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Adolescent–parent disagreement on health-related quality of life of food-allergic adolescents: who makes the difference?

J. L. van der Velde¹, B. M. J. Flokstra-de Blok², A. Hamp³, R. C. Knibb³, E. J. Duiverman¹ & A. E. J. Dubois¹

¹Division of Pediatric Pulmonology and Pediatric Allergy, Departments of Pediatrics, GRIAC Research Institute, University Medical Center Groningen, University of Groningen, Groningen, the Netherlands; ²General Practice, University Medical Center Groningen, University of Groningen, Groningen, the Netherlands; ³Department of Psychology, University of Derby, Derby, UK

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Abstract

Background: Food-allergic adolescents are at highest risk for food allergy fatalities, which may be partly due to compromised self-management behavior. Such behavior may be negatively influenced by conflictual situations caused by adolescent–parent disagreement on the adolescent’s health-related quality of life (HRQL). Comparisons of adolescent-self-reported and parent-proxy-reported HRQL of food-allergic adolescents have never extensively been studied. The aims of this study were to investigate disagreement in adolescent-self-reports and parent-proxy-reports on the HRQL of food-allergic adolescents and to investigate the factors influencing adolescent–parent disagreement.

Methods: Teenager Form (TF) and Parent Form (PFA) of the Food Allergy Quality of Life Questionnaire (FAQLQ), Food Allergy Independent Measure (FAIM), and Brief-Illness Perception Questionnaire (Brief-IPQ) were sent to food-allergic Dutch adolescents (13–17 years) and their parents. ICCs, t-tests, and Bland–Altman plots were used to investigate adolescent–parent disagreement. Participant characteristics, illness expectations, and illness perceptions influencing adolescent–parent disagreement were studied using regression analysis.

Results: Seventy adolescent–parent pairs were included. There were a moderate correlation (ICC = 0.61, \( P < 0.001 \)) and no significant difference (3.78 vs 3.56, \( P = 0.103 \)) between adolescent-self-reported and parent-proxy-reported HRQL at group level. However, Bland–Altman plots showed relevant differences (exceeding the minimal important difference) for 63% of all adolescent–parent pairs. Adolescent’s age (>15 years), poorer adolescent-reported illness comprehension (Brief-IPQ-TF, coherence), and higher adolescent-reported perceived disease severity (Food Allergy Independent Measure-Teenager Form & -Parent Form) were associated with adolescent–parent disagreement.

Conclusions: Adolescent–parent disagreement on the adolescent’s HRQL was mainly associated with adolescents’ rather than parents’ perceptions and characteristics. Illness comprehension of the adolescent may be an important target for intervention aimed at reducing adolescent–parent disagreement.

Keywords

adolescents; food allergy; health-related quality of life; illness perceptions; parents.
Food allergy affects about 2.3% of adolescents (1), and they are at highest risk for food allergy fatalities (2). This may be caused by the fact that adolescents often engage in risk-taking behaviors (2–4) resulting in reduced vigilance about food consumption or reluctance to carry the epinephrine auto-injector (EAI) (4–6). Such compromised self-management behavior may be exacerbated by parent–patient conflicts on the adolescent’s health-related quality of life (HRQL). For example, parents may not recognize the social impact of food avoidance and carrying an EAI on their adolescent’s HRQL. However, these and other aspects of the adolescent’s HRQL (7–12) may be considered as problematic by adolescents themselves, and this may cause parent–patient conflicts. Relationships between reduced disease management and family conflict have previously been shown in adolescents with diabetes (13). Additionally, interventions reducing family conflict were associated with better blood glucose monitoring (14, 15) and HRQL (16). Therefore, it is important to study adolescent–parent disagreement on the adolescent’s HRQL in food allergy as well. Another reason for studying parent-reports in addition to adolescent-self-reports on the adolescent’s HRQL is the fact that parental attitudes may influence adolescents’ own attitudes (17). For example, parental anxiety on vigilance about food consumption may serve as a psychosocial stressor for the adolescent. Additionally, parental attitudes, beliefs, and fears can have an impact on the utilization of health care services for their child (18), and parents may provide information not provided by adolescents themselves (19).

A number of factors may predict adolescent–parent disagreement on the adolescent’s HRQL (20–22), including sociodemographic variables, illness perceptions, expectations, and anxiety. For example, adolescents who report low risk perception scores on illness-expectation-questions such as ‘how big do you think the chance is of dying because of your food allergy?’ may report better HRQL than parents reporting high risk perception. Consequently, this may cause adolescent–parent disagreement on the adolescent’s HRQL. However, research findings remain inconclusive regarding the effects of these variables (20–22). Moreover, these variables have not been studied in food-allergic adolescents (13–17 years).

Therefore, the aims of this study were to compare adolescent-self-reports and parent-reports on the HRQL of food-allergic adolescents and, secondly, to investigate variables that may influence adolescent–parent disagreement on the adolescent’s HRQL to identify potential targets for interventions aimed at reducing such disagreement.

Methods

Participants and procedures

Food-allergic Dutch adolescents (13–17 years) and their parents were recruited from the pediatric allergy clinic or through Dutch food allergy support organizations (10) between May and July 2010. Adolescents with at least one physician-diagnosed food allergy were included. Possible differences between descriptive characteristics (Table 1) of adolescent–parent pairs recruited by clinic and advertisement
were examined using chi-square test (nominal/ordinal data) and Mann–Whitney U-test (numeric data).

Questionnaire packages and a letter of invitation were sent by mail to be completed at home. Adolescent–parent pairs were instructed that they were not allowed to discuss questions with each other. Participation in the study was completely voluntary. This study was approved by the local medical ethics review commission who deemed that formal approval by the commission was not required (METc 2005/051).

Questionnaires

Food Allergy Quality of Life Questionnaire-Teenager Form (FAQLQ-TF)
The original Dutch FAQLQ-TF is an adolescent-self-report instrument for measuring the impact of food allergy on the adolescent’s HRQL (10). The FAQLQ-TF contains 23 items and three domains (Allergen Avoidance & Dietary Restrictions, Risk of Accidental Exposure and Emotional Impact). Items are scored on a seven-point scale. Total FAQLQ score is the sum of all items divided by the number of items and ranges from 1 (minimal impairment of HRQL) to 7 (maximal impairment of HRQL).

Food Allergy Quality of Life Questionnaire-Parent Form, Adolescent version (FAQLQ-PFA)
The original English FAQLQ-PFA is a parent-proxy-report instrument for measuring the impact of food allergy on the adolescent’s HRQL (23), (A. Hamp, R.C. Knibb, J.L. van der Velde, B.M.J. Flokstra-de Blok, A.E.J. Dubois, unpublished data). The FAQLQ-PFA was translated into Dutch using the guidelines of the World Health Organization. Two native Dutch speakers translated the FAQLQ-PFA from English into Dutch, and two native English speakers translated the Dutch FAQLQ-PFA back into English. The original English version was compared with the back-translated English version by an expert panel. No important differences in content or meaning of questions emerged during translation and pretesting. The FAQLQ-PFA contains 27 items and four domains (Emotional Impact, Food Anxiety, Social restrictions and Dietary restrictions). Items are scored in the same way as the FAQLQ-TF.

Food Allergy Independent Measure-Teenager Form & -Parent Form (FAIM-TF & -PFA)
The Food Allergy Independent Measure (FAIM) reflects the patient’s perceived disease severity and their food allergy-related risk perception. The Dutch FAIM was originally developed as an independent measure for food allergy (24) to evaluate the construct validity of the FAQLQs. The FAIM-TF (adolescent-self-report) and FAIM-PF (parent-proxy-report) contain four expectations of outcome questions, which capture the patients’ perceived expectation of the chance of accidental exposure and of what will happen following accidental exposure, and two questions reflecting disease severity. Each question was scored on a scale ranging from 1 (no chance) to 7 (certainty). Total FAIM score is the sum of all items divided by the number of items.

Brief-Illness Perception Questionnaire-Teenager Form & -Parent-proxy Form (Brief-IPQ-TF & -PF)
The Brief-IPQ contains five items reflecting cognitive illness representations, two items reflecting emotional illness representations, and two items reflecting coherence (illness comprehension, i.e. the adolescent’s perceived understanding of food allergy) and causal illness representation. Items are scored on a scale ranging from 1 (benign view of illness) to 11 (threatening view of illness), except for the open-ended causal item. The New Zealand’s Brief-IPQ (25) was previously validated in the Netherlands (26).

Descriptive characteristics

Additional questions on food allergy, sociodemographic parameters, and trait anxiety were administered. The trait anxiety scale of the State and Trait Anxiety Inventory (STAI) was used as an anxiety measure (27, 28) and was completed as a self-report by adolescent and parents. The scale contains 20 items, which are scored on a scale ranging from 1 (no anxiety) to 3 (severe anxiety) for adolescents and from 1 to 4 for adults.

Statistical analysis

Adolescent–parent disagreement

Comparison of outcome: Data were analyzed using spss software for Windows (version 16.0). Three methods were used to investigate adolescent–parent disagreement to provide sufficient information on such disagreement. First, total FAQLQ-TF and FAQLQ-PFA scores were tested for significant differences (paired samples t-test). P < 0.05 was considered to be significant. Secondly, total FAQLQ-TF and FAQLQ-PFA scores were correlated using intraclass correlation coefficients (ICC, two-way mixed-effects model). Thirdly, Bland–Altman plots were used to visualize the differences between FAQLQ-TF and FAQLQ-PF scores for individual adolescent–parent pairs. Therefore, the mean FAQLQ score of each adolescent–parent pair was plotted against the difference (FAQLQ-TF minus FAQLQ-PFA score) of each adolescent–parent pair. As it is important to know whether a difference between FAQLQ-TF and FAQLQ-PFA scores is clinically meaningful for patients, the minimal important difference (MID) was used to calculate the percentage of individual adolescent–parent pairs reporting clinically relevant differences exceeding the MID. The MID reflects the smallest difference or change in HRQL score associated with a difference or change in health status that patients find meaningful. In HRQL questionnaires with a seven-point scale, the MID is usually around 0.5 (29). The mean difference ± the MID (0.5) was used as limits of agreement. The same procedure was followed for comparisons between FAIM-TF and FAIM-PF and between Brief-IPQ-TF and Brief-IPQ-PF.

Comparison of measurement properties: Construct validity of the FAQLQs was investigated by calculating Pearson’s correlation coefficient between FAQLQ-PFA and FAIM-PF scores and between FAQLQ-TF and FAIM-TF scores, respec-
tively. Moderate correlations (0.40–0.60) were expected (30). Internal consistency was investigated using Cronbach’s alpha (α ≥ 0.70 was considered to be good). Discriminative abilities were investigated comparing total questionnaire scores for boys vs girls, for adolescents who have two or fewer vs more than two food allergies (independent-samples t-tests), and for adolescents who experienced anaphylaxis (31) vs adolescents who did not (Mann–Whitney U-test). Floor and ceiling effects were calculated as percentage of patients with lowest and highest total questionnaire scores, respectively.

Factors influencing adolescent–parent disagreement on HRQL: Univariate and adjusted linear regression analyses were performed to investigate the factors influencing adolescent–parent disagreement. The mean difference between adolescent- and parent-reported HRQL was used as outcome variable, and participant characteristics (Table 1), illness expectations (FAIM), and perceptions (Brief-IPQ) were used as predictor variables. Predictor variables were entered into the adjusted linear regression model (enter procedure) when they were associated with the outcome variable in the univariate regression analysis (P < 0.05). There was multicollinearity (Pearson’s r > 0.60) for the variables Brief-IPQ-TF and FAIM-TF. Therefore, the variable Brief-IPQ-TF was deleted from the adjusted model and replaced by domain coherence, which was not associated with FAIM-TF.

Results

Participants

Questionnaire packages were sent to 122 adolescent–parent pairs and returned by 74 adolescent–parent pairs. One adolescent–parent pair was excluded, because the adolescent had outgrown his food allergy. Three adolescent–parent pairs were excluded because less than 85% of the questions were completed. Therefore, 70 adolescent–parent pairs were eligible for analysis.

Table 1 shows the descriptive characteristics. Forty-eight adolescent–parent pairs were recruited from our clinic, of whom 31 had a food allergy confirmed by a double-blind placebo-controlled food challenge (DBPCFC), two by an open food challenge, and fifteen by skin prick test and/or blood test. Twenty-two adolescent–parent pairs were recruited by advertisement and all reported physician-diagnosed food allergies. There were no significant differences in descriptive characteristics (Table 1) between adolescents recruited from clinic and advertisement [P-values ranged from 0.052 (presence of sesame allergy) to 0.946 (presence of vegetable allergy)] or between adolescents diagnosed by means of a DBPCFC and otherwise diagnosed.

Comparison between FAQLQ-TF and FAQLQ-PFA

There was no significant difference between FAQLQ-TF and FAQLQ-PFA total scores (3.78 vs 3.56, P = 0.103, df = 69), and the correlation between them was moderate to good (Table 2, Fig. 1A). The Bland–Altman plot illustrates that 63% of the differences between adolescent- and parent-reported HRQL of all individual adolescent–parent pairs exceeded the limits of agreement reflecting the mean difference ± the minimal clinically important difference (Fig. 2A). Thus, 63% of all adolescent–parent pairs reported clinically relevant differences in the adolescent’s HRQL.

Measurement properties of the FAQLQ-TF and FAQLQ-PFA were considered to be good (33).

Comparison between FAIM-TF and FAIM-PF

There was no significant difference between adolescent- and parent-reported total FAIM scores (3.55 vs 3.61, P = 0.574) or between individual item scores (Table 2). There were good correlations between adolescent- and parent-reported total FAIM scores (Table 2, Fig. 1B) and for the items ‘number of products to avoid’ and ‘impact on social life’. There were moderate to poor correlations between adolescent- and parent-reports for the other items (Table 2). The Bland–Altman plot illustrates that 53% of all adolescent–parent pairs showed differences between adolescent- and parent-reported FAIM scores that exceeded the MID (Fig. 2B).

Measurement properties of the FAIM-TF and FAIM-PF were considered to be good (Table 3).

Comparison between Brief-IPQ-TF and Brief-IPQ-PF

There was a significant difference between adolescent-self-reported IPQ total scores and parent-proxy-reported IPQ total scores (5.04 vs 5.32, P = 0.037), item ‘illness concern’ (4.36 vs 5.14, P = 0.024), and item ‘emotional representations’ (3.17 vs 4.14, P = 0.002) (Table 2). The differences for the items exceeded the smallest detectable change (SDC) (26). In other words, parents reported more emotions and concerns about food allergy than adolescents themselves. There were good correlations between adolescent- and parent-reported total Brief-IPQ scores (Table 2, Fig. 1C). Items ‘treatment control’ and ‘coherence’ showed poor correlations (Table 2). The Bland–Altman plot illustrates that relevant differences were shown for some adolescent–parent pairs (Fig. 2C).

Measurement properties of the Brief-IPQ-TF and Brief-IPQ-PF were considered to be moderate to good (Table 3).

Factors influencing adolescent–parent disagreement on HRQL

The final adjusted model explained 40.7% of variance in the difference between adolescent- and parent-reported HRQL (P < 0.001). Thus, increased age of the adolescent (16–17 years), higher perceived disease severity (FAIM-TF), and poorer adolescent-reported perceived illness comprehension (coherence) all contributed significantly to a larger difference between adolescent- and parent-reported HRQL (Table 4). There was borderline significance for the association between last experience of anaphylaxis and the difference between adolescent- and parent-reported HRQL. Thus, a more recent diagnosis of food allergy causes a larger difference between
adolescent- and parent-reported HRQL. The effect of parental workforce participation was confounded by the variables adolescent coherence (illness comprehension) and age. Interestingly, adolescent-reported illness perceptions and expectations showed stronger associations with the mean difference in HRQL than parent-reported illness perceptions and expectations.

**Discussion**

This is the first study comparing self-reports and parent-reports on the adolescent’s HRQL in food-allergic adolescents using valid and disease-specific HRQL instruments. Although substantial correlations and no significant differences were shown between adolescent-self-reported HRQL and parent-proxy-reported HRQL at a group level, there was a clinically important difference in HRQL scores (i.e. exceeding the MID) for 63% of all individual adolescent–parent pairs. Thus, 63% of all individual adolescent–parent pairs reported clinically relevant differences in the adolescent’s HRQL. As the MID reflects the smallest difference in HRQL score associated with a difference in health status that patients find meaningful, this is an important parameter in interpreting our study results. Clinicians should thus be aware of disagreement in perspectives on the adolescent’s HRQL and the factors contributing to such disagreement.

Several factors were associated with adolescent–parent disagreement on the adolescent’s HRQL. It was quite revealing that the adolescent’s characteristics (age and last experience of anaphylaxis), illness perceptions, and expectations (Table 4) had much stronger associations with the mean difference in the adolescent’s HRQL than parent-proxy perceptions and expectations. In other words, a high subjective disease severity (amount of products to avoid, chance of

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**Table 2** Comparison of outcome of adolescent- and parent-reports on health-related quality of life (FAQLQ), illness expectations (FAIM), and perceptions (IPQ)

| Outcome | Adolescent report score (SD) | Parent report score (SD) | Correlation adolescent–parent reports ICC |
|---------|------------------------------|--------------------------|-----------------------------------------|
| FAQLQ total score | 3.78 (1.39) | 3.56 (1.07) | 0.61 |
| Allergen avoidance & dietary restrictions | 3.88 (1.46) | 3.87 (1.59) | 3.71 (1.57) |
| Risk of accidental exposure | 4.18 (1.37) | 3.82 (1.14) | 3.21 (1.32) |
| Emotional impact | 3.09 (1.16) | 3.09 (1.16) | 0.64 |
| FAIM (illness expectations) total score | 3.55 (1.10) | 3.61 (0.90) | 0.64 |
| Chance of accidental exposure | 3.54 (1.20) | 3.36 (1.06) | 0.34 |
| Chance of severe reaction | 4.57 (1.80) | 4.63 (1.66) | 0.33 |
| Chance of dying following exposure | 2.86 (1.60) | 2.97 (1.55) | 0.57 |
| Chance of not dealing with a reaction | 3.19 (1.40) | 3.23 (1.31) | 0.36 |
| Number of products to avoid | 4.16 (1.52) | 4.23 (1.12) | 0.70 |
| Impact on social life | 2.99 (1.62) | 3.23 (1.45) | 0.69 |
| Brief-IPQ (illness perceptions) | 5.04 (1.31) | 5.32 (1.19) | 0.63 |
| Consequences | 5.77 (2.70) | 5.96 (2.34) | 0.60 |
| Timeline | 9.84 (2.26) | 10.20 (1.95) | 0.63 |
| Personal control | 3.51 (2.27) | 3.12 (1.98) | 0.40 |
| Treatment control | 6.31 (2.60) | 6.37 (2.93) | 0.28 |
| Identity | 4.81 (3.13) | 5.29 (2.98) | 0.45 |
| Illness concern | 4.36 (3.11) | 5.14 (2.70) | 0.52 |
| Coherence (illness comprehension) | 2.56 (1.71) | 2.31 (1.57) | 0.25 |
| Emotional representations | 3.17 (2.63) | 4.14 (2.54) | 0.51 |
| Open-ended question: main cause of food allergy (Top 5) | n (%) | n (%) | 0.31 |
| No idea | 26 (38) | 15 (22) |
| Genetic/innate | 29 (42) | 34 (49) |
| Environmental factors | 6 (9) | 5 (7) |
| Dysfunction of immune system | 3 (4) | 3 (4) |
| Coincidence/bad luck | 2 (3) | 5 (7) |
| Other* | 4 (6) | 8 (11) |

FAIM, Food Allergy Independent Measure; IPQ, Illness Perception Questionnaire; ICC, intraclass correlation coefficient.

*Hygiene in Western Europe, in combination with other atopic disorders, food industry, etc.

Scores in boldface represent significant differences (P < 0.05) between adolescent- and parent-reports/significant ICC scores.
severe reaction following exposure, etc.) and worse subjective illness comprehension (perceived understanding food allergy) as perceived by the adolescent caused larger differences in mean FAIM score (adolescent- and parent-report).

Mean difference

Difference (FAIM-TF minus FAIM-PF)

Mean difference + MID

Mean difference - MID

Figure 1 Adolescent-self-reports vs parent-proxy-reports for (A) health-related quality of life, (B) perceived disease severity, and (C) illness perception.

van der Velde et al.  
Food allergy-related quality of life of adolescents

Figure 2 Bland–Altman plots illustrating adolescent–parent agreement for (A) food allergy–related quality of life, (B) perceived disease severity, and (C) illness perceptions. FAIM, Food Allergy Independent Measure Questionnaire; FAQLO, Food Allergy Quality of Life Questionnaire; IPQ, Illness Perception Questionnaire; MID, Minimal clinically Important Difference.
between adolescent- and parent-reported HRQL, whereas the same perceptions as perceived by the parent were not associated with the difference between adolescent- and parent-reported HRQL. This may suggest that adolescents mainly determine adolescent–parent disagreement on the adolescent’s HRQL, because most determinants of the adolescent’s HRQL are poorly perceived by their parents.

Additionally, adolescent’s age was associated with adolescent–parent disagreement on the adolescent’s HRQL. We found better adolescent–parent agreement for younger (13–15 years) than for older adolescents (16–17 years). Associations between age and child–parent agreement on HRQL have been previously shown (32–34). We previously studied food-allergic children aged 8–12 years (34) and reported better child–parent agreement for older (11–12 years) than for younger children (8–10 years). This may be caused by the fact that as children mature, they become more articulate in expressing their feelings or concerns and consequently, parents may have a better insight into their child’s HRQL. The age-effect in the current study may be caused by the fact that as adolescents mature, they spend less time under parental supervision and develop their independence. Consequently, older adolescents may be less influenced by their parents and parents may have less insight into their older adolescent’s HRQL. These factors may negatively influence adolescent–parent agreement. It thus seems likely that child–parent agreement on the impact of food allergy on the child’s HRQL is associated with age and that child–parent agreement is highest for food-allergic children aged 11–15 years.

As it was previously shown that family conflict negatively impacts on self-management behavior of diabetic adolescents (14, 15), it is possible that adolescent–parent disagreement on the adolescent’s HRQL may influence self-management behavior of food-allergic adolescents as well. As poorer adolescent-reported illness comprehension was associated with adolescent–parent disagreement, this may be a target for intervention aimed at reducing disagreement. The impact of illness comprehension on adolescent–parent disagreement may also be reflected by the fact that a less recent diagnosis of food allergy (last experience of anaphylaxis) was associated with better adolescent–parent agreement. Adolescents with a less recent diagnosis of food allergy and their parents have probably visited clinicians more often and may have improved their comprehension of food allergy resulting in better adolescent–parent agreement on HRQL. Although the relationship between adolescent–parent disagreement on the adolescent’s HRQL and self-management behavior is hypothetical in food

**Table 3** Comparison of measurement properties of the Food Allergy Quality of Life Questionnaires (FAQLQ), Food Allergy Independent Measure (FAIM), and Illness Perception Questionnaire (IPQ)

| Validity | Internal consistency | Floor & ceiling effects* | Discriminative abilities |
|----------|----------------------|--------------------------|--------------------------|
|          | Pearson α            | %/%                      | Sex males vs females     | Number of food allergies ≤2 vs >2 | Anaphylaxis no vs yes |
| FAQLQ-TF | 0.77                 | 0.96                     | 0/0                      | 3.58 vs 4.04 | 3.52 vs 4.06 | 3.14 vs 4.03 |
| AADR     | 0.61                 | 0.93                     | 1.4/1.4                  | n.p.         | n.p.         | n.p.         |
| RAE      | 0.74                 | 0.85                     | 2.9/1.4                  | n.p.         | n.p.         | n.p.         |
| EI       | 0.66                 | 0.89                     | 1.4/1.4                  | n.p.         | n.p.         | n.p.         |
| FAQLQ-PFA| 0.64                 | 0.94                     | 0/0                      | 3.36 vs 3.83 | 3.42 vs 4.04 | 2.88 vs 3.79 |
| DR       | 0.58                 | 0.89                     | 0/0                      | n.p.         | n.p.         | n.p.         |
| FA       | 0.53                 | 0.77                     | 0/0                      | n.p.         | n.p.         | n.p.         |
| SR       | 0.44                 | 0.82                     | 2.9/1.4                  | n.p.         | n.p.         | n.p.         |
| EI       | 0.61                 | 0.84                     | 1.4/0                    | n.p.         | n.p.         | n.p.         |
| FAIM-TF  | n.a.                 | 0.81                     | 0/0                      | 3.44 vs 3.69 | 3.24 vs 3.90 | 3.01 vs 3.75 |
| FAIM-PF  | n.a.                 | 0.73                     | 0/0                      | 3.50 vs 3.74 | 3.42 vs 3.82 | 3.15 vs 3.77 |
| Brief-IPQ-TF | n.a. | 0.59 | 0/0 | 4.83 vs 5.35 | 4.79 vs 5.30 | 4.79 vs 5.17 |
| Brief-IPQ-PF | n.a. | 0.66 | 0/0 | 5.06 vs 5.69 | 4.99 vs 5.65 | 4.93 vs 5.46 |

*Percentage of patients with the minimal (floor) or maximal (ceiling) questionnaire score.

†The FAQLQ-PFA discriminated between adolescents with ≤3 food allergies vs >3 food allergies.

Scores in boldface represent significant values (P < 0.05).
Allergy, illness comprehension of the adolescent may be an important target for intervention aimed at reducing disagreement. Future studies might focus on education programs for adolescents able to improve their understanding of food allergy. Such programs may also reduce adolescent–parent disagreement and improve self-management.

Our results provide insight into several determinants of adolescent–parent disagreement on the adolescent’s HRQL. As 60.3% of the variance in the difference between self-reports and parent-proxy-reports on the adolescent’s HRQL has not been explained yet, further research may identify additional variables influencing adolescent–parent disagreement. Parental gender may be such a variable. In our study, the FAQLIQ-PFA was mainly completed by mothers. As fathers may have a different view on their adolescent’s HRQL than mothers, this may influence adolescent–parent disagreement.

There is no consensus in literature on whether parents systematically report poorer or better HRQL than their child (20, 22, 34–36). These differences in results may depend on several factors such as the disease studied, the instruments used, the age of the child, and culture. However, there is consensus on the fact that there generally is moderate child-parent agreement on the child’s HRQL. Therefore, it is important to recognize the fact that there is disagreement and to discuss areas, determinants, and possible consequences of disagreement with child–parent pairs.

In summary, the FAQLIQ-TF and FAQLIQ-PFA should be used together to highlight areas of adolescent–parent disagreement, which require special attention. There is moderate adolescent–parent agreement on the adolescent’s HRQL. Disagreement is determined mainly by the adolescent’s characteristics and perceptions of food allergy rather than the parent’s perceptions and characteristics. Illness comprehension of the

| Table 4 | Univariate & adjusted associated factors influencing adolescent–parent agreement on HRQL |
|---------|-----------------------------------------------|
|         | Univariate associations                       | Adjusted associations |
|         | B    | R² (%) | P    | CI       | B    | P    | CI       |
| Adolescent characteristics |       |       |      |         |       |       |         |
| Sex (males vs females)      | −0.002 | 0.0  | 0.995 | −0.532−0.529 | 0.823 | 0.001 | 0.332−1.314 |
| Age (13–15 vs 16–17 years) | 0.710  | 9.2  | 0.011 | 0.171−1.249 | 0.153 | 0.5  | −0.372−0.678 |
| Number food allergies      | 0.153  | 0.5  | 0.562 | −0.372−0.678 |       |       |         |
| (0–2 vs >2)                | −0.028 | 0.0  | 0.926 | −0.628−0.572 | −0.073 | 9.3  | 0.011 | −0.129−0.018 |
| Anaphylaxis (no vs yes)    | −0.073 | 9.3  | 0.011 | −0.129−0.018 |       |       |         |
| Last experience of anaphylaxis (how long ago in years) |       |       |      |         |       |       |         |
| Anxiety (STAI-TF)          | 0.017  | 2.9  | 0.161 | −0.007−0.040 |       |       |         |
| Adolescent-reported perceived disease severity (FAIM-TF) | 0.365  | 13.4 | 0.002 | 0.140−0.590 |       |       |         |
| Adolescent-reported illness perceptions (IPQ-TF) | 0.413  | 24.3 | <0.001 | 0.235−0.592 |       |       |         |
| Coherence (illness comprehension) | 0.230  | 12.9 | 0.002 | 0.084−0.375 |       |       |         |
| Emotional perceptions      | 0.182  | 18.7 | <0.001 | 0.090−0.275 |       |       |         |
| Cognitive perceptions      | 0.309  | 12.8 | 0.003 | 0.112−0.505 |       |       |         |
| Parent characteristics     |       |       |      |         |       |       |         |
| Sex (female vs male)       | −0.013 | 0.0  | 0.977 | −0.888−0.862 |       |       |         |
| Age (years)                | −0.020 | 0.5  | 0.561 | −0.088−0.048 |       |       |         |
| Marital status             | 0.136  | 0.2  | 0.742 | −0.688−0.961 |       |       |         |
| (together vs alone)        |       |       |      |         |       |       |         |
| Workforce participation    | 0.628  | 6.2  | 0.038 | 0.035−1.221 |       |       |         |
| (no vs yes)                |       |       |      |         |       |       |         |
| Education (vocational vs >vocational) | −0.116 | 0.3  | 0.676 | −0.669−0.437 |       |       |         |
| Anxiety (STAI-PF)          | 0.026  | 2.9  | 0.162 | −0.011−0.063 |       |       |         |
| Family income              | 0.266  | 1.0  | 0.461 | −0.451−0.983 |       |       |         |
| (middle vs >middle)        |       |       |      |         |       |       |         |
| Parent-reported perceived disease severity (FAIM-PF) | 0.047  | 0.2  | 0.750 | −0.246−0.340 |       |       |         |
| Parent-reported illness perceptions (IPQ-PF) | 0.067  | 0.6  | 0.539 | −0.149−0.283 |       |       |         |
| Coherence (illness comprehension) | −0.032 | 0.3  | 0.680 | −0.188−0.123 |       |       |         |
| Emotional representations  | 0.028  | 0.4  | 0.615 | −0.081−0.137 |       |       |         |
| Cognitive representations  | 0.080  | 0.7  | 0.477 | −0.144−0.304 |       |       |         |

FAIM, Food Allergy Independent Measure; FAIM-TF, Food Allergy Independent Measure-Teenager Form; HRQL, health-related quality of life; STAI, State and Trait Anxiety Inventory.

Scores in boldface represent significant values (P < 0.05).
adolescent may be an important target for intervention aimed at reducing adolescent–parent disagreement on the adolescent’s HRQL.

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All authors have declared no conflict of interest.

Author’s Contribution

All authors declare to have contributed significantly to the research and preparation, revision, and final production of the manuscript and approve its submission to the journal. All authors take public responsibility for appropriate portions of the content. The contents of the manuscript have not been previously published and are not currently submitted elsewhere.

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