

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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12

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.

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26**Parental self-efficacy in managing food allergy and mental health predicts food allergy**

27**related quality of life.**

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29

30**ABSTRACT**

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

36

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

42

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

49

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

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

55

56 **Abbreviations:**

57 FAIM: Food Allergy Independent Measure

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

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

60 GHQ-12: General Health Questionnaire – 12

61 QoL: Quality of Life

62

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67

## 68INTRODUCTION

69Food allergy affects approximately 5% of children and is often a life-long condition with about  
7020% not growing out of their allergy<sup>(1)</sup>. Symptoms related to accidental ingestion of an  
71allergen can be severe and include urticaria, hives, swelling of lips, tongue and mouth and  
72anaphylactic shock. Optimal management of food allergy is complete avoidance of the  
73allergen and administration of antihistamine or adrenaline if accidental ingestion and a  
74reaction occurs<sup>(1,2)</sup>. Parents and children have reported that food allergy has a significant  
75impact on quality of life compared to healthy controls<sup>(3)</sup> and children with other chronic  
76conditions<sup>(4)</sup>. Quality of life is a multi-dimensional construct including emotional, social,  
77environmental and physical domains and should be viewed in the context of a person's  
78culture, value systems, goals, expectations, standards and concerns<sup>(5)</sup>. A number of domains  
79of quality of life appear to be affected in food allergy including social relationships, emotional,  
80school and financial<sup>(6)</sup>. The constant risk of a serious reaction is thought to be a major cause  
81of the burden of food allergy and an important factor in causing stress and worry in parents.  
82Parents, particularly mothers, have reported high levels of stress and anxiety<sup>(7)</sup> and have also  
83reported high levels of worry about their child having an anaphylactic reaction and uncertainty  
84around what to do if their child does go into anaphylactic shock<sup>(8,9)</sup>.

85

86Parental confidence in managing their child's food allergy may be an important factor to  
87consider in relation to the burden of food allergy and its impact on quality of life. Confidence  
88and the belief in your ability to carry out certain actions and manage situations has been  
89defined as self-efficacy<sup>(10)</sup>. Self-efficacy has been related to psychological wellbeing in  
90mothers of children with long term conditions such as Cerebral Palsy<sup>(11)</sup> and in parents of  
91children with diabetes, where it has been shown to relate to better management of the child's  
92condition regarding glycaemic control and better quality of life<sup>(12)</sup>. Interventions which seek to  
93enhance self-efficacy (e.g. delivered through education, training or self-management) lead to  
94improvements in quality of life, self-management and coping with asthma<sup>(13-15)</sup> and other long-  
95term conditions<sup>(16)</sup>. Self-efficacy has not been examined before in relation to food allergy.  
96Therefore, the aim of this study was to examine whether self-efficacy in parents of food

97allergic children was a predictor of parental quality of life. As parents of children with food  
98allergy have reported high levels of distress<sup>(7-9)</sup>, mental health was also examined in order to  
99explore the unique contribution self-efficacy might make to quality of life relative to mental  
100health and food allergy characteristics.

101

102

## 103 **METHODS**

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

106

### 107 ***Participants and procedure***

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

118

### 119 ***Measures***

120 The Food Allergy Self-Efficacy scale for Parents (FASE-P)<sup>(17)</sup> is a 21 item scale measuring  
121 parental self-efficacy or confidence in managing food allergy in their child. It is scored on a 0-  
122 100 scale with higher score representing greater confidence. It has five sub-scales:  
123 managing social activities, precaution and prevention of an allergic reaction, identifying  
124 allergens, treating an allergic reaction and seeking information about food allergy. The scale  
125 has good to excellent internal consistency ( $\alpha=0.88$  for total scale; 0.63-0.89 for the sub-  
126 scales), excellent re-test reliability ( $r=.82$ ) and has been shown to have good construct and  
127 discriminative validity <sup>(17)</sup>.

128

129 Food Allergy Quality of Life – Parental Burden (FAQL-PB) scale<sup>(18)</sup> has 17 items and uses a  
130 7-point Likert scale ranging from 1 (not troubled) to 7 (extremely troubled). Questions include  
131 issues concerning going on vacation, social activities and worries and anxieties over the

132previous week. A higher score indicates greater parental burden. Reliability has been  
133reported as excellent in a U.S. sample (Cronbachs  $\alpha = 0.95$ ) <sup>(18)</sup> and in a U.K. sample ( $\alpha >$   
1340.85) <sup>(19)</sup>.

135

136Food Allergy Independent Measure (FAIM) has 4 items which measure the severity of  
137perceived risk of an accidental reaction to food and the perceived risk of not being able to  
138treat a reaction appropriately. Items are answered on a 7-point Likert scale with a greater  
139score indicating a higher level of perceived seriousness. It is a well used and valid means of  
140measuring the perceived severity of food allergy <sup>(20)</sup>.

141

142General Health Questionnaire – 12 (GHQ-12) <sup>(21)</sup> is a 12 item scale of current mental health  
143which asks individuals to state how they have felt over the last few weeks. It uses a 4 point  
144Likert scale from not at all (scored 0) to much more than usual (scored 3). Scores are  
145summed and have a range from 0 to 36. Scores over 11-12 indicate a risk of being  
146diagnosed with a mental illness. The scale has excellent reliability (Cronbach's  $\alpha = 0.77-$   
1470.93) and good validity <sup>(21)</sup>.

148

#### 149***Demographic and food allergy questionnaire***

150A questionnaire to gather demographic information from the parent and food allergy  
151information about their child was developed based on that used in previous published  
152studies<sup>(22)</sup>. Information collected included the type of food allergy, symptoms, how the allergy  
153was diagnosed, medication, history of anaphylaxis and presence of other atopic conditions  
154such as asthma, hay-fever and eczema.

155

#### 156**Statistical analysis**

157Data analyses were conducted using SPSS version 21, and all tests were 2-tailed with a  
158significance level set at  $p < 0.05$ . Missing demographic and food allergy information was  
159treated pairwise; there were no missing answers for any of the psychometric scales and  
160everyone who completed all questionnaires was included in the analysis. Tests for

161normality, kurtosis and skew were conducted and showed the data to be  
162within acceptable levels and so parametric tests were conducted.  
163Pearson's bivariate correlations were conducted to examine relationships  
164between quality of life and other continuous variables such as self-efficacy  
165and mental health. Independent t-tests were conducted to look at  
166differences in quality of life across demographic variables. Hierarchical  
167regression was conducted to examine which factors were predictive of  
168quality of life.

169

170

## 171 RESULTS

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

179

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

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

192

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

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

200allergy (mean=77.72 s.d.=20.50) compared to children without (mean=72.54, s.d.=21.06),  
201(t=2.50(432), p=0.01), history of anaphylaxis (mean=76.03 s.d.=20.97) compared to children  
202with no history (mean=71.68, s.d.=21.04), (t=1.94(369) p=0.05) and hospitalisation due to  
203food allergy (mean=76.55, s.d.=21.02) compared to children who had no such history  
204(mean=70.28, s.d.=20.29), (t=3.00(430), p=0.003).

205

206As there was a significant relationship between quality of life and age of child, age might be a  
207reason for the differences seen in children with egg allergy, which tends to affect younger  
208children. To assess this, an Analysis of Covariance (ANCOVA) was run. After controlling for  
209age of child there was still a significant difference in quality of life for parents of children with  
210egg allergy or not (F=15.12, p<0.001).

211

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

213Hierarchical regression models were run with variables that significantly related to quality of  
214life. Food allergy and demographic characteristics were entered in step one in order to  
215control for these variables; self-efficacy, GHQ-12 and FAIM scores were entered in step two.  
216In step one age of child, number of allergies and presence of asthma were significantly  
217related to parental quality of life, explaining 7% of the variance. In step two, age of child and  
218number of allergies retained their significance but with attenuated beta coefficients. Food  
219allergy self-efficacy, mental health and FAIM scores were all significantly related to parental  
220quality of life with 46% of the variance in quality of life explained, which was a significant  
221increase from step one ( $R^2$  change=.385, p<0.001), (Table 5). Examination of the  
222standardized betas showed that self-efficacy explained the most variance in parental quality  
223of life.

224

225A forced entry regression model was run with the sub-scales of the FASE-P to explore  
226whether particular areas of parental self-efficacy were important in explaining quality of life.  
227The FASE-P sub-scales together explained 35% of the variance in food allergy related quality  
228of life. Examination of both standardized and unstandardized betas (as all predictors were

229measured on the same scale) showed that confidence in managing social activities and  
230precaution and prevention of allergic reactions appeared to be the most important aspects of  
231in explaining food allergy related quality of life in parents (Table 5).

## 232 **DISCUSSION**

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

243

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

252

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

261take more responsibility for their own allergy management. The child may also grow out of  
262some of their allergies as they get older, resulting in a better quality of life for the family. The  
263relationship between quality of life and age is not consistent in the literature however, with  
264Wassenberg et al<sup>(26)</sup> reporting that younger children (up to age 3 years) had better parental  
265rated quality of life than older children, possibly due to older children taking part in more in  
266social activities and having greater independence from parents. The relationship between  
267age of child and quality of life would therefore benefit from further investigation.

268

269There was a significant difference in levels of quality of life reported by parents of children  
270with egg allergy compared to other allergies. Much attention has been placed on the impact  
271of allergies such as peanut and nut <sup>(e.g. 4,6,22)</sup> and so this is a novel finding. The difference in  
272quality of life found here may be because egg allergy is difficult to manage due to the number  
273of foods that contain egg. It is also a good source of protein and a diet excluding egg would  
274need to substitute other foods to ensure adequate nutritional content. This may be less of an  
275issue when avoiding foods such as peanut and nut.

276

277A strength of this study was the large sample size drawn from a general population, which  
278provided a sample of participants with a range of food allergy characteristics such as the type  
279of food allergen reported, the length of time since diagnosis and age of child. Nevertheless  
280the study was predominately completed by mothers, which limits any conclusions we can  
281make about what fathers experience, and does rely on parental reporting of a clinical  
282diagnosis in their child. The high proportion of children with prescribed adrenaline auto-  
283injectors implies it is probable that these children had received a clinical diagnosis. It would  
284be useful to examine the relationship between self-efficacy and quality of life in a population  
285drawn from a clinical database to check that self-reporting of allergy has not affected the  
286results. This study is also cross-sectional in nature and so we cannot make any conclusions  
287about cause and effect to determine whether better self-efficacy for food allergy management  
288leads to better quality of life or whether better initial quality of life supports parents to feel  
289more efficacious in how they are managing. It would be useful to conduct a longitudinal study

290looking at food allergy self-efficacy and quality of life from the point of diagnosis and across  
291time in order to ascertain the causal relationships between these variables.

292

293In conclusion, this study has shown that parental self-efficacy for food allergy management is  
294important in explaining quality of life in parents of children with food allergy. Measurement of  
295self-efficacy should be considered in addition to quality of life when parents attend allergy  
296clinic with their child. Low scores in any domain of self-efficacy could help focus the content  
297of a consultation or prompt a referral to a dietician or to psychological support. Interventions  
298to improve self-efficacy in parents of children with food allergy should be explored as they  
299may be able to improve food allergy related quality of life.

300

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305

#### 306**Conflicts of interest**

307There are no conflicts of interest.

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398Table 1. Characteristics of respondents (n %)

		<b>Sample n=434</b>	
		<b>n/%</b>	
399			
400	<b>Parents age (mean, s.d.)</b>	42.21 (6.41)	
401	<b>Gender of Parent completing survey</b>		
402	Male	19 (4.4%)	
403	Female	411 (94.7%)	Where % don't add up to 100 there are missing values
	<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

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

407

		Sample n=482
		n/%
<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)
	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</b>		300 (62.2)
<b>to food</b>		

Table 1 continued

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

410Table 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)

411

412 Table 4. Relationships (Pearsons r) between quality of life, self-efficacy, mental health, FAIM  
 413 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***

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

415

416

417 Table 5. Hierarchical regression models showing significant predictors of parental quality of  
418 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	

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

420

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

Predictors of Quality of Life
Age of child
Number of allergies
Food Allergy Self-Efficacy (FASE-P)
General Health Questionnaire (GHQ12)
Food Allergy Independent Measure
Predictors of Quality of Life - FASE-P sub-scales
Managing social activities
Precaution and prevention

422

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