

ORIGINAL ARTICLE

The psychosocial impact of an activity holiday for young children with severe food allergy: a longitudinal study

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Abstract

Background: Food allergy has been shown to severely affect quality of life (QoL) in children and their families. The Anaphylaxis Campaign UK supports families with allergic children and as part of that support ran an activity holiday for those with food allergy. This study investigated the effectiveness of this activity holiday for reducing anxiety and improving QoL and food allergy management for these children.

Methods: Measures were taken at baseline, at the start of the activity holiday, at the end of the holiday, at 3 and 6 months follow-up. Children ($n = 24$) completed a paediatric food allergy-specific QoL questionnaire (PFA-QL), a generic QoL questionnaire (PedsQLTM), the Spence Children's Anxiety Scale (SCAS) and the Children's Health Locus of Control (CHLC) scale at all stages of the study.

Results: There were significant improvements in social QoL, food allergy-specific QoL, total CHLC and internal locus of control scores over time ($p > 0.05$). There were significant decreases in powerful others locus of control, total anxiety and obsessive compulsive disorder scores ($p < 0.05$). Greater anxiety significantly correlated with poorer QoL at all time points; no correlations with locus of control were significant at the 3- and 6-month follow-up.

Conclusions: The activity holiday was of significant benefit to the children who took part, providing support for the need for activity holidays such as this for children with severe food allergy. Ways in which adaptive locus of control and improved quality of life can be facilitated need to be further explored.

Food allergy is an immunologically mediated adverse reaction to a food affecting approximately 3–6% of children (1, 2). Accidental ingestion of an allergen can cause unpleasant, debilitating and sometimes fatal symptoms (2, 3), and treatment is mainly restricted to avoidance of the implicated food and emergency treatment of symptoms caused by accidental ingestion (2). Constant vigilance is therefore needed to avoid these symptoms (4, 5), and a number of studies have reported the detrimental affect food allergy can have on quality of life (QoL) (6–12). In order to cope with the impact food allergy has, families are using online support groups (13) or charities set up to support such families. The Anaphylaxis Campaign UK is one such charity that supports those affected by allergy. As part of this support, the charity ran an activity holiday for children with severe food allergy with the aim to build confidence in the children in a safe environment situated away from home and for participants to start to assess and manage risks associated with their food allergy. Activity holidays or camps for children with life-threatening illnesses have been

growing in number both in the USA, where over 60 camps have been developed for children with cancer, and more recently in Europe (14). These camps allow children to participate in a number of activities in a supportive environment, away from the stresses of daily living, and are therefore seen as a therapeutic environment, which can aid well-being (14, 15).

The present study's aim was to investigate whether attending an activity holiday helped improve a number of psychological and social dimensions of the children's lives and whether it assisted them in dealing more effectively with their food allergy. This was assessed by looking at anxiety, quality of life and health locus of control and aspects of the children's food allergy management.

Methods

Design

A longitudinal repeated measures design was utilized, using validated self-report scales. Measures were taken at baseline (at

the start of the holiday), at the end of the holiday (after 1 wk), at a 3-month follow-up at home and a 6-month follow-up at home.

Participants

All children attending the activity holiday (N = 24) took part: 17 boys and seven girls all aged 11 or 12 yr (mean = 11.46, s.d = 0.51), 11 had never been away from home without their parents before. All had a clinically confirmed allergy (by skin prick test, blood test and/or food challenge) to peanut or tree nut, and in addition, three were allergic to sesame, three to dairy and one to kiwi fruit. All children had been diagnosed at least a year prior to taking part and had been prescribed adrenaline auto-injectors used to treat anaphylactic symptoms; four also carried anti-histamine. The children reported a range of symptoms (see Table 1). There were no exclusion criteria, and none of the children had any other chronic illness that could have impacted on well-being. None of the children had any major allergic reactions to food allergy during the study and so were stable during the time they were in the study.

Materials

All children completed the following questionnaires:

Paediatric quality of life inventory 4.0 – PedsQL™ 4.0

The PedsQL is a 23-item self-report generic quality of life scale for children from the ages of 2–18 yr (16). It measures physical, emotional, social and school functioning, with children rating on a five-point Likert scale (never, almost never, sometimes, often, almost always) how often they experience things. Each subscale is marked out of 100, and higher scores represent a better quality of life. The scale has good reliability (Cronbach's $\alpha = 0.89$), and the scale has been validated in healthy and patient populations (17, 18).

Spence child anxiety scale (SCAS)

The SCAS scale has been developed for children aged 8 upwards and consists of 45 items (19). It provides an overall measure of anxiety together with six subscale scores measuring panic attack and agoraphobia, separation anxiety, physical injury fears, social phobia, obsessive compulsive, generalized anxiety disorder/overanxious disorder. Children have to rate

on a four-point Likert scale – never, sometimes, often or always – how often something happens to them; higher scores represent greater anxiety. The scale has high internal reliability ($\alpha = 0.92$) (19).

Children's Health Locus of Control Scale (CHLC)

The CHLC is a 20-item scale for children aged from 8 to 16 yr and asks children to give an answer of either yes or no to a number of questions about how they see their own health (20). The scale measures whether children see their health as under their own control, the control of powerful others (such as a doctor), or is down to chance or luck. A high score on the overall locus of control score is associated with a child or adolescent being more ready to adopt adaptive health-related behaviours. External or powerful others scores can indicate internalizing behaviour problems. The psychometric properties of the scale are satisfactory, with Cronbach's α scores of 0.68, 0.71 and 0.34 for internal, powerful others and chance subscales, respectively (20).

Paediatric food allergy quality of life scale (PFA-QL)

The PFA-QL is a 25-item scale, marked out of 100 with a higher score representing worse quality of life (21). Children are asked to rate how often an aspect of their food allergy affects them using a Likert scale, from never (scored 1) to always (scored 4). The items in the scale relate to experience, management and living with a food allergy. The scale was originally developed to measure quality of life in children with peanut allergy (8) and has since been validated for children with other food allergies and as a proxy measure for parents to complete (21). It has also been shown to have good internal reliability with Cronbach's α of 0.77–0.82 (21).

Demographic and activity camp holiday-specific questionnaire

A non-validated questionnaire specifically designed for the study asked children to give demographic and food allergy-specific information. The questionnaire also asked children to provide ratings on a 5-point Likert scale regarding their knowledge about food allergy, frequency of and confidence in reading food labels, asking about ingredients in foods, taking responsibility for carrying their medication, telling friends, teachers or adults about their food allergy and spending time away from home. These were areas that were covered in sessions on the activity holiday.

The activity holiday

The activity holiday lasted for 1 wk and was run by staff and volunteers of the Anaphylaxis Campaign in conjunction with an outdoor pursuits company. A number of confidence building activities took place during the week including orienteering, climbing, raft building and archery. In addition, there were two sessions on allergy management. The team was made up of one Anaphylaxis Campaign staff member specializing in the Youth and Parent workshop programme, a qualified nurse with a particular interest in food allergy plus two junior leaders.

Table 1 Number and percentage of symptoms reported by children

Symptoms	N	%
Mouth, throat or facial swelling	17	34.7
Breathing difficulties	10	20.4
Rash/hives	7	14.3
Itching	5	10.2
Vomiting or diarrhoea	5	10.2
Faint/tired	2	4.1
Anaphylaxis	2	4.1
Rise in temperature	1	2.0

Procedure

At the start of the holiday, children were given questionnaire pack 1 containing all scales and an activity holiday-specific questionnaire. At the end of the holiday (after 1 wk) before they went home, the children were given questionnaire pack 2 and were asked to complete the questionnaires regarding how they had felt in the last 7 days (the PFA-QL scale was not completed after 7 days as items on the scale were deemed to be insensitive to such short-term changes). Three months after the activity holiday, children were sent questionnaire pack 3 to their home, containing all scales and asked to record how they had felt since the activity holiday. They received the same questionnaire pack at 6 months and asked to say how they had felt since receiving the last questionnaire. All questionnaires were self-completed by the children; the person responsible for handing out questionnaires at the activity holiday, and parents were asked not to answer the questionnaires for the children, only to aid in understanding of a question if it was needed.

Attrition rates

Four children left the activity holiday early and therefore only completed the baseline measures. All of these children were included in the 3- and 6-month follow-up, but only one child returned these questionnaires. Of those children that remained at the activity holiday for the full week, only one was lost to follow-up, resulting in full sets of data for 19 children and part data for two children.

Ethical considerations

The study was approved by the departmental Psychology Research Ethics Committee (ethical approval number 005/04). It was also approved by the Medical Advisory Board of the Anaphylaxis Campaign. All children and parents gave written informed consent before taking part and understood they could withdraw at any time.

Statistical analysis

The Statistical Package for Social Sciences (SPSS) version 18.0 (SPSS Inc, Chicago, IL, USA) was used to analyse the data. With a sample size of 19 and an alpha level set at 0.05, the power of this study to detect medium to large effect sizes ($r = 0.35$ and over) was 0.68 (calculated using the computer program GPOWER). The Kolmogorov–Smirnov test for normal distributions (22) showed that all scale scores apart from the PFA-QL scale were significantly different from a normal distribution ($p < 0.05$). Therefore, the exact test of Friedman's ANOVA, which yields a χ^2 distribution, was used to investigate differences in scores across all time points in the study. The Wilcoxon signed-rank test was used to analyse differences between 2 time points. Spearman's correlations were conducted to examine relationships among scale scores. For PFA-QL scale, parametric analyses were used to explore differences over time. Scores on all scales were compared with

published norm data where available using one-sample t-tests. Comparison with norm data from a healthy population was conducted as food allergy is a unique condition where the patient is generally well and suffers no symptoms unless the allergenic food is eaten by mistake and so they are more like a healthy norm group than a group of children who have a condition that results in more frequent symptoms.

Results

Locus of control (LOC)

Composite total health LOC scores significantly increased over time from baseline to 6 months, indicating that children were more ready to adopt adaptive health-related behaviours as time progressed ($\chi^2(3) = 8.01$, $p = 0.04$; Table 2). Scores on the subscale powerful others decreased over time from baseline to 6 months ($\chi^2(3) = 7.8$, $p = 0.047$). Whereas scores on the internal subscale significantly increased over time ($\chi^2(3) = 9.3$, $p = 0.021$; Table 2). There were no significant differences for the chance subscale.

Anxiety

Composite total anxiety scores significantly decreased from baseline to 6 months ($\chi^2(3) = 7.72$, $p = 0.05$). The only significant difference over time for any subscale was for obsessive compulsive disorder, which decreased from baseline to 6 months ($\chi^2(3) = 18.98$, $p < 0.001$). Baseline subscale scores and total anxiety score for the SCAS from the children with food allergy were not significantly different to European norm data from children with no chronic illness (23) apart from social anxiety. Children with food allergy had significantly lower social anxiety than children with no chronic illness ($t(23) = -3.66$, $p = 0.001$; Table 2). At 6 months post-activity camp, separation anxiety ($t(18) = -3.14$, $p = 0.006$), social anxiety ($t(18) = -4.93$, $p < 0.001$), obsessive compulsive disorder ($t(18) = -9.65$, $p < 0.001$) and total anxiety ($t(18) = -4.25$, $p < 0.001$) were all significantly lower than norm data anxiety levels (Table 2).

Quality of life (QoL)

Children demonstrated overall high generic levels of QoL at all time points on the PedsQL™ (Table 2), and there were no significant differences between baseline QoL scores and norm data scores (23). Social QoL, which includes questions regarding getting along with other children, demonstrated a significant increase over time ($\chi^2(3) = 10.33$, $p = 0.013$). There were no significant differences between any of the other subscales over time. At 6 months post-activity camp, physical QoL ($t(18) = 4.26$, $p < 0.001$) and total QoL ($t(18) = 2.41$, $p = 0.03$) were significantly better than norm data QoL scores (Table 2).

For the PFA-QL scale, there was no improvement in QoL over time ($F(1,17) = 2.7$, $p = 0.08$). There was a trend for quality of life to improve from baseline to 3 months, although this was not significant ($t(18) = 2.015$, $p = 0.059$; Table 2).

Table 2 Scale score means (and standard deviations) from baseline to 6-month follow-up and norm data where available

Scale	Baseline	1 wk	3 months	6 months	Norm data
CHLC					
Powerful others ^{*,†}	10.7 (1.8)	10.5 (1.7)	10.1 (1.1)	9.9 (1.1)	n.a.
Internal ^{*,†}	10.7 (1.6)	11.2 (1.0)	11.0 (1.3)	11.5 (0.6)	n.a.
Chance	6.9 (1.2)	6.4 (1.0)	6.5 (1.1)	6.6 (1.3)	n.a.
Total locus of control ^{*,†}	35.2 (2.8)	36.3 (2.5)	36.3 (2.2)	36.9 (2.1)	n.a.
SCAS					
Panic	3.0 (3.5)	2.4 (2.9)	1.9 (2.1)	1.3 (1.4)	1.80 (2.3)
Separation	3.1 (3.3)	2.3 (2.8)	1.7 (1.9)	1.5 (2.1) ^{**,‡}	3.05 (2.5)
Physical	2.3 (2.3)	2.4 (2.4)	2.5 (2.3)	2.5 (2.4)	2.69 (2.5)
Social	3.0 (2.5) ^{***,§}	2.7 (2.2)	2.9 (2.1)	2.3 (2.2) ^{***,‡}	4.82 (3.6)
OCD ^{***,†,‡}	4.3 (3.1)	2.4 (2.5)	2.5 (2.3)	1.1 (1.3) ^{***,‡}	3.86 (3.2)
General anxiety	5.2 (4.3)	3.8 (2.5)	4.2 (2.6)	3.7 (2.2)	4.59 (2.7)
Total anxiety ^{*,†}	20.9 (15.4)	15.9 (12.8)	15.7 (10.8)	12.5 (8.7) ^{***,‡}	20.92 (13.3)
PedsQL					
Physical	88.4 (11.1)	89.2 (8.4)	91.4 (7.2)	92.9 (8.8) ^{***,‡}	84.37 (17.33)
Emotional	76.7 (19.0)	84.8 (13.2)	78.5 (13.0)	82.4 (11.5)	81.04 (19.54)
Social ^{*,†}	85.2 (16.0)	82.5 (17.0)	87.4 (9.6)	89.5 (12.2)	86.82 (17.52)
School	75.6 (19.4)	72.5 (16.3)	80.5 (13.2)	80.3 (11.2)	78.19 (20.70)
Psychosocial	79.2 (13.6)	79.7 (11.2)	82.1 (8.3)	84.0 (8.1)	82.11 (15.72)
Total	82.4 (11.3)	83.2 (9.8)	84.6 (8.7)	87.1 (7.9) ^{*,‡}	82.79 (15.00)
PFA-QL	56.8 (9.0)	Not asked	52.8 (9.7)	53.7 (8.0)	n.a.

n.a., not available.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.[†]Obsessive compulsive disorder.[‡]Comparison from baseline scores to 6 months scores.[§]Comparison of 6 months scores to norm data.[§]Comparison of baseline scores to norm data.

Relationship between locus of control, anxiety and quality of life

Spearman's correlations were run between quality of life, anxiety and locus of scores for each time point (Tables 3 and 4). At baseline, poorer food allergy-specific QoL related to higher levels of social anxiety and panic; poorer generic QoL related to increased anxiety across a number of subscales (Table 3). An increase in belief in powerful others as responsible for health related to greater panic, OCD and general anxiety. At the end of the activity holiday, these patterns were very similar although school-related QoL was no longer associated with any variable. Greater social and general anxiety and better generic QoL were also related to higher scores on chance and powerful others LOC (Table 3).

By 3 months, all significant relationships with LOC had disappeared apart from a better physical quality of life now relating to a lower score on chance LOC. Poorer food allergy specific and generic QoL again related to greater anxiety across a number of subscales, although school-related QoL was still not significantly related to any other variable (Table 4).

Activity holiday questions

There was a significant increase in children feeling more confident in telling their friends about their food allergy between leaving the activity holiday and the 3-month follow-up

($z = -2.11$, $p = 0.035$; Table 3). There were no significant differences in children's confidence in other areas of food allergy management. However, mean scores on these scales were high, demonstrating good confidence levels at all time points (Table 5).

Discussion

This study assessed whether attending an activity holiday could help improve a number of psychological and social dimensions of the children's lives and whether it assisted them in dealing more effectively with their food allergy. It is clear that these children benefited in a number of ways including the adoption of more health-related behaviours, development of a more adaptive health locus of control, a reduction in overall anxiety and in particular a decrease in obsessive compulsive attributes. They also reported an increase in certain areas of quality of life and in confidence in dealing with other children. These benefits were demonstrated over time, some lasting as long as 6 months after they had been on the activity holiday. In addition, overall anxiety and quality of life was better than published norm levels by 6 months after the activity holiday.

The development of a more adaptive health locus of control, demonstrating that the children learnt that they should and could take more responsibility for their own health, perhaps stems from the children successfully engaging in activities they would not normally do, away from the parental home. Parents

Table 3 Spearman's correlations between quality of life, anxiety and locus of control at baseline (with significant correlations for end of week one in brackets)

	PedsQL				Locus of control			
	PFA-QL	Physical	Emotional	Social	School	Psychosocial	Total	Total LOC
PFA-QL	-	-0.07	-0.10	-0.56**	-0.19	-0.36	-0.30	0.31
SCAS								
Panic	0.41*	-0.45* (-0.45*)	-0.22	-0.36	-0.43*	-0.45* (-0.44*)	-0.50* (-0.46*)	0.25
Separation	0.23	-0.61** (-0.53*)	-0.41	-0.07	-0.31	-0.37	-0.49* (-0.47*)	0.08
Physical	0.28	-0.38 (-0.59**)	-0.55** (-0.65**)	-0.28 (-0.60**)	-0.33	-0.52** (-0.69***)	-0.54** (-0.70***)	0.29
Social	0.50**	-0.23 (-0.55*)	-0.21 (-0.67***)	-0.58** (-0.65**)	-0.21	-0.42* (-0.61**)	-0.40* (-0.64**)	0.35
OCD	0.25	-0.44* (-0.55*)	-0.10 (-0.52*)	-0.27	-0.43*	-0.35 (-0.53*)	-0.43* (-0.56**)	0.16
General	0.28	-0.68*** (-0.51*)	-0.47* (-0.47*)	-0.27 (-0.55*)	-0.46*	-0.54** (-0.63**)	-0.66*** (-0.61**)	0.62
Total	0.39	-0.60** (-0.63**)	-0.40* (-0.60**)	-0.36 (-0.52*)	-0.46*	-0.55** (-0.64**)	-0.63*** (-0.67***)	0.87
LOC scale								
Powerful	0.38	-0.13 (0.53*)	0.18 (0.68***)	-0.12	-0.43	0.02 (0.55*)	-0.03 (0.60**)	0.44*
Chance	-0.08	-0.09 (0.44*)	-0.12	0.05 (0.46*)	0.11	0.01 (0.44*)	-0.03 (0.45*)	0.41*
Internal	0.31	0.07	-0.03	-0.31	-0.09	-0.19	-0.18	0.38
Total LOC	-0.01	0.10 (-0.60**)	-0.09 (-0.55*)	-0.12	-0.08	-0.11 (-0.58**)	-0.07 (-0.62**)	0.17

LOC, locus of control; OCD, obsessive compulsive disorder.

*p < 0.05; **p < 0.01; ***p < 0.001.

Table 4 Spearman's correlations between quality of life, anxiety and locus of control at 3 months (with significant correlations for 6 months in brackets)

	PedsQL					Locus of control				
	PFA-QL	Physical	Emotional	Social	School	Psychosocial	Total	Powerful	Chance	Total LOC
PFA-QL	-	-0.25	-0.46	-0.33	0.20	-0.25	-0.23	0.17	-0.29	-0.06
SCAS										
Panic	0.26 (0.62**)	-0.46*	-0.56* (-0.57**)	-0.57**	-0.33	-0.69*** (-0.61**)	-0.56** (-0.58**)	0.31	-0.04	-0.33
Separation	0.28	-0.39	-0.45 (-0.48*)	-0.34 (-0.46*)	-0.07	-0.40 (-0.49*)	-0.38	0.34	-0.23	-0.30
Physical	0.66** (0.61**)	-0.29	-0.34 (-0.49*)	-0.15	-0.18	-0.33	-0.23	0.24	-0.44*	-0.04
Social	0.64** (0.48*)	-0.37	-0.48* (-0.52*)	-0.63**	-0.10	-0.54* (-0.60**)	-0.49* (-0.50*)	0.30	-0.38	0.09
OCD	0.14	-0.72*** (-0.48*)	-0.64**	-0.33	-0.44	-0.69***	-0.47*** (-0.49*)	0.13	-0.07	-0.20
General	0.45 (0.61**)	-0.42	-0.65** (-0.60**)	-0.14	-0.40	-0.60** (-0.46*)	-0.56**	0.10	-0.08	-0.12
Total	0.50* (0.58**)	-0.54*	-0.64** (-0.70***)	-0.43	-0.32	-0.67** (-0.67**)	-0.61** (-0.61**)	0.28	-0.25	-0.22
LOC scale										
Powerful	0.17	-0.18	0.30	-0.15	-0.08	-0.26	-0.28			
Chance	-0.29	-0.12 (-0.47*)	-0.06	0.02	0.04	-0.003	0.14			
Internal	-0.07	0.38	-0.35	0.11	-0.03	0.21	0.17			
Total LOC	-0.06	0.28	-0.45	0.15	-0.08	0.25	0.17			

LOC, locus of control; OCD, obsessive compulsive disorder.

*p < 0.05; **p < 0.01; ***p < 0.001.

Table 5 Likert scale means (and standard deviations) for food allergy related confidence ratings

Scale	Baseline mean (s.d.)	1 wk mean (s.d.)	3 months mean (s.d.)	6 months mean (s.d.)
Confidence in				
Reading food labels	4.46 (0.78)	4.35 (0.93)	4.80 (0.62)	4.32 (1.25)
Asking about ingredients in food	4.19 (0.87)	4.30 (1.03)	4.40 (0.82)	3.95 (1.13)
Responsibility for carrying own medication	Not asked	4.30 (0.98)	4.35 (0.88)	4.26 (0.99)
Telling friends about food allergy*	Not asked	4.16 (0.96)	4.45 (1.05)	4.11 (1.20)
Telling teachers about food allergy	Not asked	4.10 (0.85)	4.30 (0.92)	4.17 (0.86)
Staying away from home without parents	Not asked	4.06 (1.48)	4.29 (1.31)	4.53 (1.00)
Knowledge about food allergy	4.29 (0.60)	Not asked	4.45 (0.61)	4.42 (0.51)

* $p < 0.05$.

can be extremely anxious when looking after a child with severe food allergy (11) and may take a large role in checking food labels and selecting foods for their child to eat (24). This may have contributed to the higher score on the powerful others locus of control at the start of the activity holiday, with children believing that control over their health was largely in the domain of their parents or doctors. However, this decreased over time after attending the activity holiday.

Locus of control in children with food allergy has not been looked at before and requires further investigation in order to develop ways in which a more beneficial internal locus of control can be facilitated. Increases in internal locus of control have been demonstrated in children with asthma and epilepsy after a course of self-management training, in which children were trained to assume a leading role in the management of their health (25). This is extremely important in children with severe food allergy, who will have to assume more responsibility for their own risk assessments of safety of food to eat, as they get older. Adolescents are the group most at risk of death by anaphylaxis after accidental ingestion of an allergen (4, 5). Therefore, developing adaptive health behaviours in children at the age of 11 and 12 may help reduce this risk.

A further benefit of the activity holiday appeared to be an improvement in the social aspect of quality of life. This subscale of the PedsQL™ concerns how the respondent gets on with other children. This significant finding is in line with the increase in confidence children reported in being able to tell their friends about their food allergy in the 3 months after leaving the activity holiday. These findings may be a result of the environment of the activity holiday, where children mixed with other children with food allergy, were able to talk to other children who have had the same experiences as them and may have therefore become more comfortable in talking about issues that previously made them feel different.

Overall anxiety scores for children were higher at the start of the activity holiday and dropped over time. Higher baseline scores are unsurprising as children will have only just been left by their parents. It is interesting that baseline social anxiety was significantly lower in children with food allergy compared with the norm data from children with no chronic illness. It might be because children with food allergy are better able to deal with a range of different social situations as they need to

be able to ensure they don't eat anything that might cause an allergic reaction. This could extend to non-food-related social occasions, but this theory needs further exploration. The drop in overall anxiety scores from baseline to 1 wk, just prior to leaving the activity holiday, is very encouraging and demonstrates that in general the activity holiday in itself was not anxiety provoking.

Overall anxiety levels continued to drop over time to three and 6 months after the activity holiday. It may be expected that the 3-month level may be lower, as children completed questionnaires in their own home, in a presumably comfortable and safe environment. However, this does not account for a further drop in anxiety levels at 6 months, when questionnaires were also completed at home. At 6 months, separation, social and overall anxiety levels were significantly lower than European children of the same age, which may be due to a related improvement in certain areas of social QoL and confidence. It is unclear the extent to which these changes can be attributed to the activity holiday and comparison of anxiety, QoL and LOC levels of a control group of children with severe food allergy who have not attended any such activity holiday would be beneficial in further ascertaining the benefits of the activity holiday.

The significant finding regarding the reduction in the scores for the obsessive compulsive disorder (OCD) subscale was not expected. There is no mention in the food allergy literature of links between children with food allergy and OCD, and there has been no direct examination of this in literature looking at more generalized allergy or atopy. It may stem from these children having to be constantly vigilant in what they eat, but clear reasons for this require further investigation.

The pattern of correlations between QoL and anxiety were generally expected, with poorer QoL relating to greater anxiety. It is interesting that school-related QoL was not related to other variables and may not be as important for food allergy as other aspects of QoL such as emotional, social and physical QoL. Chance and powerful others LOC were related to better QoL and lower anxiety at the end of the holiday, but these relationships may have been transient as they had disappeared by 3 and 6 months. The importance of LOC in food-allergic children would benefit from further study with a larger sample size to ascertain how changing LOC may impact on anxiety and QoL.

A number of limitations exist for this study. Clearly, the sample size is small and a larger group size may have increased the power of the study to detect further significant results. It would be useful to increase the sample size by collecting the same data from participants if subsequent activity holidays are run and to compare findings with a control group who have not attended the holiday, to examine whether these differences remain and indeed if further differences emerge. There was also an uneven gender split in the present study; the small sample size meant it was not possible to examine differences in gender, and this would also be useful in any future study. Another limitation is the different settings for completion of the questionnaires. Following children over this time period necessitated questionnaires being compared that were completed at the activity holiday and in their own home. The locations may have affected the way in which the children responded to the questions. However, differences were still found at the 6-month follow-up, thus reducing somewhat the argument that differences were purely due to the different locations in which the questionnaires were completed.

Although it is clear that the activity holiday had benefits for the children who attended, it is not known if these benefits would extend to all children with severe food allergy. To a certain extent, it could be argued that the children who attended were a self-selected sample of children motivated to leave the parental home and attend this type of holiday. The children themselves completed all questionnaires, so no

demographic information about the parents was available, so it is not known if these children came from a specific demographic which may have had an influence on their questionnaire results. It may be that this type of activity is only beneficial for those children who are motivated and willing to attend and that merely going away on camp produced the positive results; however, many benefits were specifically related to food allergy and would not be expected to extend to 6 months after if this was the case. A positive impact has been shown in other studies where taking part in challenging experiences in a supportive environment such as this has been shown to have a positive impact on children, contributing to an improved self-image (26).

More wide-spread interventions such as the Anaphylaxis Campaign activity holiday need to be developed and evaluated so that we can further facilitate these positive changes for children with severe food allergy. Further holidays such as this are recommended, possibly with follow-up sessions, which could have a greater focus and impact on children and adolescents taking more responsibility for their food allergy.

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