:170-177.
7. Roy KM, Wu YP, Roberts MC. Allergic reactions in children: implications for pediatric psychology. In: Roberts MC, Steele RG, eds. *Handbook of Pediatric Psychology*. 4th ed. New York, NY: Guilford Press; 2009:755-762.
8. Lyons AC, Forde EME. Food allergy in young adults: perceptions and physiological effects. *J Health Psychol*. 2004;9:497-504.
9. Bollinger ME, Dahlquist LM, Mudd K, Sonntag C, Dillinger L, McKenna K. The impact of food allergy on the daily activities of children and their families. *Ann Allergy Asthma Immunol*. 2006;96:415-421.
10. Mandell D, Curtis R, Gold M, Hardie S. Anaphylaxis: how do you live with it? *Health Soc Work*. 2005;3:325-335.
11. Primeau MN, Kagan R, Joseph L, et al. The psychological burden of peanut allergy as perceived by adults with peanut allergy and the parents of peanut-allergic children. *Clin Exp Allergy*. 2000;30:1135-1143.
12. Williams NA, Parra GR, Elkin TD. Subjective distress and emotional resources in parents of children with food allergy. *Child Health Care*. 2009;38:213-227.
13. Seid M, Varni JW, Jacobs JR. Pediatric health-related quality-of-life measurement technology: Intersections between science, managed care, and clinical care. *J Clin Psychol Med Settings*. 2000;7:17-27.
14. Starfield B, Riley A. Profiling health and illness in children and adolescents. In: Drotar D, ed. *Measuring Health-Related Quality of Life in Children and Adolescents: Implications for Research and Practice*. Mahwah, NJ: Lawrence Erlbaum; 1998:85-104.
15. King RM, Knibb RC, Hourihane JO. Impact of peanut allergy on quality of life, stress, and anxiety in the family. *Allergy*. 2009;64:461-468.
16. Varni JW, Burwinkle TM, Katz ER, Meeske K, Dickinson P. The PedsQL in pediatric cancer: reliability and validity of the Pediatric Quality of Life Inventory generic core scales, multidimensional fatigue scale, and cancer module. *Cancer*. 2002;94:2090-2105.
17. Abidin RR. *Parenting Stress Index*. 3rd ed. Odessa, FL: Psychological Resources; 1995.
18. Reynolds CR, Richmond BO. *Revised Children's Manifest Anxiety Scale Manual*. Los Angeles, CA: Western Psychological Services; 1985.
19. Varni JW, Burwinkle TM, Seid M, Skarr D. The PedsQL 4.0 as a pediatric population health measure: feasibility, reliability, and validity. *Ambul Pediatr*. 2003;3:329-341.
20. Kazak AE, Schneider S, Kassam-Adams N. Pediatric medical traumatic stress. In: Roberts MC, Steele RG, eds. *Handbook of Pediatric Psychology*. 4th ed. New York, NY: Guilford Press; 2009:205-215.