

1 **TITLE PAGE**

2 Original Article

3 **Title: Parental self-efficacy in managing food allergy and mental health predicts food**  
4 **allergy related quality of life.**

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13 Running Head: **Self-efficacy in managing food allergy**

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23 protocol; C Stalker collected and inputted the data for the study; R Knibb analysed the data

24 and wrote the paper; all authors contributed to editing the paper and agreed the final version.

25

26 Knibb R C, Barnes C, Stalker C

27 **Parental self-efficacy in managing food allergy and mental health predicts food allergy**  
28 **related quality of life.**

29 *Pediatr Allergy Immunol*

30

31 **ABSTRACT**

32 **Background:** Food allergy has been shown to have a significant impact on quality of life  
33 (QoL) and can be difficult to manage in order to avoid potentially life threatening reactions.  
34 Parental self-efficacy (confidence) in managing food allergy for their child might explain  
35 variations in QoL. This study aimed to examine whether self-efficacy in parents of food  
36 allergic children was a good predictor of QoL of the family.

37

38 **Methods:** Parents of children with clinically diagnosed food allergy completed the Food  
39 Allergy Self-Efficacy Scale for Parents (FASE-P), the Food Allergy Quality of Life Parental  
40 Burden Scale (FAQL-PB), the GHQ-12 (to measure mental health) and the Food Allergy  
41 Independent Measure (FAIM), which measures perceived likelihood of a severe allergic  
42 reaction.

43

44 **Results:** A total of 434 parents took part. Greater parental QoL was significantly related to  
45 greater self-efficacy for food allergy management, better mental health, lower perceived  
46 likelihood of a severe reaction, older age in parent and child and fewer number of allergies (all  
47  $p < 0.05$ ). Food allergy self-efficacy explained more of the variance in QoL than any other  
48 variable and self-efficacy related to management of social activities and precaution and  
49 prevention of an allergic reaction appeared to be the most important aspects.

50

51 **Conclusions:** Parental self-efficacy in management of a child's food allergy is important and  
52 is associated with better parental QoL. It would be useful to measure self-efficacy at visits to  
53 allergy clinic in order to focus support; interventions to improve self-efficacy in parents of food  
54 allergic children should be explored.

55 **Key words: confidence; food allergy; parents; quality of life; self-efficacy**

56

57 **Abbreviations:**

58 FAIM: Food Allergy Independent Measure

59 FASE-P: Food Allergy Self-Efficacy Scale for Parents

60 FAQL-P: Food Allergy Quality of Life – Parental Burden Questionnaire

61 GHQ-12: General Health Questionnaire – 12

62 QoL: Quality of Life

63

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69

70 **INTRODUCTION**

71 Food allergy affects approximately 5% of children and is often a life-long condition with about  
72 20% not growing out of their allergy<sup>(1)</sup>. Symptoms related to accidental ingestion of an  
73 allergen can be severe and include urticaria, hives, swelling of lips, tongue and mouth and  
74 anaphylactic shock. Optimal management of food allergy is complete avoidance of the  
75 allergen and administration of antihistamine or adrenaline if accidental ingestion and a  
76 reaction occurs <sup>(1,2)</sup>. Parents and children have reported that food allergy has a significant  
77 impact on quality of life compared to healthy controls<sup>(3)</sup> and children with other chronic  
78 conditions<sup>(4)</sup>. Quality of life is a multi-dimensional construct including emotional, social,  
79 environmental and physical domains and should be viewed in the context of a person's  
80 culture, value systems, goals, expectations, standards and concerns<sup>(5)</sup>. A number of domains  
81 of quality of life appear to be affected in food allergy including social relationships, emotional,  
82 school and financial<sup>(6)</sup>. The constant risk of a serious reaction is thought to be a major cause  
83 of the burden of food allergy and an important factor in causing stress and worry in parents.  
84 Parents, particularly mothers, have reported high levels of stress and anxiety<sup>(7)</sup> and have also  
85 reported high levels of worry about their child having an anaphylactic reaction and uncertainty  
86 around what to do if their child does go into anaphylactic shock<sup>(8,9)</sup>.

87  
88 Parental confidence in managing their child's food allergy may be an important factor to  
89 consider in relation to the burden of food allergy and its impact on quality of life. Confidence  
90 and the belief in your ability to carry out certain actions and manage situations has been  
91 defined as self-efficacy<sup>(10)</sup>. Self-efficacy has been related to psychological wellbeing in  
92 mothers of children with long term conditions such as Cerebral Palsy<sup>(11)</sup> and in parents of  
93 children with diabetes, where it has been shown to relate to better management of the child's  
94 condition regarding glycaemic control and better quality of life<sup>(12)</sup>. Interventions which seek to  
95 enhance self-efficacy (e.g. delivered through education, training or self-management) lead to  
96 improvements in quality of life, self-management and coping with asthma<sup>(13-15)</sup> and other long-  
97 term conditions<sup>(16)</sup>. Self-efficacy has not been examined before in relation to food allergy.  
98 Therefore, the aim of this study was to examine whether self-efficacy in parents of food

99 allergic children was a predictor of parental quality of life. As parents of children with food  
100 allergy have reported high levels of distress<sup>(7-9)</sup>, mental health was also examined in order to  
101 explore the unique contribution self-efficacy might make to quality of life relative to mental  
102 health and food allergy characteristics.

103

104

105

106 **METHODS**

107 Ethical approval was provided by the Psychology Research Ethics Committee at the  
108 University (102-13-CB). All participants gave informed consent to take part.

109

110 ***Participants and procedure***

111 Participants were recruited from the general population via advertisement of an online survey  
112 through social media channels such as Facebook and Twitter and through the Anaphylaxis  
113 Campaign's website. Emails advertising the study were also sent to all eligible members of  
114 the Campaign although parents did not need to be members of the Campaign to take part.  
115 Inclusion criteria for the study were that the participant was a parent who had at least one  
116 child under the age of 18 years living in the family home who had a food allergy diagnosed by  
117 a clinician at an allergy clinic. There were no exclusion criteria, although participants needed  
118 to be able to understand written English in order to take part in the study as the scales used  
119 were only validated in the English language. Participants completed the questionnaires  
120 anonymously.

121

122 ***Measures***

123 The Food Allergy Self-Efficacy scale for Parents (FASE-P)<sup>(17)</sup> is a 21 item scale measuring  
124 parental self-efficacy or confidence in managing food allergy in their child. It is scored on a 0-  
125 100 scale with higher score representing greater confidence. It has five sub-scales:  
126 managing social activities, precaution and prevention of an allergic reaction, identifying  
127 allergens, treating an allergic reaction and seeking information about food allergy. The scale  
128 has good to excellent internal consistency ( $\alpha=0.88$  for total scale; 0.63-0.89 for the sub-  
129 scales), excellent re-test reliability ( $r=.82$ ) and has been shown to have good construct and  
130 discriminative validity <sup>(17)</sup>.

131

132 Food Allergy Quality of Life – Parental Burden (FAQL-PB) scale<sup>(18)</sup> has 17 items and uses a  
133 7-point Likert scale ranging from 1 (not troubled) to 7 (extremely troubled). Questions include  
134 issues concerning going on vacation, social activities and worries and anxieties over the

135 previous week. A higher score indicates greater parental burden. Reliability has been  
136 reported as excellent in a U.S. sample (Cronbachs  $\alpha = 0.95$ ) <sup>(18)</sup> and in a U.K. sample ( $\alpha >$   
137  $0.85$ ) <sup>(19)</sup>.

138

139 Food Allergy Independent Measure (FAIM) has 4 items which measure the severity of  
140 perceived risk of an accidental reaction to food and the perceived risk of not being able to  
141 treat a reaction appropriately. Items are answered on a 7-point Likert scale with a greater  
142 score indicating a higher level of perceived seriousness. It is a well used and valid means of  
143 measuring the perceived severity of food allergy <sup>(20)</sup>.

144

145 General Health Questionnaire – 12 (GHQ-12) <sup>(21)</sup> is a 12 item scale of current mental health  
146 which asks individuals to state how they have felt over the last few weeks. It uses a 4 point  
147 Likert scale from not at all (scored 0) to much more than usual (scored 3). Scores are  
148 summed and have a range from 0 to 36. Scores over 11-12 indicate a risk of being  
149 diagnosed with a mental illness. The scale has excellent reliability (Cronbach's  $\alpha = 0.77-$   
150  $0.93$ ) and good validity <sup>(21)</sup>.

151

### 152 ***Demographic and food allergy questionnaire***

153 A questionnaire to gather demographic information from the parent and food allergy  
154 information about their child was developed based on that used in previous published  
155 studies<sup>(22)</sup>. Information collected included the type of food allergy, symptoms, how the allergy  
156 was diagnosed, medication, history of anaphylaxis and presence of other atopic conditions  
157 such as asthma, hay-fever and eczema.

158

### 159 **Statistical analysis**

160 Data analyses were conducted using SPSS version 21, and all tests were 2-tailed with a  
161 significance level set at  $p < 0.05$ . Missing demographic and food allergy information was  
162 treated pairwise; there were no missing answers for any of the psychometric scales and  
163 everyone who completed all questionnaires was included in the analysis. Tests for normality,

164 kurtosis and skew were conducted and showed the data to be within acceptable levels and  
165 so parametric tests were conducted. Pearson's bivariate correlations were conducted to  
166 examine relationships between quality of life and other continuous variables such as self-  
167 efficacy and mental health. Independent t-tests were conducted to look at differences in  
168 quality of life across demographic variables. Hierarchical regression was conducted to  
169 examine which factors were predictive of quality of life.

170

171

172



173 **RESULTS**

174 A total of 434 parents completed the questionnaires for 482 children with food allergy.  
175 Demographic information for participants can be found in Table 1 and food allergy information  
176 can be found in Table 2. Means and standard deviations of scores for each measure can be  
177 found in Table 3. Mean GHQ scores exceeded the cut-off score for being at risk of being  
178 diagnosed with a mental illness. Examination of mean scores of the sub-scales for self-  
179 efficacy showed that parents appeared to be least confident in managing social activities and  
180 seeking information about food allergy.

181

182 ***Relationships between quality of life, self-efficacy and mental health***

183 Pearson's correlations between quality of life, self-efficacy, mental health and FAIM scores  
184 can be seen in Table 4. Better quality of life was significantly related to greater self-efficacy  
185 for food allergy management ( $p < 0.001$ ), better mental health ( $p < 0.001$ ) and lower perceived  
186 likelihood of a severe reaction ( $p < 0.001$ ). The correlations with total mean self-efficacy were  
187 particularly strong and there were also strong correlations between quality of life and self-  
188 efficacy for managing social activities ( $p < 0.001$ ). To explore whether mental health status  
189 and FAIM scores were influencing the relationship between self-efficacy and quality of life,  
190 partial correlations were run. After controlling for mental health, the unique relationship  
191 between quality of life and self-efficacy was still significant ( $-0.512$ ,  $p < 0.001$ ). After controlling  
192 for FAIM scores, the unique relationship between quality of life and self-efficacy was also still  
193 significant ( $-0.533$ ,  $p < 0.001$ ).

194

195 ***Relationships between quality of life, parent, child and food allergy characteristics***

196 Greater quality of life was significantly related to older age in parent and child and fewer  
197 numbers of allergies (Table 4). Significantly poorer quality of life was reported in parents of  
198 children who had asthma (mean=75.88, s.d.=21.32) compared to children without  
199 (mean=69.03, s.d.=19.13), ( $t=2.76(399)$ ,  $p=0.006$ ) and children who had eczema (mean=  
200 75.46, s.d.=21.09) compared to children without (mean=68.67, s.d.=18.91), ( $t=2.18(415)$ ,  
201  $p=.03$ ). Significantly poorer quality of life was also reported in parents of children who had egg

202 allergy (mean=77.72 s.d.=20.50) compared to children without (mean=72.54, s.d.=21.06),  
203 (t=2.50(432), p=0.01), history of anaphylaxis (mean=76.03 s.d.=20.97) compared to children  
204 with no history (mean=71.68, s.d.=21.04), (t=1.94(369) p=0.05) and hospitalisation due to  
205 food allergy (mean=76.55, s.d.=21.02) compared to children who had no such history  
206 (mean=70.28, s.d.=20.29), (t=3.00(430), p=0.003).

207

208 As there was a significant relationship between quality of life and age of child, age might be a  
209 reason for the differences seen in children with egg allergy, which tends to affect younger  
210 children. To assess this, an Analysis of Covariance (ANCOVA) was run. After controlling for  
211 age of child there was still a significant difference in quality of life for parents of children with  
212 egg allergy or not (F=15.12, p<0.001).

213

#### 214 ***Explaining variance in quality of life***

215 Hierarchical regression models were run with variables that significantly related to quality of  
216 life. Food allergy and demographic characteristics were entered in step one in order to  
217 control for these variables; self-efficacy, GHQ-12 and FAIM scores were entered in step two.  
218 In step one age of child, number of allergies and presence of asthma were significantly  
219 related to parental quality of life, explaining 7% of the variance. In step two, age of child and  
220 number of allergies retained their significance but with attenuated beta coefficients. Food  
221 allergy self-efficacy, mental health and FAIM scores were all significantly related to parental  
222 quality of life with 46% of the variance in quality of life explained, which was a significant  
223 increase from step one ( $R^2$  change=.385, p<0.001), (Table 5). Examination of the  
224 standardized betas showed that self-efficacy explained the most variance in parental quality  
225 of life.

226

227 A forced entry regression model was run with the sub-scales of the FASE-P to explore  
228 whether particular areas of parental self-efficacy were important in explaining quality of life.  
229 The FASE-P sub-scales together explained 35% of the variance in food allergy related quality  
230 of life. Examination of both standardized and unstandardized betas (as all predictors were

231 measured on the same scale) showed that confidence in managing social activities and  
232 precaution and prevention of allergic reactions appeared to be the most important aspects of  
233 in explaining food allergy related quality of life in parents (Table 5).

234

235 **DISCUSSION**

236 This is the first study to explore the contribution parental self-efficacy for managing food  
237 allergy can make in explaining the impact of food allergy on quality of life in the parent. We  
238 found that self-efficacy explained the greatest proportion of variance in parental quality of life.  
239 The regression model which included just self-efficacy explained over a third of the variance  
240 in quality of life and managing social activities and precaution and prevention of allergic  
241 reactions appeared to be particularly important. Aspects of allergy such as history of  
242 anaphylaxis, type of allergy, other atopic conditions, age of child and age of parent only  
243 accounted for a small proportion of the variance. It appears then that parental self-efficacy is  
244 an important construct to consider when offering advice and training in food allergy  
245 management for the parent or psychological support.

246

247 Self-efficacy for managing social activities explained the greatest proportion of quality of life  
248 when just self-efficacy sub-scales were examined. Interestingly this sub-scale also had the  
249 lowest level of self-efficacy reported by parents. This sub-scale includes items such as going  
250 out to a restaurant, planning a holiday and being on holiday in this country or abroad. Having  
251 good self-efficacy to do these sorts of activities appears to be very important to having a good  
252 quality of life. Ways in which we can support parents in growing confident in being able to do  
253 these things should be explored further, which might include providing information and  
254 helping parents with action plans for travelling in this country and abroad.

255

256 The age of the child, the number of food allergies they had and the presence of asthma were  
257 all significantly related to parental quality of life, although they explained only a small amount  
258 of its variance. Previous studies have also found that presence of other atopic conditions  
259 such as asthma and eczema<sup>(23)</sup> and number of allergies<sup>(24-26)</sup> reduces quality of life and these  
260 findings therefore provide further evidence of the detrimental effect of multiple allergies on  
261 quality of life. It is interesting that our study found that parental quality of life gets better as  
262 the child gets older. This may be because parents become used to coping with their child's  
263 allergy over time and develop good management strategies and as children get older they

264 take more responsibility for their own allergy management. The child may also grow out of  
265 some of their allergies as they get older, resulting in a better quality of life for the family. The  
266 relationship between quality of life and age is not consistent in the literature however, with  
267 Wassenberg et al<sup>(26)</sup> reporting that younger children (up to age 3 years) had better parental  
268 rated quality of life than older children, possibly due to older children taking part in more in  
269 social activities and having greater independence from parents. The relationship between  
270 age of child and quality of life would therefore benefit from further investigation.

271

272 There was a significant difference in levels of quality of life reported by parents of children  
273 with egg allergy compared to other allergies. Much attention has been placed on the impact  
274 of allergies such as peanut and nut (e.g. 4,6,22) and so this is a novel finding. The difference in  
275 quality of life found here may be because egg allergy is difficult to manage due to the number  
276 of foods that contain egg. It is also a good source of protein and a diet excluding egg would  
277 need to substitute other foods to ensure adequate nutritional content. This may be less of an  
278 issue when avoiding foods such as peanut and nut.

279

280 A strength of this study was the large sample size drawn from a general population, which  
281 provided a sample of participants with a range of food allergy characteristics such as the type  
282 of food allergen reported, the length of time since diagnosis and age of child. Nevertheless  
283 the study was predominately completed by mothers, which limits any conclusions we can  
284 make about what fathers experience, and does rely on parental reporting of a clinical  
285 diagnosis in their child. The high proportion of children with prescribed adrenaline auto-  
286 injectors implies it is probable that these children had received a clinical diagnosis. It would  
287 be useful to examine the relationship between self-efficacy and quality of life in a population  
288 drawn from a clinical database to check that self-reporting of allergy has not affected the  
289 results. This study is also cross-sectional in nature and so we cannot make any conclusions  
290 about cause and effect to determine whether better self-efficacy for food allergy management  
291 leads to better quality of life or whether better initial quality of life supports parents to feel  
292 more efficacious in how they are managing. It would be useful to conduct a longitudinal study

293 looking at food allergy self-efficacy and quality of life from the point of diagnosis and across  
294 time in order to ascertain the causal relationships between these variables.

295

296 In conclusion, this study has shown that parental self-efficacy for food allergy management is  
297 important in explaining quality of life in parents of children with food allergy. Measurement of  
298 self-efficacy should be considered in addition to quality of life when parents attend allergy  
299 clinic with their child. Low scores in any domain of self-efficacy could help focus the content  
300 of a consultation or prompt a referral to a dietician or to psychological support. Interventions  
301 to improve self-efficacy in parents of children with food allergy should be explored as they  
302 may be able to improve food allergy related quality of life.

303

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308

#### 309 **Conflicts of interest**

310 There are no conflicts of interest.

311

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403 Table 1. Characteristics of respondents (n %)

		<b>Sample n=434</b>
		<b>n/%</b>
<b>Parents age (mean, s.d.)</b>		42.21 (6.41)
<b>Gender of Parent completing survey</b>		
	Male	19 (4.4%)
	Female	411 (94.7%)
<b>Marital status</b>		
	Married/living with partner	393 (90.5)
	Divorced	16 (3.7)
	Single	17 (3.9)
	Widowed	1 (0.2)
<b>Employment status</b>		
	Working full-time	123 (28.3)
	Working part-time	204 (47.0)
	Full-time education	3 (0.7)
	Not working or in education	102 (23.5)
<b>Country of residence</b>		
	UK	410 (94.5)
	Other EU	12 (2.8)
	Non-EU	8 (1.8)
<b>Number of children within family (mean, s.d.)</b>		2.03 (1.12)
<b>Number of children in family with a food allergy</b>		
	One	382 (88)
	Two	44 (10.1)
	Three	6 (1.4)

405 Where % don't add up to 100 there are missing values

406

407

408 Table 2. Food allergy characteristics (n %).

409

		<b>Sample n=482</b>
		<b>n/%</b>
<b>Child age in years (mean, s.d.)</b>		9.47 (4.7)
<b>Child age range (years)</b>		1-18
<b>Gender of child with food allergy</b>		
	Male	300 (62.2)
	Female	170 (35.3)
<b>Foods reported</b>		
	Peanut	354 (73.4)
	Tree nut	302 (62.7)
	Both peanut and tree nut	275 (57.1)
	Egg	177 (36.7)
	Cows Milk	128 (26.6)
	Fruit	59 (12.2)
	Sesame	45 (9.3)
	Shellfish	36 (7.5)
	Soya	34 (7.1)
	Fish	34 (7.1)
	Wheat	18 (3.7)
<b>Symptoms reported</b>		
	Rash, hives, urticaria	346 (71.8)
	Vomiting	247 (51.2)
	Abdominal Pain	172 (35.7)
	Swelling of face	296 (60.8)
	Swelling of lips or tongue	270 (56.0)
	Tingling or sore mouth	236 (49.0)
	Breathing difficulties	224 (46.5)

Table 1 continued

	Wheeze	217 (45.0)
	Throat tightening	188 (39.0)
<b>Other allergies</b>		
	Latex	15 (3.1)
	Tree Pollen	122 (25.3)
	Grass Pollen	134 (27.8)
<b>Asthma</b>		337 (69.9)
<b>Eczema</b>		403 (83.6)
<b>Hayfever</b>		264 (54.8)
<b>History of Anaphylaxis</b>		237 (49.2)
<b>Prescribed Adrenaline Auto Injector</b>		436 (90.5)
<b>How allergy diagnosed</b>		
	Skin prick test	357 (74.1)
	Blood test	290 (60.2)
	Food challenge	73 (15.1)
<b>Hospitalisation due to an allergic reaction to food</b>		300 (62.2)

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410 Where % don't add up to 100 there are missing values; where % total more than 100 parents  
411 were able to select more than one answer.  
412

413 Table 3. Means (and standard deviations) of scale scores

<b>Scale</b>	<b>Mean (SD)</b>
<b>Quality of life (FAQL-PB)</b>	74.47 (20.98)
<b>Food Allergy Self-Efficacy (FASE-P)</b>	76.07 (11.37)
<b>FASE-P sub-scales</b>	
Managing social activities	68.85 (20.50)
Precaution and prevention	81.22 (11.82)
Allergic treatment	88.60 (11.17)
Food allergen identification	87.41 (11.37)
Seeking information	64.11 (16.83)
<b>General Health Questionnaire (GHQ12)</b>	11.06 (5.1)
<b>FAIM</b>	3.32 (.97)

414

415

416 Table 4. Relationships (Pearsons r) between quality of life, self-efficacy, mental health, FAIM  
 417 scores and demographic and food allergy characteristics

Scale	Quality of life (FAQL-PB)
<b>Age of parent</b>	-.205**
<b>Age of child</b>	-.257***
<b>Number of allergies</b>	.130*
<b>Food Allergy Self-Efficacy (FASE-P)</b>	-.563***
<b>FASE-P sub-scales</b>	
Managing social activities	-.584***
Precaution and prevention	-.451***
Allergic treatment	-.243***
Food allergen identification	-.219***
Seeking information	-.280***
<b>General Health Questionnaire (GHQ12)</b>	.330***
<b>FAIM</b>	.447***

418 \*p<0.05; \*\*p<0.01; \*\*\*p<0.001

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421

422 Table 5. Hierarchical regression models showing significant predictors of parental quality of  
 423 life

Predictors	Standardised $\beta$	
	Step 1	Step 2
Age of parent	-.089	-.013
Age of child	-.171*	-.115*
Number of allergies	.158*	-.107*
Egg allergy	.115	-.096
Asthma	-.118*	-.003
Eczema	-.027	-.029
Anaphylaxis	-.061	-.088
Hospitalisation	-.046	-.041
Food Allergy Self-Efficacy (FASE-P)		-.451***
General Health Questionnaire (GHQ12)		.128**
FAIM		.295***
<b>F value</b>	3.77***	24.30***
<b>Adj R<sup>2</sup></b>	.068	.457

Predictors	Standardised	Unstandardized
	$\beta$	$\beta$
<b>FASE-P sub-scales</b>		
Managing social activities	-.467***	-.482
Precaution and prevention	-.159**	-.280
Allergic treatment	-.013	-.025
Food allergen identification	-.032	.058
Seeking information	-.066	-.081
<b>F value</b>	45.840***	
<b>Adj R<sup>2</sup></b>	.35	

424 \*p<0.05; \*\*p<0.01; \*\*\*p<0.001

425



426 Table S1. Table of significant predictors of parental quality of life

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**Predictors of Quality of Life**

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Age of child

Number of allergies

Food Allergy Self-Efficacy (FASE-P)

General Health Questionnaire (GHQ12)

Food Allergy Independent Measure

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**Predictors of Quality of Life - FASE-P sub-scales**

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Managing social activities

Precaution and prevention

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