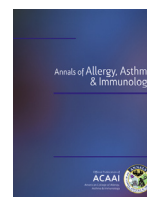




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Health-related quality of life in food-allergic adults from eight European countries

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ABSTRACT

Background: Food allergy can impair health-related quality of life (HRQL). Food Allergy Quality of Life Questionnaires (FAQLQs) have been developed and validated, including an adult form (FAQLQ-AF). HRQL has not, to date, been measured across different European countries using a uniform methodology.

Objective: To translate and validate the FAQLQ-AF for use in 8 European countries (Iceland, The Netherlands, Poland, France, Spain, Italy, Greece, and Sweden).

Methods: The English FAQLQ-AF was translated, back-translated, and compared for use in the 8 relevant European languages. Adults with a perceived food allergy were recruited from outpatient departments and through a community survey. Participants completed the FAQLQ-AF, the Food Allergy Independent Measure, and questions concerning participants' characteristics. Validity of the FAQLQ-AF was analyzed for use in the 8 countries.

Results: The FAQLQ-AF had strong construct validity ($r > 0.59$) and an excellent internal consistency (Cronbach $\alpha > 0.95$) in all countries. Total FAQLQ-AF scores (range 3.2–5.0) were significantly different across participating countries.

Conclusion: The FAQLQ-AF is a suitable and valid instrument for measuring HRQL in food-allergic adults in Iceland, The Netherlands, Poland, France, Spain, Italy, Greece, and Sweden. The impact of food allergy on HRQL seems to differ among adults from the 8 participating European countries.

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Introduction

Food allergy affects approximately 3% to 4% of the Western adult population and this prevalence seems to be increasing.^{1–3} The prevalence rate of perceived food allergy is estimated to be 3% to 35% in adults,⁴ which is much higher than for confirmed food allergy. Avoidance of the food that could lead to an allergic reaction is currently the only available treatment for food allergy. In addition, food-allergic individuals at risk for anaphylaxis should always carry an epinephrine auto-injector (EAI) for emergency treatment.⁵

Previous studies have shown that health-related quality of life (HRQL) is impaired in individuals with confirmed and perceived food allergy.^{6–9} In EuroPrevall, a multicenter international research project, the Food Allergy Quality of Life Questionnaire–Adult Form (FAQLQ-AF) was developed for the measurement of HRQL in food-allergic adults.¹⁰

The aim of this study was to translate and validate the FAQLQ-AF for use in 8 European countries (Iceland, The Netherlands, Poland, France, Spain, Italy, Greece, and Sweden).

Methods

Participants and Procedure

Participants (≥ 18 years old) were recruited from outpatient departments of medical centers in Reykjavik, Iceland; Utrecht, The Netherlands; Lodz, Poland; Strasbourg, France; Madrid, Spain; Milan, Italy; Athens, Greece; and Gothenburg, Sweden. Patients with at least 1 perceived food allergy who visited these outpatient departments were asked to participate in the HRQL study. In Poland and Spain, participants also were recruited through a community survey,¹¹ in which participants with positive screening outcomes (indicating that they judged themselves food allergic) were asked to participate in the study. In Sweden, only participants with a doctor-diagnosed food allergy for milk, egg, or wheat were included, although most also had a perceived allergy to other foods.

Materials

The FAQLQ-AF was developed and validated in The Netherlands.¹⁰ The FAQLQ-AF consists of 29 items that are answered using a 7-point response scale (1 = no impairment; 7 = maximum impairment). The total FAQLQ-AF score is the average score of all individual items of the FAQLQ-AF. Construct validity of the FAQLQ-AF was measured using the Food Allergy Independent Measure (FAIM).¹² This questionnaire measures the self-perceived severity of the food allergy. Individual FAQLQ-AF items are listed in eTable 1 and the FAQLQ-AF can be downloaded from <http://www.FAQLQ.com>.

Translation

The FAQLQ-AF, FAIM, and questions concerning participant characteristics were translated from Dutch into English in a previous study.¹³ Then, this English-language questionnaire package was translated, back-translated, and compared for the Icelandic, Polish, French, Spanish, Italian, Greek, and Swedish versions, as prescribed by the World Health Organization.¹⁴

Construct Validity

Construct validity was investigated for each translated FAQLQ-AF with the use of each translated FAIM. Correlation coefficients were calculated between the total FAQLQ-AF score and the total FAIM score, between individual FAQLQ-AF items and the total FAIM score, and between individual FAQLQ-AF items and individual FAIM items. Moderate correlation coefficients (0.40–0.60) were expected.¹⁵ In addition, internal consistency was measured for each translated FAQLQ-AF. A cutoff α value equal to 0.7 was used to determine good internal consistency.¹⁵

Cross-Cultural Comparison

Outcomes of individual FAQLQ-AF items, total FAQLQ-AF score, and total FAIM score of participants in the 8 European countries were compared.

Statistical Analyses

Participants' descriptive characteristics were compared using analysis of variance (age) and the χ^2 test (anaphylaxis, EAI ownership). Construct validity of the translated FAQLQ-AF was tested by calculating the Spearman correlation coefficient of the FAQLQ with the FAIM. Internal consistency was determined using the Cronbach α . Total FAQLQ-AF scores and total FAIM scores of participating countries were compared using the Kruskal-Wallis test. A multivariate regression analysis was performed to correct the relation between country of origin and HRQL (total FAQLQ-AF score) for the potential confounder "perceived severity" (total FAIM score). The cross-cultural comparison was adjusted for this confounder in the event the linear relation between country of origin and HRQL (B coefficients) was subject to at least a 10% change as a result of fitting the model with a confounder.¹⁶ Statistical analyses were performed with SPSS 18.0 (SPSS, Inc, Chicago, Illinois).

Ethical Approval

This study was part of the EuroPrevall Project, a multicenter international research project funded by the European Union. All individual outpatient centers in the 8 participating European countries obtained ethical approval from their local medical ethics review committees to participate in the present HRQL study. No informed consent was needed for this study according to the local ethics committees.

Results

Participants

From May 2007 to September 2009 (2010 to 2011 in Sweden), 491 participants returned the questionnaires (FAQLQ-AF, FAIM, and participant characteristics) in the 8 European countries. Sixty participants were excluded because they were younger than the minimum age of 18 years or incomplete information was provided concerning the most important participant characteristics. Another 6 participants were excluded because they did not complete any of the FAQLQ-AF or FAIM questions. Thus, data from 425 participants were available for analysis (Table 1). Figure 1 presents the criteria used to diagnose anaphylaxis and Figure 2 presents the number of participants from each participating country who had experienced anaphylaxis. Proportions of participants who experienced anaphylaxis within 1 country are not shown but were significantly different across participating countries ($P < .001$). In addition, Figure 2 shows the number of participants with anaphylaxis who were prescribed an EAI. These proportions also were significantly different across countries ($P = .007$).

Construct Validity

The correlation of the total FAQLQ-AF score with the total FAIM score was strong ($r \geq 0.60$) in Iceland, Spain, Italy, Greece, and Sweden and very strong ($r \geq 0.80$) in The Netherlands, Poland, and France (Table 2). Most individual items of the translated FAQLQ-AFs showed moderate to strong correlation coefficients (ρ 0.40–0.80) with the total FAIM score. Some items of the FAQLQ-AF did not reach the expected moderate correlation coefficient with the total FAIM score (Table 2), but all individual FAQLQ-AF items correlated significantly with at least 1 FAIM item in all countries (data not shown). Excellent internal consistency (Cronbach α) of the FAQLQ-AF was shown in all participating countries (0.93–0.98).

Table 1

Self-reported participant characteristics and perceived food allergies in all participating countries

	Iceland	Netherlands	Poland	France	Spain	Italy	Greece	Sweden
Participants, n	57	53	71	40	85	58	32	29
Male/female, n	23/33	11/42	25/46	12/28	33/52	20/38	16/16	11/18
Age, mean in years (SD)	34 (13)	32 (10)	40 (11)	36 (11)	37 (9)	40 (13)	30 (9)	43 (17)
Food allergy, n (%) ^a								
Tree nuts	10 (17.9)	36 (67.9)	29 (40.8)	23 (57.5)	19 (22.4)	35 (60.3)	10 (31.2)	15 (51.7)
Peanut	14 (25.0)	20 (37.7)	19 (26.8)	16 (25.0)	15 (17.6)	30 (51.7)	14 (43.8) ^h	13 (44.8)
Milk	7 (12.5)	8 (15.1)	27 (38.0)	2 (5.0)	14 (16.5)	1 (1.7)	2 (6.2)	19 (65.5) ^h
Egg	6 (10.7)	5 (9.4)	10 (14.1)	5 (12.5)	3 (3.5)	1 (1.7)	2 (6.2)	16 (55.2)
Wheat	8 (14.3)	1 (1.9)	7 (9.9)	3 (7.5)	4 (4.7)	2 (3.4)	1 (3.1)	14 (48.3)
Soy	4 (7.1)	9 (17.0)	6 (8.5)	7 (17.5)	2 (2.4)	5 (8.6)	0 (0.0)	6 (20.7)
Sesame seed	6 (10.7)	3 (5.7)	4 (5.6)	9 (22.5)	1 (1.2)	16 (27.6)	2 (6.2)	10 (10.3)
Fish	21 (37.5)	1 (1.9)	5 (7.0)	6 (15.0)	19 (22.4)	4 (6.9)	6 (18.8)	6 (20.7)
Shell fish	26 (46.4) ^h	2 (3.8)	7 (9.9)	4 (10.0)	16 (18.8)	5 (8.6)	7 (21.9)	9 (31.0)
Fruit	13 (23.2)	37 (69.8) ^h	42 (59.2) ^h	31 (77.5) ^h	42 (49.4) ^h	49 (84.5) ^h	12 (37.5)	14 (48.3)
Vegetables	7 (12.5)	12 (22.6)	24 (33.8)	17 (42.5)	18 (21.2)	27 (46.6)	5 (15.6)	9 (31.0)
Number of food allergies, mean (SD) ^b	3 (2)	3 (1)	3 (2)	4 (2)	2 (1)	4 (2)	2 (1)	3 (1)
Type of symptoms during most severe food-allergic reaction, n (%) ^a								
Cardiovascular ^c	16 (28.1)	16 (30.2)	14 (19.7)	11 (27.5)	21 (24.7)	7 (12.1)	14 (43.8) ^h	14 (48.3)
Respiratory tract ^d	30 (52.6) ^h	25 (47.2) ^h	17 (23.9) ^h	21 (52.5) ^h	26 (30.6) ^h	34 (58.6) ^h	5 (15.6)	14 (48.3) ^h
Gastrointestinal tract ^e	3 (5.3)	3 (5.7)	11 (15.5)	1 (2.5)	16 (18.8)	2 (3.4)	4 (12.5)	1 (3.4)
Skin ^f	6 (10.5)	3 (5.7)	15 (21.1)	5 (12.5)	15 (17.6)	5 (8.6)	6 (18.8)	0 (0.0)
Other ^g	2 (3.5)	6 (11.3)	14 (19.7)	2 (5.0)	7 (8.2)	10 (17.2)	3 (9.4)	0 (0.0)
Allergy diagnosed by, n (%) ^a								
General practitioner	9 (16.1)	17 (32.1) ^h	5 (7.0)	10 (25.0)	5 (5.9)	2 (3.4)	1 (3.1)	1 (3.4)
Dietitian	2 (3.6)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	3 (10.3)
Allergist	37 (66.1) ^h	14 (26.4)	29 (40.8) ^h	23 (57.5) ^h	24 (28.2) ^h	56 (96.6) ^h	16 (50.0) ^h	22 (75.9) ^h
Dermatologist	1 (1.8)	14 (26.4)	10 (14.1)	1 (2.5)	1 (1.2)	1 (1.7)	0 (0.0)	4 (13.8)
Pediatrician	0 (0.0)	5 (9.4)	4 (5.6)	1 (2.5)	1 (1.2)	0 (0.0)	3 (9.4)	9 (31.0)
Alternative	5 (8.9)	2 (3.8)	0 (0.0)	0 (0.0)	2 (2.4)	0 (0.0)	0 (0.0)	1 (3.4)
Allergy not diagnosed by health care professional, n (%) ^a	8 (14.0)	14 (26.4)	26 (36.6)	11 (27.5)	50 (58.8)	1 (1.7)	10 (31.3)	2 (6.9)

^aSelf-reported symptoms.^bNumber of food allergies for specific foods listed.^cDizziness, palpitations, loss of vision, inability to stand, light-headedness, collapse, loss of consciousness.^dTightening throat, difficulty swallowing, hoarseness, difficulty breathing, shortness of breath, wheezing, cough.^eNausea, stomach cramps, vomiting, diarrhea.^fItchy skin, red rash, swelling of skin, hives, worsening eczema.^gOral allergy, swollen tongue or lips, symptoms of nose or eyes.^hHighest value in the particular country.

Cross-Cultural Comparison

Outcomes of individual FAQLQ-AF items, total FAQLQ-AF scores, and total FAIM scores in participating countries are presented in Table 3. Total FAQLQ-AF scores of the participating countries were significantly different ($P < .001$), with Sweden showing the highest total FAQLQ-AF score (indicating most impaired HRQL) and Iceland showing the lowest total FAQLQ-AF score (indicating least impaired HRQL).

The cross-cultural difference in HRQL was still significant after adjusting for the confounder “perceived severity” (total FAIM score; Table 4). When adjusted for total FAIM score (perceived severity), Spain had the highest total FAQLQ-AF score (most impaired HRQL) and France had the lowest total FAQLQ-AF score (least impaired

HRQL). This is shown by the B coefficients of the individual countries, which reflect the difference in total FAQLQ-AF score between that particular country and the Netherlands, when adjusted for total FAIM scores.

Discussion

This study shows that the FAQLQ-AF is a valid instrument to measure HRQL in food-allergic adults in 8 European countries. Construct validity of the FAQLQ-AF was strong to very strong and internal consistency was excellent in all 8 countries. Not all individual FAQLQ-AF items showed a moderate correlation with the total FAIM score in all countries. Nevertheless, the FAQLQ-AF as a whole is a valid instrument to measure HRQL of food-allergic patients in each of these 8 European countries.

The availability of a uniform instrument for use in different countries will allow future HRQL studies to operate internationally. The effect of interventions, such as double-blind, placebo-controlled food challenges, food allergy education, and immunotherapy, could be studied in a multinational design. In this way, interventions can be studied in larger samples and differences might be found between different populations or cultures.

The present study found that participants from 8 European countries did not have comparable HRQL (as measured with total FAQLQ-AF scores). This strengthens the value of the instrument, because it proves its sensitivity for differences in HRQL between populations. These cross-cultural differences in HRQL persisted after correction for perceived disease severity (total FAIM score), which indicates that HRQL may differ between populations

Anaphylaxis is highly likely when at least one symptom from Box 1 and one symptom from Box 2 was present during an acute reaction after ingestion of a potential culprit food

Box 1

- Skin involvement
- Mucosal tissue involvement
- Gastrointestinal symptoms

Box 2

- Respiratory symptoms
- Cardiovascular symptoms

Figure 1. Criteria used to diagnose anaphylaxis.

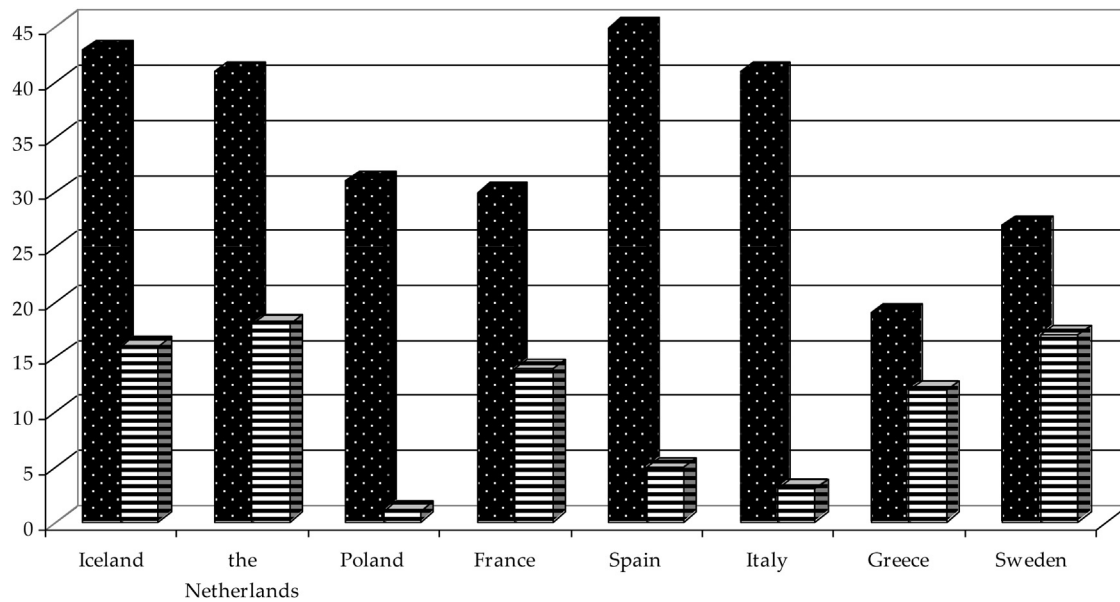


Figure 2. Cross-cultural comparison of the number of participants per country who experienced anaphylaxis (black bars) and the number of these participants who had been prescribed an epinephrine auto-injector (EAI) (gray bars). Differences exist in the percentages of participants who were incorrectly not prescribed an EAI, but the general conclusion is that many participants who should have been prescribed an EAI were not.

independent of perceptions of disease severity. These differences exceeded the previously reported clinical important difference of 0.5.¹⁷ Apparently, factors other than perceived severity might be

associated with HRQL of food-allergic patients. It would be especially interesting to know why these differences exist and how specific populations could best be treated.

Table 2

Correlation coefficients of total FAQLQ-AF score and individual FAQLQ-AF items with total FAIM score^a

	Total FAIM score							
	Iceland	Netherlands	Poland	France	Spain	Italy	Greece	Sweden
Total FAQLQ-AF score (<i>P</i> value)	0.60 (<.001)	0.83 (<.001)	0.80 (<.001)	0.81 (<.001)	0.73 (<.001)	0.78 (<.001)	0.76 (<.001)	0.79 (<.001)
FAQLQ-AF items ^b								
Q1	0.54	0.55	0.64	0.63	0.54	0.52	0.51	0.56
Q2	0.35 ^c	0.40	0.66	0.50	0.53	0.45	0.43	0.47
Q3	0.46	0.57	0.66	0.61	0.53	0.54	0.40	0.60
Q4	0.50	0.65	0.58	0.66	0.52	0.48	0.48	0.32 ^c
Q5	0.57	0.64	0.42	0.36 ^c	0.52	0.51	0.44	0.52
Q6	0.49	0.54	0.68	0.60	0.38 ^c	0.58	0.38 ^c	0.35 ^c
Q7	0.38 ^c	0.55	0.56	0.37 ^c	0.38 ^c	0.62	0.47	0.48
Q8	0.46	0.60	0.68	0.64	0.42	0.54	0.49	0.49
Q9	0.58	0.54	0.58	0.57	0.43	0.51	0.54	0.59
Q10	0.49	0.53	0.63	0.67	0.50	0.54	0.51	0.62
Q11	0.44	0.64	0.62	0.72	0.59	0.62	0.69	0.65
Q12	0.40	0.63	0.66	0.72	0.56	0.68	0.60	0.54
Q13	0.48	0.70	0.49	0.66	0.48	0.46	0.63	0.65
Q14	0.54	0.59	0.64	0.57	0.52	0.48	0.63	0.54
Q15	0.35 ^c	0.52	0.36 ^c	0.69	0.53	0.34 ^c	0.28 ^c	0.00 ^c
Q16	0.55	0.59	0.55	0.51	0.41	0.45	0.43	0.62
Q17	0.41	0.60	0.26 ^c	0.54	0.49	0.48	0.66	0.39 ^c
Q18	0.32 ^c	0.47	0.54	0.49	0.45	0.62	0.60	0.30 ^c
Q19	0.19 ^c	0.47	0.48	0.33 ^c	0.51	0.29 ^c	0.31 ^c	0.08 ^c
Q20	0.33 ^c	0.53	0.59	0.36 ^c	0.28 ^c	0.51	0.50	0.42
Q21	0.52	0.48	0.57	0.67	0.43	0.47	0.50	0.48
Q22	0.25 ^c	0.73	0.70	0.51	0.47	0.53	0.86	0.22 ^c
Q23	0.29 ^c	0.66	0.71	0.51	0.46	0.65	0.61	0.31 ^c
Q24	0.30 ^c	0.67	0.69	0.60	0.61	0.61	0.77	0.62
Q25	0.52	0.75	0.66	0.70	0.60	0.73	0.70	0.45
Q26	0.54	0.59	0.70	0.70	0.62	0.70	0.65	0.62
Q27	0.28 ^c	0.60	0.68	0.79	0.58	0.62	0.40	0.33 ^c
Q28	0.35 ^c	0.56	0.64	0.57	0.59	0.70	0.45	0.44
Q29	0.59	0.71	0.72	0.59	0.68	0.83	0.71	0.37 ^c

Abbreviations: FAIM, Food Allergy Independent Measure; FAQLQ-AF, Food Allergy Quality of Life Questionnaire—Adult Form; Q, question (questions are listed in eTable 1).

^aTable lists correlation coefficients (construct validity) between total FAQLQ-AF scores (health-related quality of life) and total FAIM scores (self-perceived disease severity). Underneath, the correlation coefficients between individual FAQLQ-AF items and total FAIM score are reported.

^bIndividual FAQLQ-AF questions can be found in Flokstra-de Blok et al¹⁰ and in eTable 1

^cThese values did not reach a moderate (≥ 0.40) correlation.

Table 3

Outcomes of FAQLQ-AF, FAIM, and individual FAQLQ-AF items (seven-point response scale)

	Iceland	Netherlands	Poland	France	Spain	Italy	Greece	Sweden
Total FAQLQ-AF score (SD)	3.2 (1.3)	3.5 (1.5)	3.4 (1.7)	3.6 (1.5)	3.4 (1.4)	3.6 (1.3)	4.0 (1.4)	5.0 (1.0)
Total FAIM score (SD)	2.9 (0.8)	3.5 (1.1)	2.8 (1.1)	3.8 (1.2)	2.6 (1.0)	3.4 (1.1)	3.7 (1.2)	4.4 (1.1)
Individual FAQLQ-AF items ^a								
Q1	3.6	3.9	3.8	4.5	3.5	4.2	4.8	6.1 ^b
Q2	3.6	3.8	3.8	4.6	3.7	4.1	3.8	5.7
Q3	3.1	3.3	3.3	4.1	3.2	3.4	3.7	5.9
Q4	3.2	3.2	3.3	3.4	2.7	3.4	4.5	6.1 ^b
Q5	3.8	3.8	3.3	3.8	3.2	3.5	4.4	5.5
Q6	3.4	3.0	3.5	3.4	2.5	3.5	2.8	4.5
Q7	3.5	3.6	2.9	3.1	3.1	2.7	2.7	4.5
Q8	3.2	2.8	2.3 ^b	2.6 ^b	2.6	2.2	2.4 ^b	4.8
Q9	3.8	3.5	3.2	3.3	3.5	3.4	3.7	6.0
Q10	2.5	2.7 ^b	3.0	2.6 ^b	2.3 ^b	1.9 ^b	3.7	4.6
Q11	3.5	3.2	2.9	3.5	2.9	3.1	4.3	6.0
Q12	4.0 ^b	3.7	3.6	3.8	3.6	4.1	5.0 ^b	5.9
Q13	2.9	3.3	2.8	2.9	2.9	3.1	3.8	5.0
Q14	3.7	3.7	3.6	2.9	3.7	3.8	4.6	4.8
Q15	2.2 ^b	3.0	3.5	2.6 ^b	3.6	3.7	3.4	4.4
Q16	2.6	3.4	3.4	3.1	3.8	4.2	4.7	4.9
Q17	2.7	3.5	2.8	3.4	3.2	3.1	4.1	4.8
Q18	3.1	3.4	3.2	3.9	3.1	3.5	4.4	5.2
Q19	3.7	4.5 ^b	3.8	3.1	4.6	3.5	4.7	3.4 ^b
Q20	3.3	3.4	3.1	3.7	2.7	3.5	3.8	5.1
Q21	3.8	3.8	2.9	3.8	2.4	4.0	4.2	4.3
Q22	2.9	3.3	3.5	4.1	4.3	4.2	4.3	4.4
Q23	3.1	4.3	4.3 ^b	4.4	5.0 ^b	5.0 ^b	4.1	3.7
Q24	3.0	4.2	3.9	4.8 ^b	4.5	4.9	4.6	4.5
Q25	3.2	4.0	3.8	4.3	4.1	4.3	4.4	4.7
Q26	3.3	3.3	3.3	3.8	4.0	4.4	4.5	5.0
Q27	3.3	3.4	2.9	3.2	2.7	3.1	3.0	4.9
Q28	2.6	3.9	4.0	4.3	3.0	4.3	4.5	5.0
Q29	3.4	3.3	3.5	4.1	3.3	3.8	4.0	4.7

Abbreviations: FAIM, Food Allergy Independent Measure; FAQLQ-AF, Food Allergy Quality of Life Questionnaire—Adult Form; Q, question (questions are listed in eTable 1); Q1, must always be alert to what you are eating; Q4, must read labels; Q8, less able to spontaneously accept invitation to stay for a meal; Q10, can eat out less; Q12, hesitate eating a product when having doubts about it; Q15, that the lettering on labels is too small; Q19, that it is unclear to which foods you are allergic; Q23, worried that your allergic reactions to foods will become increasingly severe; Q24, frightened of an allergic reaction.

^aIndividual FAQLQ-AF questions can be found in Flokstra-de Blok et al.¹⁰ and in eTable 1

^bHighest (most impaired health-related quality of life) and lowest (least impaired health-related quality of life) values in each country.

For example, differences in HRQL might be related to cultural differences among the 8 European countries. As hypothesized in another cross-cultural comparison of HRQL in food-allergic adults, the way of coping with life events might differ among countries¹³ and might influence the attitude toward having a food allergy. Likewise, the practices and traditions of eating might differ among

the 8 European countries,¹⁸ so having a food allergy might not have the same impact in different countries.

Furthermore, a discrepancy was found between the frequency of reported anaphylaxis and the frequency of EAI prescription in participants from all 8 European countries (Fig 2). Forty-seven percent of all participants who reported anaphylaxis and who were diagnosed by a health care professional were not prescribed an EAI. This finding confirms the results of previous studies^{19–21} and also seems to be an issue in the United States (51.3% of US participants with anaphylaxis did not have an EAI).¹³ Explanations for this underprescription are potentially diverse^{21,22} and include unfamiliarity of health care professionals with EAI prescription guidelines and uncertainty about diagnosing food allergy. Furthermore, the cost of an EAI ranges from approximately €40 to €125²² and is not reimbursed in Poland, France, and Greece, which could make EAI unaffordable for many food-allergic patients. Therefore, the lack of prescription of EAI is a point of interest for further research.

Four individual FAQLQ-AF items (items 12, 19, 23, and 24) appeared to produce the highest scores in food-allergic adults in 7 European countries (Table 3). These items measure the impact of worries about the food allergy becoming increasingly severe, the impact of uncertainty about the diagnosis, and the impact of anxiety about an allergic reaction on HRQL. Thus, uncertainty and anxiety seem to account for the greatest impact on HRQL in European food-allergic adults. These themes should be important targets for intervention. A previous study has shown that uncertainty and anxiety decreased in patients who underwent a double-blinded, placebo-controlled food challenge in the Netherlands,²³ which may be true for food-allergic patients from all countries.

Table 4Relation between country of origin and HRQL (total FAQLQ-AF score), adjusted for perceived severity (total FAIM score)^a

	n	B	SE	P value
Constant	425	0.059	0.191	.757
Country of origin	425			
The Netherlands	53	—	—	—
Greece	32	0.330	0.206	.109
Italy	58	0.203	0.174	.245
Iceland	57	0.266	0.177	.134
Spain	85	0.691	0.165	<.001
France	40	−0.215	0.193	.265
Poland	71	0.527	0.169	.002
Sweden	29	0.523	0.215	.016
Total FAIM score	425	0.990	0.041	<.001

Abbreviations: B, B coefficient of variable within multivariate regression analysis; FAIM, Food Allergy Independent Measure; FAQLQ-AF, Food Allergy Quality of Life Questionnaire—Adult Form; HRQL, health-related quality of life.

^aTable presents the relation between country of origin and HRQL, adjusted for the confounder “total FAIM score” (self-perceived disease severity), as established by a multivariate regression analysis. The variance in HRQL could be predicted for 62% based on country of origin and total FAIM score ($R^2 = 0.617$, $SEE = 0.918$). Analyses were performed using a reference group (The Netherlands) and dummy variables.

When using the FAQLQ-AF in a clinical or research setting, it is important to remember that a single study cannot establish the psychometric properties of a questionnaire for all possible patients and under all possible circumstances. This study has shown that the questionnaire is a valid instrument for a cross-sectional measurement of HRQL of food-allergic adults in particular European countries. Longitudinal validity and responsiveness of the FAQLQ-AF were not tested in this study and should be tested in the target population before conclusions can be drawn. Also, reliability in individual patients was not tested and the FAQLQ-AF is therefore most suitable for group measurements.

Another limitation of this study might be the inhomogeneity of participants. Especially the participants from Sweden differed in many ways from all other participants. These Swedish participants were older; were allergic to milk, egg, or wheat; and reported significantly higher FAIM scores than other participants (which indicates a higher self-perceived disease severity). An advantage of this heterogeneous study population is that the authors were able to show that the FAQLQ-AF can be validated in populations that differ in several ways. A disadvantage of these inhomogeneous populations is that it might be a source of confounding in the cross-cultural comparison of HRQL. However, total FAIM score (self-perceived disease severity) is considered the most important predictor for HRQL and a potential confounder in the cross-cultural comparison. The cross-cultural comparison of HRQL was adjusted for this confounder and the authors expect that this adjustment limits the confounding of cross-cultural differences in participant characteristics.

In conclusion, the FAQLQ-AF is a suitable and valid instrument for measuring HRQL in food-allergic adults from Iceland, The Netherlands, Poland, France, Spain, Italy, Greece, and Sweden. In addition, HRQL in food-allergic adults seems to differ among these countries. These differences cannot be fully explained by differences in the perceived severity of food allergy among participants, suggesting that other (cultural) factors are operative. Future research should recognize the cross-cultural differences in food allergy-related quality of life when identifying targets for optimizing the treatment of patients with food allergy.

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Supplementary Data

Supplementary data related to this article can be found at <http://dx.doi.org/10.1016/j.anai.2014.04.004>.

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eTable 1Individual items on the Food Allergy Quality of Life Questionnaire—Adult Form^a

How troublesome do you find it, because of your food allergy, that you

1. Must always be alert as to what you are eating?
2. Are able to eat fewer products?
3. Are limited as to the products you can buy?
4. Must read labels?
5. Have the feeling that you have less control of what you eat when eating out?
6. Must refuse many things during social activities?
7. Sometimes frustrate people when they are making an effort to accommodate your food allergy?
8. Are less able to spontaneously accept an invitation to stay for a meal?
9. Are less able to taste or try various products when eating out?
10. Can eat out less?
11. Must personally check whether you can eat something when eating out?
12. Hesitate eating a product when you have doubts about it?

How troublesome is it, because of your food allergy

13. That the ingredients of a product change?
14. That labels are incomplete?
15. That the lettering on labels is too small?
16. That the label states: "May contain (traces of) ..."?
17. That ingredients are different in other countries (eg, during vacation)?
18. That people underestimate your problems caused by food allergy?
19. That it is unclear to which foods you are allergic?
20. That you must explain to those around you that you have a food allergy?
21. For your host or hostess should you have an allergic reaction?

How worried are you because of your food allergy?

22. About your health?
23. That the allergic reactions to foods will become increasingly severe?

How frightened are you because of your food allergy?

24. Of an allergic reaction?
25. Of accidentally eating the wrong food?
26. Of an allergic reaction when eating out although your dietary restrictions have been discussed beforehand?

Answer the following questions:

27. To what degree do you feel you are being a nuisance because you have a food allergy when eating out?
28. How discouraged do you feel during an allergic reaction?
29. How apprehensive are you about eating something you have never eaten before?

^aThe Food Allergy Quality Life Questionnaire—Adult Form can be downloaded from <http://www.FAQLQ.com>.