

Development of IMPAACT (Impairment Measure for Parental Food Allergy-Associated Anxiety and Coping Tool), a validated tool to screen for food allergy-associated parental anxiety



Sharon To, PhD^{*}; Clara Westwell-Roper, MD, PhD^{†,‡}; Lianne Soller, PhD[§];
S. Evelyn Stewart, MD^{†,‡,2}; Edmond S. Chan, MD^{‡,§,2}

^{*} Department of Psychology, BC Children's Hospital, Vancouver, British Columbia, Canada

[†] Department of Psychiatry, Faculty of Medicine, The University of British Columbia, Vancouver, British Columbia, Canada

[‡] BC Children's Hospital Research Institute, Vancouver, British Columbia, Canada

[§] Division of Allergy and Immunology, Department of Pediatrics, Faculty of Medicine, The University of British Columbia, Vancouver, British Columbia, Canada

ARTICLE INFO

Article history:

Received for publication November 5, 2021.

Received in revised form February 15, 2022.

Accepted for publication February 17, 2022.

ABSTRACT

Background: Parents commonly experience anxiety owing to their children's food allergies (FAs). Although FA-specific anxiety screening tools for adult and pediatric patients exist, a tool for parents with children with food allergy is lacking.

Objective: To develop and validate a tool that measures parental anxiety related to their child's FA.

Methods: To construct the instrument, items were developed based on consultations with stakeholders and review of existing literature. The instrument was then pilot tested, and items were modified based on relevance, importance, item-total correlations, and fit with the instrument's overall factor structure. The modified instrument was validated through assessing internal validity (reliability), convergent and discriminant validity, concurrent validity, and practical usefulness at 2 time points (precoronavirus disease 2019 and current).

Results: The scale showed excellent reliability (Cronbach's $\alpha = 0.95$). It had a 4-factor structure that was replicated at the 2 time points. The 4 subscales were moderately correlated (between $r = 0.438$ and 0.744). The scale showed excellent convergent and discriminatory validity, correlating moderately with State Trait Anxiety Inventory and Generalized Anxiety Disorder, and highly with Food Allergy Quality of Life—Parental Burden. It also showed excellent concurrent validity, differentiating among many external variables. Most importantly, it successfully differentiated parents in need of psychological support for problems related to their child's FA.

Conclusion: The Impairment Measure for Parental Food Allergy-associated Anxiety and Coping Tool fills a gap in the existing literature as a validated screening tool for parental anxiety associated with a child's FA, employing a multi-factor structure addressing multiple dimensions of anxiety and its functional impacts. It has excellent internal and external validity and is well-suited for use in both research and clinical settings to quickly determine which parents of children with FA are in need of further psychological support.

© 2022 American College of Allergy, Asthma & Immunology. Published by Elsevier Inc. All rights reserved.

Introduction

Parenting a child with food allergy (FA) can be stressful and anxiety provoking owing to the uncertainty of potential allergen

Reprints: Lianne Soller, PhD, Division of Allergy and Immunology, Department of Pediatrics, Faculty of Medicine, The University of British Columbia, 4480 Oak St, Room 1C31B, Vancouver, BC, V6H 3V4, Canada. E-mail: lsoller@bcchr.ca.

Disclosures: Dr Chan has received research support from DBV Technologies; has been a member of advisory boards for Pfizer, Pediapharm, Leo Pharma, Kaleo, DBV, AllerGenis, Sanofi Genzyme, Bausch Health, and Avir Pharma; is a member of the health care advisory board for Food Allergy Canada; was an expert panel and coordinating committee member of the National Institute of Allergy and Infectious Diseases-sponsored Guidelines for Peanut Allergy Prevention; and is colead of the CSACI oral immunotherapy guidelines. The other authors have no conflicts of interest to declare.

Funding: This study has received funding from the BC Children's Hospital Foundation.

² Dr Stewart and Dr Chan should be considered joint senior authors.

exposure and its consequences.^{1–3} Increased distress and heightened anxiety can be expected and adaptive when they motivate families to take appropriate action and utilize resources to address medical needs of the child.⁴ Parent vigilance in daily life remains essential for avoidance of allergens and use of epinephrine for accidental exposures. However, extended elevated levels of parental FA anxiety can lead to constant fear, excessive avoidance behaviors, and important impairment to daily (family) functioning.⁵

Although several studies have noted impaired quality of life for parents of children with FA,^{6–8} research examining FA-associated parental anxiety is sparse. Existing findings indicate that anxiety related to a child's FA has considerable adverse effects on parental personal relationships.⁹ Mothers who experience severe health anxiety tend to perceive their children to be sicker and take them to the

doctor more frequently.¹⁰ Notably, a parent's anxiety can also affect the child.¹¹

There is a need for interventions that help parents deal with anxiety caused by their child's FA. Although still in early developmental phases, certain psychosocial interventions have shown effectiveness, especially in helping parents who are highly anxious. Herbert et al¹² recommended referring parents or children to a mental health professional when they are suffering from mental health issues related to FA. However, identifying families in need of further support in the context of limited consultation time and skills in identifying mental health needs is problematic. Feng and Kim¹³ have created screening questions to be asked during an allergy consultation, but the scope of these questions is limited. Unfortunately, previous research shows that even after going through educational programs, allergists are not able to identify families who are suffering from high levels of anxiety and describe this task as very time consuming.¹⁴ This situation points to the importance and urgency of creating a tool for assessing parental anxiety related to their child's FA and the extent of impairment.

Screening tools for FA anxiety have recently been created for adult patients (Food Allergy Anxiety Scale [FAAS]),¹⁵ pediatric patients (child and parent proxy) (Scale of Food Allergy Anxiety [SOFAA]),¹⁶ and parents of children with FA (Worry about Food Allergy [WAFa]).¹⁷ While the WAFa was published after the initial development and validation of IMPAACT, there remains a need for a parental screening tool that also addresses functional impact, coping, and other aspects (behaviors, distress), both from a theoretical and a practical standpoint. Such a tool would improve allergists' ability to identify families who have been impaired by FA. Furthermore, specific difficulties identified with such a screening tool can be used to tailor future interventions for families.

The primary objective of the IMPAACT (Impairment Measure for Parental Food Allergy-associated Anxiety and Coping Tool) study was to develop and validate a screening tool that measures parental anxiety related to having a child (or multiple children) with FA. A cognitive-behavioral framework was used to structure the tool, including examination of parents' FA-associated anxiety-related cognitions (ie, worries related to caring for a child with FA), anxiety-related physical symptoms and behaviors (eg, avoidance behaviors owing to having a child with FA), and assessment of parental coping and impairment.

Methods

In developing a novel screening tool to measure parental anxiety related to their children's FA, multiple steps were taken (eTable 1). The instrument was constructed with iterative feedback from stakeholders, including allergists, FA researchers, and families impacted by FA. Inclusion criteria for caregivers for each phase of this study were as follows: a caregiver of a child with confirmed diagnosis of food allergy by a pediatric allergist (convincing recent history of reaction with confirmatory skin testing, specific immunoglobulin E blood testing, or positive oral food challenge) and ability to understand the survey in English. Participants were eligible to participate in both phases 1.1 and 1.2.

This study was approved by the University of British Columbia Research Ethics Board.

Phase 1.1—Item Generation and Initial Reduction

Preliminary questionnaire items were generated through a combination of inductive and deductive approaches. The inductive approach involved reviewing contents of a previous qualitative study in which parents shared their experiences related to having children with FA in a focus group.¹⁸ The deductive approach involved conducting a systematic review on the topic.¹⁹ By combining these 2 approaches (systematic review, review of focus group transcripts, gathering experience, and feedback of authors), the initial list of 56

items was generated. The main goal of this list was to have broad coverage of relevant areas of FA-associated parental anxiety. A cognitive-behavioral framework was used to structure the tool, including examination of parents' FA-associated cognitions (worries related to caring for a child with FA), anxiety-related physical symptoms, and behaviors (eg, behavioral avoidance owing to having a child with FA).

Participants were asked to evaluate each item using a 5-point Likert-type scale (0: not at all to 4: very much) for clarity and relevance in FA-associated parental anxiety. All items with mean clarity or importance scores less than 3 were reviewed, revised, or deleted.

Phase 1.2—Further Item Selection and Revision

To narrow down the number of screening items, stakeholders (ie, parents of children with FA) were asked to identify the most important questions for assessing FA-associated anxiety. There were 35 parents recruited from a local volunteer parent-group whose focus is to provide support for those at risk of anaphylaxis. Parents were asked to rate each item for how much they were troubled by the item (on a sliding scale of 0 to 100). All participants were also asked to choose items they consider most relevant for assessing FA-associated parental anxiety in each domain (ie, anxiety-related cognition, physical symptoms, interference, behaviors, and coping).

Phase 2.1—Initial Validation of IMPAACT

Participants were initially recruited from our hospital's Allergy clinic. During the coronavirus disease 2019 (COVID-19) pandemic, participants were recruited through the local parent support group through e-bulletin.

The validation phase was carried out during the first and second waves of the COVID-19 pandemic (March–August 2020). Questions in the IMPAACT and Generalized Anxiety Disorder—7 (GAD-7) were revised to ask participants to recall their “current” experience during the pandemic and in a “typical week prior to COVID-19.”

The factor structure of IMPAACT was examined using exploratory factor analysis. The extraction method used was the maximum likelihood estimate (MLE) with oblique (Promax) rotation, to allow for natural correlation of factors. MLE is one of the most popular forms of common factor analysis which extracts the common variance to determine the best factor structure of the variables, and factor rotation methods such as Promax allows us to obtain a more interpretable factor solution.²⁰

Based on the results of factor analysis of phase 2.1, we determine whether items need to be modified or retained.

Phase 2.2—Factor Analysis of Final IMPAACT

If there are any modifications of the scale were needed after phase 2.1 was completed, further factor analyses with MLE would be conducted in phase 2.2 to examine the structure of the new scale.

Measures

Participants were asked to respond to IMPAACT questions on a 7-point Likert-type scale, assessing how much they were troubled by each of the items in the past week: from “not at all” to “extremely.” The word “troubled” is also used in the FAQL-PB (Food Allergy Quality of Life—Parental Burden questionnaire)²¹ described below, and the authors thought it was an appropriate alternative to “anxious” which can have a negative connotation. After completing the IMPAACT tool, they were also asked to complete the FAQL-PB to assess the level of parental burden,²¹ Visual Analogue Scale (VAS) as a global measure of FA-associated parental anxiety, State Trait Anxiety Inventory (STAI) to measure state and trait anxiety,²² GAD-7 for generalized anxiety,²³

and other outcome measures about the impact of their child's FA (eg, the need for psychological support, their anxiety related to managing their child's FA, child's current FA anxiety, impact on parental functioning owing to FA and their worries about FA, respectively, and the impact of COVID-19 on their anxiety levels in general and their anxiety related to managing their child's FA). FAQL-PB is the most commonly used and validated measure that assesses parental experience and burden of having a child with FA. However, it does not measure parental anxiety, and hence other measures of parental anxiety were needed in the study. Although measures such as STAI and GAD-7 are well-validated measures of generalized anxiety, they are not specific to parents of children with FA. Hence, these measures were included together with a more general measure (much less validated) to examine the degree of FA-associated parental anxiety (VAS).

Data Analysis

Data were summarized using means and frequency distributions for categorical data. Assessment of item-total correlations (ITCs) was used to check for the association of each of the scale items with the total score obtained. The threshold of a corrected ITC of less than 0.3 was used as an indicator of a limited association of an item to the overall construct measured by the scale.²³ Items that had ITCs lower than the threshold were removed.

Exploratory factor analysis was conducted to determine the factor structure of the scale with principal components used as the extraction method. A Promax rotation with Kaiser normalization was conducted to allow for natural correlations among the factors.²⁴ Items with a difference of less than 0.2 in loadings between 2 or more factors were removed.

The convergent and discriminant validity of the IMPAACT was assessed by conducting Pearson product-moment correlations between the IMPAACT (global) score and the FAQL-PB, STAI, GAD-7, VAS, the interference they feel from FA, the child's current FA anxiety, FA-induced reduced parental functioning, and worrying about such impaired functioning.

Concurrent validity was assessed by comparing IMPAACT scores of parents across the following various categories (the direction of expected higher anxiety is stated in brackets): age of the child (younger children), age at which the child was diagnosed with having FA (at a younger age), the number of children with allergies (more children with allergy), the number of allergies that a child has (more allergies), the severity of the FA symptoms (more severe symptoms), whether or not the child ever had an anaphylactic reaction (did have a reaction), whether or not the child has been in an emergency department (ED) owing to their FA (did go to ED), the type of food (unknown), atopic conditions (with atopic conditions), and the need to be referred to a psychologist (there is a need).

In addition, scale scores were correlated with various resources the participants stated they needed, to understand diagnostic suitability of subscales and the total score for determination of patient resources which should be provided.

Analyses were performed with IBM SPSS Statistics for Macintosh, Version 23 (Armonk, NY: IBM Corp).

Results

Phase 1.1—Item Generation and Initial Reduction

None of the initial items had a mean clarity score below 3. Two items related to worries about the risk of undertaking an oral food challenge and the risk of undergoing oral immunotherapy received a mean importance rating below 3 and were deleted. During COVID-19, families with children with FA were reportedly struggling to find foods free of allergens. An additional item was added to assess parental anxiety related to obtaining these foods.

Phase 1.2—Further Item Selection and Revision

To create a tool that captures areas in each of the anxiety domains, items were selected based on a combination of the highest impact score and the highest frequency of being placed as one of the top items in a category. Selected items were reviewed by 3 authors and further revised to combine items that assess similar content. This process resulted in an initial version of IMPAACT consisting of 31 items: 9 items for FA-associated worries, 3 items for physical symptoms associated with anxiety, 8 items for behaviors associated with caring for a child with FA, 5 items for impairment to their lives owing to caring for a child with FA, and 6 items for parental coping with distress associated with having a child with FA.

Phase 2.1—Initial Validation of IMPAACT

Subjects

This included participants from 294 families (Table 1). Only respondents who completed the IMPAACT questionnaire were included in the analysis. Characteristics of children and their FAs are in Table 2; mean age was 10.3 years old (SD = 5.6) with first FA diagnosed at a mean of 2.1 years (SD = 2.21).

Factor Structure of IMPAACT

There were 5 factors retained based on a combination of statistical criteria: values higher than 1, results of the screening test, and cumulative variance explained (highest proportion of variance while retaining the most theoretically meaningful structure).²⁴ After

Table 1
Demographics for Participants in Validation Phase (N = 294)

Category	n	% of respondents answering the question
Recruited through		
National parent association	237	81
Local parent association	37	13
Allergist webinar	7	2
Other	12	4
Parent age		
26-35	44	11
36-45	119	30
46-55	89	23
56+	9	2
Relationship to child with FA		
Mother	243	62
Father	17	4
Grandparent	1	0.3
Legal guardian	1	0.3
Highest level of education completed		
High school	12	3
Postsecondary school	171	44
Postgraduate or professional degree	81	21
Health care professional		
No	218	56
Yes	45	11
Approximate household income		
Less than \$100,000	56	14
\$100,000 or more	147	38
Refused to answer	57	15
Province or territory do you currently reside		
Ontario	120	31
British Columbia	74	19
Other	55	17
Marital Status		
Single/never been married	4	1
Married	231	80
Living with a partner	17	6
Widowed	1	0.4
Divorced	11	4

Abbreviation: FA, food allergy.

Table 2
Information About the Children in the Study and Their Food Allergies (N = 294)

Category	n	%
Number of children in household with FA		
1	248	84
2	41	14
3+	4	1
Sex (referring to the child most impacted by FAs)		
Female	129	43
Male	164	55
Other	1	0.3
Allergen		
Peanuts	233	79
Tree nuts	165	56
Fish	24	8
Shellfish	27	9
Sesame seeds	58	20
Cow's milk	78	26
Egg	100	34
Wheat and triticale	21	7
Soy	30	10
Mustard	7	2
Sulfites	1	0.3
Other	60	20
Number of avoided foods		
0–2	92	31
3–6	89	30
7–10	30	10
10+	81	28
Parent's perception of the severity of child's food allergy		
Mild	4	1
Moderate	42	14
Severe	231	79
Do not know	15	5
Previous experience of having an anaphylactic reaction to a food		
No	89	30
Yes	204	70
Emergency department visit because of an allergic reaction to a food		
No	82	28
Yes	211	72
Atopic conditions		
None	64	22
Asthma	106	36
Hay fever (allergic rhinitis)	82	28
Eczema (atopic dermatitis)	172	58

Abbreviation: FA, food allergy.

analyzing these factors, 6 items were problematic; 2 were retained with no changes, 1 was changed, and 3 were removed. The criteria which they did or did not fulfill, and the modifications to these items, are described in eTable 2.

Phase 2.2—Factor Analysis of Final IMPAACT

After scale modification, which reduced it to the final 28 items (Fig 1), factor analyses using MLE were conducted again.

Factor analyses revealed 4 factors, which in combination explained 63% (pre-COVID-19) and 67% (current) of the variance. An examination of the factor loadings after rotation (Table 3) suggested that factor 1 (dubbed FA-associated worries) explained 5.73% of the variance, factor 2 (behavioral avoidance and reassurance) explained 3.92%, factor 3 (anxiety impact) explained 46.79%, and factor 4 (child coping) explained 4.36%. A few items had similar loading across multiple factors. For instance, worry about “not being able to find specific ‘safe’ foods at grocery store” was seen in FA-associated worries (factor 1) and situations causing anxiety and interfering with everyday life (factor 3). The 4 factors sensibly described the research topic and explained a satisfactory amount of variance (eFig 1). Furthermore, they showed excellent factor stability across the 2 time points.

Reliability

Item sampling adequacy for the 28-item scale was excellent (Kaiser-Meyer-Olkin = 0.942 [pre-COVID-19], 0.945 [current]). The scale showed very high internal reliability, with Cronbach's α at 0.95 for both pre-COVID-19 and current reports. The scale showed high test-retest reliability, with high correlations of scores at 2 time points for all 4 subscales (r ranging from 0.719 to 0.852) and total score ($r = 0.795$).

Each of the subscales had moderate inter-item correlation (mean inter-item correlations ranging from 0.397 to 0.707 for pre-COVID-19 data and 0.49 to 0.735 for current data), indicating that items were related but not overlapping. The average item-total correlation of items total score was 0.661 for pre-COVID-19 data and 0.860 for the current data.

In Table 4, subscales had moderate-to-high intercorrelation (between $r = 0.438$ and $r = 0.744$). The total score had the highest correlation with the impact subscale, which was expected because the impact factor explained the highest amount of variance in exploratory factor analysis. Taken together, all measures indicate good scale reliability.

Validity

Convergent and Discriminative Validity

To test for convergent and discriminative validity, correlations of the IMPAACT scale were calculated against FAQL-PB, STAI, and GAD-7 scales. In Table 5, the highest correlations were with FAQL-PB, showing excellent convergent validity, because it correlates with a very similar concept. Correlations with anxiety measurements were significant ($P < 0.01$), moderate, and positive, which were in line with expectations and implied that IMPAACT measures a concept that is similar but different. They also imply that IMPAACT cannot be reduced to any of the other questionnaires and is therefore novel in content.

Further validation was done by assessing scores against outcome variables representing simple, straightforward reflections of situations the parents were in (Table 6). Total IMPAACT scores were highly correlated with self-reported anxiety of parents. Impairment that anxiety had on parent functioning had low correlation with total score and moderate correlation with the impact subscale. However, the impaired parenting measurement and worrying about impaired parenting measurement correlated moderately with the total score and the highest with the impact subscale. Difficulties that the child has as a result of FA were best represented by the child coping subscale. Finally, the impact subscale had highest correlation with the need for psychology referral measurement, whereas total score had a somewhat lower correlation. The significance and direction of the correlations were in line with expectations and indicated good convergent validity.

Concurrent Validity

There were significant, negative correlations of total IMPAACT score with both age of the children with allergy ($r = -0.310$, $P < .001$) and age at which the child was first diagnosed with having food allergy ($r = -0.131$, $P = .03$). There were no correlations with number of children in the household who have allergies ($P = .86$). There was a difference in IMPAACT scores based on number of FAs ($F [3, 288] = 3.880$, $P = .01$). Parents who perceived their children's FA as severe had significantly higher IMPAACT scores ($M = 107.24$, $SD = 34.69$) than parents who perceived them as moderate ($M = 94.28$, $SD = 34.04$) ($t [271] = -2.232$, $P = .03$). There were no significant differences based on whether a child had experienced anaphylaxis ($t [291] = -1.139$, $P = .26$). However, time since the last

INSTRUCTIONS

Listed in the following section are some of the anxiety-related thoughts that are commonly reported by parents of children with food allergies. Rate how much you were bothered by each of the following worries *in the past week*.

Because of my child's food allergies, I worry about...

My child may have a severe reaction or die if s/he is exposed to something to which s/he is allergic.

Not at all	Hardly	Somewhat	Moderately	Quite a bit	Very much	Extremely
☐	☐	☐	☐	☐	☐	☐

My child not knowing how to respond appropriately to an allergic reaction.

Not at all	Hardly	Somewhat	Moderately	Quite a bit	Very much	Extremely
☐	☐	☐	☐	☐	☐	☐

My child's caregiver/teacher not knowing how to respond appropriately to an allergic reaction.

Not at all	Hardly	Somewhat	Moderately	Quite a bit	Very much	Extremely
☐	☐	☐	☐	☐	☐	☐

How to manage his/her condition during upcoming changes/transitions in my child's life.

Not at all	Hardly	Somewhat	Moderately	Quite a bit	Very much	Extremely
☐	☐	☐	☐	☐	☐	☐

How my child will cope with his/her food allergy in the future.

Not at all	Hardly	Somewhat	Moderately	Quite a bit	Very much	Extremely
☐	☐	☐	☐	☐	☐	☐

The possibility of allergens in foods.

Not at all	Hardly	Somewhat	Moderately	Quite a bit	Very much	Extremely
☐	☐	☐	☐	☐	☐	☐

How food allergy may limit my child's social and psychological development (e.g., peer relationship, being bullied).

Not at all	Hardly	Somewhat	Moderately	Quite a bit	Very much	Extremely
☐	☐	☐	☐	☐	☐	☐

Not knowing when to use EpiPen (epinephrine) auto-injector appropriately on my child.

Not at all	Hardly	Somewhat	Moderately	Quite a bit	Very much	Extremely
☐	☐	☐	☐	☐	☐	☐

Not being able to find specific "safe" foods at grocery store.

Not at all	Hardly	Somewhat	Moderately	Quite a bit	Very much	Extremely
☐	☐	☐	☐	☐	☐	☐

Figure 1. IMPAACT validated 28-item tool. IMPAACT, Impairment Measure for Parental food Allergy-associated Anxiety and Coping Tool.

Due to worries related to my child's food allergies,

I experience physical distress (e.g. restlessness, muscle tension, trembling, sweating, shortness of breath, nausea).

Not at all	Hardly	Somewhat	Moderately	Quite a bit	Very much	Extremely
☐	☐	☐	☐	☐	☐	☐

I have trouble relaxing.

Not at all	Hardly	Somewhat	Moderately	Quite a bit	Very much	Extremely
☐	☐	☐	☐	☐	☐	☐

I become tearful when I think/talk about my child's food allergy.

Not at all	Hardly	Somewhat	Moderately	Quite a bit	Very much	Extremely
☐	☐	☐	☐	☐	☐	☐

My worries related to my child's food allergies...

Make me constantly stressed out.

Not at all	Hardly	Somewhat	Moderately	Quite a bit	Very much	Extremely
☐	☐	☐	☐	☐	☐	☐

Overwhelm me or are hard to control.

Not at all	Hardly	Somewhat	Moderately	Quite a bit	Very much	Extremely
☐	☐	☐	☐	☐	☐	☐

Make it difficult for me to work or pursue leisure activities.

Not at all	Hardly	Somewhat	Moderately	Quite a bit	Very much	Extremely
☐	☐	☐	☐	☐	☐	☐

Affect my relationships with others.

Not at all	Hardly	Somewhat	Moderately	Quite a bit	Very much	Extremely
☐	☐	☐	☐	☐	☐	☐

Affect my child's coping or have made him/her become more anxious.

Not at all	Hardly	Somewhat	Moderately	Quite a bit	Very much	Extremely
☐	☐	☐	☐	☐	☐	☐

These are some of the things parents often reported that they do because of their child's food allergy. Please rate how well each of these statements applies to you in the past week. For the following section, please think about the reasons for the behaviors and only endorse the items if it is because of your child's food allergy.

Because of my child's food allergies, I:

Avoid going to places that we are not familiar with or where we are uncertain about "safety".

Not at all/NA	Hardly	Somewhat	Moderately	Quite a bit	Very much	Extremely
☐	☐	☐	☐	☐	☐	☐

Figure 1 Continued.

Avoid travelling with my child.

Not at all/NA	Hardly	Somewhat	Moderately	Quite a bit	Very much	Extremely
☐	☐	☐	☐	☐	☐	☐

Avoid social activities with others involving food.

Not at all/NA	Hardly	Somewhat	Moderately	Quite a bit	Very much	Extremely
☐	☐	☐	☐	☐	☐	☐

Avoid leaving my child in the care of others (e.g., relative, friend, babysitter, teacher).

Not at all/NA	Hardly	Somewhat	Moderately	Quite a bit	Very much	Extremely
☐	☐	☐	☐	☐	☐	☐

Am hesitant to undergo medically recommended tests or treatments involving potential allergen exposure (e.g., Oral Food Challenge, Oral Immunotherapy).

Not at all/NA	Hardly	Somewhat	Moderately	Quite a bit	Very much	Extremely
☐	☐	☐	☐	☐	☐	☐

Am hesitant to introduce peanuts/other allergens (early) to my (other) child(ren).

Not at all/NA	Hardly	Somewhat	Moderately	Quite a bit	Very much	Extremely
☐	☐	☐	☐	☐	☐	☐

Constantly check my mobile phone when my child is not in my care.

Not at all/NA	Hardly	Somewhat	Moderately	Quite a bit	Very much	Extremely
☐	☐	☐	☐	☐	☐	☐

Avoid/limit other foods beyond identified food allergens (i.e., beyond medically recommended restrictions) (e.g., avoiding all nuts when only peanut allergy has been diagnosed).

Not at all/NA	Hardly	Somewhat	Moderately	Quite a bit	Very much	Extremely
☐	☐	☐	☐	☐	☐	☐

In the following section, you will be asked about your experience of coping with a child/children with food allergies in the past week.

I need more help/support for my anxiety related to my child's food allergies.

Not at all	Hardly	Somewhat	Moderately	Quite a bit	Very much	Extremely
☐	☐	☐	☐	☐	☐	☐

My child needs more help/support for anxiety related to his/her food allergies.

Not at all	Hardly	Somewhat	Moderately	Quite a bit	Very much	Extremely
☐	☐	☐	☐	☐	☐	☐

Food allergy defines our lifestyle.

Not at all	Hardly	Somewhat	Moderately	Quite a bit	Very much	Extremely
☐	☐	☐	☐	☐	☐	☐

Figure 1 Continued.

Table 3
Factor Loadings of the 28-Item Questionnaire

Item loading factor	Factor loadings			
	1	2	3	4
In the past week/in a typical week before COVID-19 (eg, think back the time in Nov 2019)				
Factor 1: Food allergy-associated worries (cognitive subscale)				
Because of my child's food allergy, I worry about...				
my child may have a severe reaction or die if s/he is exposed to something to which s/he has allergy	0.695			
my child not knowing how to respond appropriately to an allergic reaction	0.644			
my child's caregiver/teacher not knowing how to respond appropriately to an allergic reaction	0.717			
how to manage his/her condition during upcoming changes/transitions in my child's life	0.786			
how my child will cope with his/her food allergy in the future	0.791			
the possibility of allergens in foods	0.74			
how food allergy may limit my child's social and psychological development (eg, peer relationship, being bullied)	0.508			
not knowing when to use EpiPen (epinephrine) autoinjector appropriately on my child	0.64			
not being able to find specific "safe" foods at grocery store	0.284		0.305	
Factor 2: Behavioral avoidance and reassurance (behavioral subscale)				
Because of my child's food allergy, I...				
avoid going to places that we are not familiar with or where we are uncertain about "safety"		0.921		
avoid traveling with my child		0.849		
avoid social activities with others involving food		0.953		
avoid leaving my child in the care of others		0.876		
am hesitant to undergo medically recommended tests or treatments involving potential allergen exposure		0.558		
am hesitant to introduce peanuts/other allergens (early) to my (other) younger children		0.373		
constantly check my mobile phone when my child is not in my care		0.557		
avoid/limit other foods beyond identified food allergens (ie, beyond medically recommended restrictions) (eg, avoiding all nuts when only peanut allergy has been diagnosed)	0.209	0.149		0.156
Food allergy defines our lifestyle		0.401		
Factor 3: Anxiety impact (impact subscale)				
Physical symptoms				
Due to worries related to my child's FA...				
I experience physical distress (eg, restlessness, muscle tension, trembling, sweating, shortness of breath, nausea)			0.945	
I have trouble relaxing			0.965	
I become tearful when I think/talk about my child's food allergy			0.672	
Impact on activities/stress				
My worries related to my child's food allergies...				
make me constantly stressed out			0.786	
overwhelm me or are hard to control			0.957	
make it difficult for me to work or pursue leisure activities			0.702	
affect my relationships with others			0.621	
I need more help/support for my anxiety related to my child's food allergies			0.779	
Factor 4: Child coping				
My worries related to my child's food allergies affect my child's coping or have made him/her become more anxious				0.614
My child needs more help/support for anxiety related to his/her food allergies				0.983

Abbreviation: COVID-19, coronavirus disease 2019.

anaphylactic reaction was significantly, moderately, and negatively correlated with IMPAACT total score ($r = -0.207$, $P = .004$). Parents of children who had been to an ED because of their child's FA had significantly higher ($M = 107.91$, $SD = 35.15$) IMPAACT scores than those whose child had not ($M = 97.18$, $SD = 33.21$) ($t [291] = -2.381$, $P = .02$). Parents of children with allergy to sesame seed, cow's milk, egg, wheat and triticale, and mustard had higher IMPAACT scores (eTable 3).

Total IMPAACT scores had a significant, moderate, positive correlation with parents' endorsement for needing psychologist referral ($r = 0.544$, $P < .001$).

Table 4
Intercorrelations of the Subscales and the Total Scores

	Cognitive subscale	Behavioral subscale	Impact subscale	Child coping subscale
IMPAACT total	0.872 ^a	0.885 ^a	0.905 ^a	0.635 ^a
Cognitive subscale	1	0.626 ^a	0.744 ^a	0.438 ^a
Behavioral subscale		1	0.693 ^a	0.545 ^a
Impact subscale			1	0.569 ^a

Abbreviation: IMPAACT, Impairment Measure for Parental food Allergy-associated Anxiety and Coping Tool.

^a $P < .001$.

Relationships With Other Variables of Interest

To determine practical usefulness, IMPAACT total scores and subscales were correlated with the kind of resources participants desired access to. Correlations can be seen in Table 7, and from them the following can be inferred:

1. Cognitive and behavioral subscales were weakly associated with participants wishing to attain (nearly) any resources.
2. The impact of anxiety and total score was associated with all resources, but mainly related to people wishing to attain psychological support for themselves, their partners, their child, or take part in a support group (r values > 0.3).
3. Child coping was most strongly associated with wanting psychological support information for the child.

Discussion

This article describes development of a novel, self-reported assessment instrument (IMPAACT) for parental anxiety associated with childhood FAs. This instrument was also evaluated on the basis of its psychometric properties. Overall, our results provide solid evidence for psychometric properties. The 4-factor structure was stable across 2 time points, and internal consistency was excellent both for individual

Table 5
Correlation of IMPAACT Total Scores With Other Related Scales

	State Anxiety	Trait Anxiety	FAQL-PB	GAD (pre–COVID-19)	GAD (current)
IMPAACT pre–COVID-19	0.421 ^a	0.427 ^a	0.768 ^a	0.493 ^a	0.383 ^a
IMPAACT current	0.453 ^a	0.314 ^a	0.786 ^a	0.331 ^a	0.367 ^a

Abbreviations: COVID-19, coronavirus disease 2019; FAQL-PB, Food Allergy Quality of Life—Parental Burden; GAD, Generalized Anxiety Disorder; IMPAACT, Impairment Measure for Parental food Allergy-associated Anxiety and Coping Tool.

^a $P < .01$.

Table 6
Correlation of the Total IMPAACT Score and the Subscale Scores With Outcome Variables

Dependent variable	IMPAACT total	Cognitive subscale	Behavioral subscale	Impact subscale	Child coping subscale
VAS (parental self-reported anxiety)	0.709 ^a	0.654 ^a	0.538 ^a	0.694 ^a	0.477 ^a
Interference (how difficult have these made it for you to do your work, take care of things at home, or get along with other people?)	0.328 ^a	0.242 ^a	0.228 ^a	0.398 ^a	0.264 ^a
Child current FA anxiety (parent report)	0.413 ^a	0.330 ^a	0.369 ^a	0.303 ^a	0.623 ^a
FA impaired parental functioning	0.564 ^a	0.475 ^a	0.467 ^a	0.566 ^a	0.328 ^a
Worry about FA impaired parental functioning	0.597 ^a	0.482 ^a	0.448 ^a	0.674 ^a	0.367 ^a

Abbreviations: FA, food allergy; IMPAACT, Impairment Measure for Parental food Allergy-associated Anxiety and Coping Tool; VAS, Visual Analogue Scale.

^a $P < .001$.

scales and for the whole scale. Furthermore, for convergent and discriminant validity, the scale correlated moderately with GAD and STAI, and correlated moderately to highly with FAQL-PB. Such correlations were expected, as the developed scale was intended to measure anxiety related to having a child with FA instead of general anxiety.

Indicators of concurrent validity showed good results. Correlation of the total score with the desire for a referral to a psychologist was high, which was the most important indicator. It was higher for the parents of younger children and children whose FA started younger. The absence of correlation with number of children with FA in a household was probably owing to most of the samples (84%) having only 1 child with FA.

There was an unexpected correlation between the number of FAs that the child had and parent anxiety up to 7 to 10 foods, with anxiety dropping off for the 10+ group. This may be owing to parents of children with very large number of food allergies being well informed and adapted to having a child with FA. Nevertheless, this relationship should be tested further.

Anxiety scores were as expected higher for parents who view their child's allergies as more severe and for parents whose child has been to an ED for FA. Although there were no differences in IMPAACT scores based on whether or not the child had ever experienced anaphylaxis, which is in line with the findings of Knibb et al,²⁵ there was a negative correlation between recent anaphylaxis and anxiety, supporting the findings of earlier studies.^{2,3}

In line with the findings of Knibb et al,²⁵ egg and cow's milk provoked the highest anxiety. Allergies to sesame seed, wheat and triticale, and mustard were more anxiety provoking in the current study, whereas other allergies were not. This may be because cow's milk,

egg, and grains (and sesame seeds and mustard, but not as much) are more difficult to avoid.

Concurrent validity was excellent, because IMPAACT could differentiate between multiple groups of participants with different FAs that may cause different levels of FA-associated parental anxiety.

The scale demonstrates promise for practical utility in pointing practitioners toward help their patients may need. The impact scale was the most important in determining whether or not a parent needs psychological help, whereas the child coping scale may be useful for determining whether or not the child needs psychological help. Lastly, the cognitive and behavioral scales allow us to characterize parental anxiety, informing the kinds of interventions (eg, cognitive-behavioral therapy) that families may benefit from before they pursue further psychological consultations.

There are several unique features of this measurement tool. Although food allergy anxiety has been examined in adult patients with FAAS,¹⁵ in pediatric patients with SOFAA,¹⁶ and with parents with WAFA,¹⁷ IMPAACT fills a gap in the existing literature as a validated screening tool for parental anxiety associated with a child's FA, employing a multi-factor structure that addresses multiple domains of anxiety and its functional impacts. IMPAACT items were derived from a cognitive-behavioral framework with consideration of Diagnostic and Statistical Manual of Mental Disorders (Fifth Edition) diagnostic criteria for anxiety. IMPAACT subscales were based on different aspects of FA-associated parental anxiety, with the final scale consisting of FA-associated parental anxiety—associated cognitions (worries related to caring for a child with FA), behaviors (eg, behavioral avoidance owing to having a child with FA), impairment related to having a child with FA (including physical symptoms and

Table 7
Correlations of Wanted Resources With IMPAACT Scores

Wanted resources	Cognitive	Behavioral	Anxiety impact	Coping	Total
Info on child's FA	0.197 ^a	0.108	0.122 ^b	−0.079	0.142 ^b
Info on treatment options	0.242 ^a	0.142 ^b	0.126 ^b	0.025	0.181 ^a
Info on psych support for self or partner	0.245 ^a	0.273 ^a	0.443 ^a	0.220 ^a	0.362 ^a
Info on psych support for child	0.256 ^a	0.227 ^a	0.315 ^a	0.336 ^a	0.313 ^a
Support group	0.271 ^a	0.247 ^a	0.365 ^a	0.159 ^a	0.328 ^a
Daily living with FA	0.218 ^a	0.153 ^a	0.161 ^a	−0.030	0.184 ^a
Mentorship program	0.163 ^a	0.178 ^a	0.161 ^a	0.020	0.179 ^a

Abbreviations: FA, food allergy; IMPAACT, Impairment Measure for Parental food Allergy-associated Anxiety and Coping Tool.

^a $P < .01$ (2-tailed).

^b $P < .05$ (2-tailed).

general impact owing to anxiety), and coping of the child affected by FA. The scale can thus be used by clinicians and allergists to determine specific domains of concern for different people. Once these domains are identified, appropriate interventions may be targeted toward them, to help them overcome their parental FA-associated anxiety.

Another strength of this study was its large sample for both pre-COVID-19 and current time points. Furthermore, the sample came from multiple sources, which increased representation from the wider population of parents who have children with FA. This scale can be used on a large variety of populations, both for scientific research purposes and in a clinical setting.

There were some limitations to this study, which indicate future directions of research. First, the scale should be tested further in a clinical setting. More specifically, its actual impact and usefulness in an allergy clinic as a mediator between physicians and psychologists need to be determined. Next, the scale, although not too long, would be more practical if the number of items were further reduced. The creation of a shorter version would provide a briefer examination, while having minimal trade off on the psychometric properties of the present scale. Another limitation is the lack of race and ethnicity data in this study, which limits its generalizability to other populations; it is important to collect race and ethnicity in future studies and to further validate the tool internationally, both in similar and different populations (eg, in United Kingdom/United States where the FA population is similar to Canada, and in other countries where FA prevalence differs). For the clinical setting, it would also be very useful to evaluate sensitivity and specificity of various “cut-off” scores of IMPAACT in comparison to formal psychiatric diagnoses. This could be based on semistructured interviews that represent the current reference standard for psychiatric diagnosis.

In conclusion, given the considerable distress and impairment that having a child with FA can cause, screening and detection of maladaptively high parental FA anxiety are of paramount importance. We have developed a screening tool specifically for parents which complements recently developed tools for patients themselves. Use of IMPAACT, WAFA, FAAS, and SOFAA in the research and clinical settings will provide a breadth of FA anxiety tools for allergists and other providers, for both screening and management. Our study provides results supporting the validity of IMPAACT for parents of children with FA and provides opportunities for further research.

Supplementary Data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.anai.2022.02.020>

References

1. Cortes A, Castillo A, Sciaraffia A. Food allergy: children's symptom levels are associated with mothers' psycho-socio-economic variables. *J Psychosom Res*. 2018;104:48–54.

2. Akeson N, Worth A, Sheikh A. The psychosocial impact of anaphylaxis on young people and their parents. *Clin Exp Allergy*. 2007;37(8):1213–1220.
3. Mandell D, Curtis R, Gold M, Hardie S. Anaphylaxis: how do you live with it? *Health Soc Work*. 2005;30(4):325–335.
4. Mandell D, Curtis R, Gold M, Hardie S. Families coping with a diagnosis of anaphylaxis in a child. *ACI International*. 2002;14(96):101.
5. Klennert MD, Robinson JL. Addressing the psychological needs of families of food-allergic children. *Curr Allergy Asthma Rep*. 2008;8(3):195–200.
6. Birdi G, Cooke R, Knibb R. Quality of life, stress, and mental health in parents of children with parentally diagnosed food allergy compared to medically diagnosed and healthy controls. *J Allergy (Cairo)*. 2016 1497375. 2016.
7. King RM, Knibb RC, Hourihane JO. Impact of peanut allergy on quality of life, stress and anxiety in the family. *Allergy*. 2009;64(3):461–468.
8. Primeau M, Kagan R, Joseph L, Lim H, Dufresne C, Duffy C, 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(8):1135–1143.
9. Gupta RS, Springston EE, Smith B, Kim JS, Pongracic JA, Wang X, et al. Food allergy knowledge, attitudes, and beliefs of parents with food-allergic children in the United States. *Pediatr Allergy Immunol*. 2010;21(6):927–934.
10. Thorgaard MV, Frostholm L, Walker L, Jensen JS, Morina B, Lindegaard H, et al. Health anxiety by proxy in women with severe health anxiety: a case control study. *J Anxiety Disord*. 2017;52:8–14.
11. Chow C, Pincus DB, Comer JS. Pediatric food allergies and psychosocial functioning: examining the potential moderating roles of maternal distress and overprotection. *J Pediatr Psychol*. 2015;40(10):1065–1074.
12. Herbert LJ, Lin A, Matsui E, Wood RA, Sharma H. Development of a tool to measure youths' food allergy management facilitators and barriers. *J Pediatr Psychol*. 2016;41(3):363–372.
13. Feng C, Kim J-H. Beyond avoidance: the psychosocial impact of food allergies. *Clin Rev Allergy Immunol*. 2019;57(1):74–82.
14. Rubes M, Podolsky AH, Caso N, Ambrose MA, Sicherer SH, Shemesh E, et al. Utilizing physician screening questions for detecting anxiety among food-allergic pediatric patients. *Clin Pediatr*. 2014;53(8):764–770.
15. Coelho GL, Byrne A, Hourihane J, DunnGalvin A. Development of the food allergy anxiety scale in an adult population: psychometric parameters and convergent validity. *J Allergy Clin Immunol Pract*. 2021;9(9):3452–3458. e1.
16. Dahlsgaard K, Wilkey LK, Stites SD, Lewis MO, Spergel JM. Development of the child- and parent-rated scales of food allergy anxiety (SOFAA). *J Allergy Clin Immunol Pract*. 2022;10(1):161–169. e6.
17. Poehacker S, McLaughlin A, Humiston T, Peterson C. Assessing Parental Anxiety in Pediatric Food Allergy: Development of the Worry About Food Allergy Questionnaire. *J Clin Psychol Med Settings*. 2021;28(3):447–456.
18. Chooniedass R, Soller L, Hsu E, To S, Cameron SB, Chan ES. Parents of children with food allergy: a qualitative study describing needs and identifying solutions. *Ann Allergy Asthma Immunol*. 2020;125(6):674–679.
19. Westwell-Roper C, To S, Andjelic G, Lu C, Lin B, Soller L, et al. Food-allergy-specific anxiety and distress in parents of children with food allergy: a systematic review. *Pediatr Allergy Immunol*. 2022;3(1):e13695.
20. Carpenter S. Ten steps in scale development and reporting: a guide for researchers. *Commun Methods Meas*. 2018;12(1):25–44.
21. Cohen BL, Noone S, Muñoz-Furlong A, Sicherer SH. Development of a questionnaire to measure quality of life in families with a child with food allergy. *J Allergy Clin Immunol*. 2004;114(5):1159–1163.
22. Spielberger CD. Manual for the state-trait anxiety inventory. 1970. Available at: [https://www.scirp.org/\(S\(351jmbntvnsjt1aadkposzje\)\)/reference/ReferencesPers.aspx?ReferenceID=464744](https://www.scirp.org/(S(351jmbntvnsjt1aadkposzje))/reference/ReferencesPers.aspx?ReferenceID=464744). Accessed November 1, 2020.
23. Spitzer RL, Kroenke K, Williams JB, Löwe B. A brief measure for assessing generalized anxiety disorder: the GAD-7. *Arch Intern Med*. 2006;166(10):1092–1097.
24. Field A. *Discovering Statistics Using IBM SPSS Statistics*. Sage; 2013.
25. Knibb RC, Barnes C, Stalker C. Parental confidence in managing food allergy: development and validation of the food allergy self-efficacy scale for parents (FASE-P). *Clin Exp Allergy*. 2015;45(11):1681–1689.

Supplementary data

eMeasures

IMPAACT Screening Tool

Participants were asked to respond to IMPAACT questions on a 7-point Likert-type scale, assessing how much they were bothered by each of the symptoms: from “not at all” to “extremely.”

Food Allergy Quality of Life—Parental Burden Questionnaire

The FAQL-PB assesses issues that parents who have a child with FA live with.¹ The goal is to assess the level of parental burden, consisting of 17 items. Parents are asked to rank each question on a scale of 0 (“not troubled”) to 6 (“extremely troubled”). It has been thoroughly validated and has a high internal consistency (Cronbach's $\alpha = 0.95$).

Visual Analogue Scale

This has been used as a global measure of FA-associated parental anxiety in previous FA studies (“How anxious do you feel about your child's food allergy at this time?”).² Participants were asked to indicate their degree of anxiousness by marking a point on a line with the extreme points of 0 (“not at all”) and 100 (“very much”).

State Trait Anxiety Inventory

STAI is a 40-item self-report measure for adults, consisting of 2 sections of 20 questions each, measuring state (how you feel right now) and trait (how you feel generally) anxiety.³ Items are rated on a 4-point scale (from “almost never” to “almost always”), with the total score ranging from 20 to 80, where higher scores indicate higher levels of anxiety. It has a high internal consistency (Cronbach's α ranging from 0.82 to 0.95).⁴

Generalized Anxiety Disorder-7

GAD-7 scale is a 7-item self-report measure for generalized anxiety.⁵ Items are formulated by asking how much a certain symptom is bothersome in the last 2 weeks. There is a 4-point scale (“not at all,” “several days,” “more than half the days,” and “nearly every day,” scored with 0–3), with total score ranging from 0 to 21, where higher scores indicate higher levels of anxiety. The scale has excellent internal reliability (Cronbach's $\alpha = 0.92$).

Other Outcome Measures

Parents were also asked 3 questions about the impact of their child's FA on a 7-point Likert scale. One was about the need for psychological support, and the other 2 were about the impact of COVID-19 on their anxiety levels in general and their anxiety related to managing their child's FA.

eReferences

1. Cohen BL, Noone S, Muñoz-Furlong A, Sicherer SH. Development of a questionnaire to measure quality of life in families with a child with food allergy. *J Allergy Clin Immunol*. 2004;114(5):1159–1163.
2. Soller L, To S, Hsu E, Chan ES. Current tools measuring anxiety in parents of food-allergic children are inadequate. *Pediatr Allergy Immunol*. 2020;31(6):678–685.
3. Spielberger CD. Manual for the state-trait anxiety, inventory. 1990. Available at: [https://www.scirp.org/\(S\(351jmbntvnsjt1aadkposzje\)\)/reference/ReferencesPapers.aspx?ReferenceID=464744](https://www.scirp.org/(S(351jmbntvnsjt1aadkposzje))/reference/ReferencesPapers.aspx?ReferenceID=464744). Accessed November 1, 2020.
4. Spielberger CD. Development of the Spanish edition of the State–Trait Anxiety Inventory. *Rev Interamericana Psicol*. 1971;5(3–4):145–158.
5. Spitzer RL, Kroenke K, Williams JB, Löwe B. A brief measure for assessing generalized anxiety disorder: the GAD-7. *Arch Intern Med*. 2006;166(10):1092–1097.

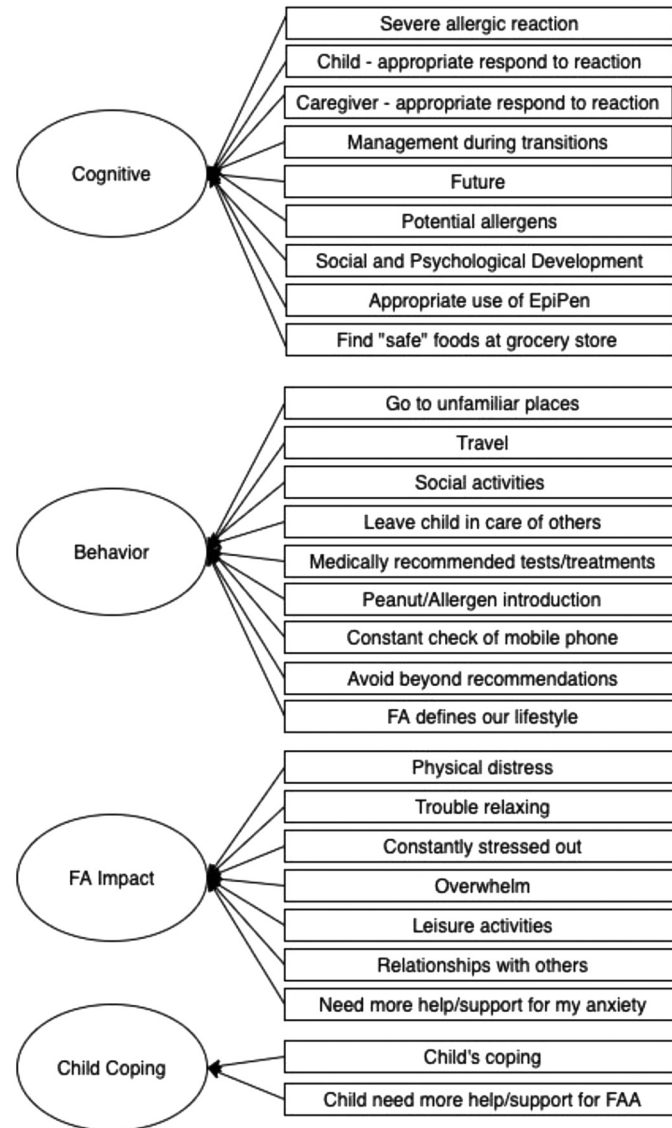


Figure 1. Factor structure of the IMPAACT. FA, food allergy; FAA, Food Allergy Anxiety; IMPAACT, Impairment Measure for Parental food Allergy-associated Anxiety and Coping Tool.

eTable 1
Description of the Various Phases of Validation of IMPAACT

Phase description	Participants	Goal	Results
Phase 1.1—Item generation and initial reduction	4 allergists and 10 caregivers with a child with FA recruited through allergy clinic	To evaluate the clarity and importance of the items	None of the initial 56 items had a mean clarity score below our criteria. Two items related to worries about the risk of oral food challenge and oral immunotherapy received a mean importance rating below our criteria. These 2 items were hence deleted in this phase.
Phase 1.2—Item selection and revision	35 caregivers with a child/children with FA recruited through local support group (8 of them also participated in phase 1.1)	To identify the most important questions to ask to assess FA-related anxiety in each of the domain and to provide qualitative feedback to the survey items	Start with 54 items, reduced to 31 items: Cognition/fear/worries—9 items Physical symptoms—3 items Interference—5 items Behaviors—8 items Coping—6 items
Phase 2.1—Initial validation of IMPAACT	294 caregivers with a child/children with FA recruited through a national support group	To examine the factor structure of IMPAACT and determine if any items need to be removed	Start with 31 items, end with final 28 items with a 4-factor-structure
Phase 2.2—Factor analysis of final IMPAACT	294 caregivers with a child/children with FA	To examine the reliability, convergent and discriminative, and concurrent validity of the 28-item IMPAACT, and its relationships with other variables of interest	The reliability, convergent and discriminative, and concurrent validity all showed good results, and there was a correlation with certain variables of interest (Table 7)

Abbreviations: FA, food allergy; IMPAACT, Impairment Measure for Parental food Allergy-associated Anxiety and Coping Tool.

eTable 2

Characteristics of the Problematic Items From the Initial Scale

Items	Factor loading		ITC		Cronbach's α		Theoretical relevance	Introduced changes
	PC	C	PC	C	PC	C		
Not being able to find specific “safe” foods at grocery store	✓	✓	X	✓	X	X	Relevant, especially during COVID-19	Retained as is
Am hesitant to introduce peanuts or other allergens (early) to my (other) children	✓	✓	✓	✓	X	X	Relevant, implies need for psychoeducation	Add “younger” children and add 99 for a N/A option
Avoid/limit other foods beyond identified food allergens (ie, beyond medically recommended restrictions) (eg, avoiding all nuts when only peanut allergy has been diagnosed)	✓	✓	✓	X	X	X	Relevant, implies need for psychoeducation	Retained as is
Nobody understands the seriousness of my child's food allergy	✓	✓	✓	X	X	X	Irrelevant	Deleted
I have someone with whom I can share responsibilities related to managing my child's FA	X	X	✓	✓	✓	✓	Irrelevant	Deleted
I have someone with whom I can share my worries related to my child's food allergy	X	X	✓	✓	✓	✓	Irrelevant	Deleted

Abbreviations: C, current; FA, food allergy; ITC, item-total correlation; N/A, not available; PC, pre-COVID-19; ✓, fulfilled criteria; X, did not fulfill criteria.

eTable 3

Means and SDs of Parental Anxiety (IMPAACT Score) With Different Food Allergies (N=294)

Allergy	Does the child have allergy	Mean	SD	n
Sesame seeds	No	102.57	35.72	236
	Yes	114.03	29.67	58
Cow's milk	No	99.68	34.47	216
	Yes	119.1	32.04	78
Egg	No	99.12	35.79	194
	Yes	115.91	30.21	100
Wheat and triticale	No	103.61	34.81	273
	Yes	120.67	32.38	21
Mustard	No	104.08	34.73	287
	Yes	135.57	27.04	7

Abbreviation: IMPAACT, Impairment Measure for Parental food Allergy-associated Anxiety and Coping Tool.