

Original article

Developmental pathways in food allergy: a new theoretical framework

Background: To date, there is no model of psychosocial development based on empirical food allergy (FA) research. This limits the ability of clinicians, researchers and policy-makers to predict and evaluate the real impact of FA on the child, with implications for prevention, treatment, intervention and health policy.

Objectives: To provide an integrated conceptual framework to explain the onset, development and maintenance of FA-related cognitions, emotions and behaviour, with particular attention to transition points.

Method: Fifteen focus groups meetings were held with 62 children (6–15 years). Developmentally appropriate techniques were designed to stimulate discussion, maintain interest and minimize threat to children's self-esteem. Data were analysed using grounded theory.

Results: FA impacts directly on children's normal trajectory of psychological development in both an age- and disease-specific manner. Six key themes emerged from the analysis: 'meanings of food'; 'autonomy, control and self-efficacy'; 'peer relationships'; 'risk and safety'; 'self/identity'; and 'coping strategies'.

Conclusions: Coping with FA is more than simply a strategy, it is a cumulative history of interactive processes (age, gender and disease specific) that are embedded in a child's developmental organization.

Clinical Implications: The early recognition and incorporation of an FA-specific developmental framework into a treatment plan is essential and sets the stage for an effective medical care and the eventual transition from paediatric to adult care.

Capsule Summary: This study represents a first attempt to provide an integrated developmental framework to explain the onset, development and maintenance of FA-related cognitions, emotions and behaviour.

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The growing prevalence of allergic diseases presents an increasing challenge for populations and healthcare systems around the world, and food allergies (FA) constitute a notable part of this increase (1, 2). The emotional and social aspects of FA have not received much attention to date although an association between allergy and anxiety disorders in children and adolescents has been found to persist into adulthood (3, 4), and evidence linking psychological stress to the expression of asthma and atopy continues to grow (5, 6). In child/adolescent populations with asthma, up to one-third may meet criteria for comorbid anxiety disorders (4). For healthcare providers, there is a socioeconomical interest in supporting the development of adaptive and active coping strategies in children with chronic conditions as early as possible. Coping strategies are likely to be both disease- and age-specific (7, 8). Existing psychometric

measures prove particularly weak in assessing the 'emotional responses' of children, as indicated for instance by the skewed distributions on the respective scales (8, 9).

Health development may be understood as a lifelong process of developmental integration that involves complex interactions between biological and environmental factors (10). One key transition point occurs at between 4 and 7 years in most cultures and involves entry into formal education. Children's social networks start to change from networks in which children primarily interact with adults to networks in which children primarily interact with other children, with consequent exposure to social comparison and competition in school classrooms and peer groups (11). The child clinical literature suggests that children's social functioning in middle childhood is predictive of relationships at later points in development

(12). Furthermore, there is evidence of shifts in cognitive development in which enhanced memory, new reasoning abilities and new strategies for recall emerge (11). Adolescence marks a similar transition point.

A chronic condition may affect and/or interact with already existing normative demands and changes in socialization (13). Thus, although most children follow normative developmental pathways and encounter predictable transition points, disease-specific pathways may be embedded within these trajectories and influence the phenotypic expression of physiology, psychology and behaviour (10). For example, children with chronic conditions such as diabetes and asthma have been found to differ in their interpersonal behaviour from healthy controls (14).

To date, there is no psychological development model based on empirical research in the FA literature. This limits the ability of clinicians, researchers and policy-makers to predict and evaluate cognitive and emotional development in the food-allergic child, with implications for prevention, treatment, intervention and health policy. Furthermore, a developmental perspective has the potential to provide an explanatory framework for previous findings of the impact of FA on children and adolescents. For example, children with FA were found to be at an increased risk of negative socioemotional outcomes (15) and teenagers were found to represent a high-risk group for anaphylactic fatalities caused by FA (16), accounting for 53% of a group of UK fatalities (17). Teenagers may adopt more risk-taking behaviours with regard to their FA (18). In addition, gender differences found in reporting quality of life impact with respect to FA (19) are consistent with research into epilepsy and asthma that shows an excess of psychological vulnerability in adolescent girls compared with boys (20).

Over the past decade, there has been a growth of interest among health service researchers in qualitative research methods (21). Qualitative methods within basic research fields offer great promise for integration into the type of applied developmental contexts that characterize our objectives in this study. Grounded theory is a qualitative method that emphasizes theoretical development, generating theories about a phenomenon, rather than just generating a set of findings, and is thus particularly suited for exploratory research (22).

The aims of this study were: (i) to gain an insight into the FA experience, from the perspective of children with FA; (ii) to provide an integrated conceptual framework to explain the onset, development and maintenance of FA-related cognitions, emotions and behaviour, with particular attention paid to transition points; (iii) to provide a foundation for multidisciplinary work on the development of an integrated biopsychosocial development model of FA; and (iv) to assess the implications of this model of early experiences in FA for intervention and prevention of negative short- and long-term outcomes.

Method

Approval of the study protocol was obtained from the Clinical Research Ethics Committee of University College Cork.

Data collection

Focus groups were used to generate data because they are one of the most appropriate research tools available for children. Children have their own set of social rituals and understandings when they interact with peers (23), which enables the analyst to explore some of the shared assumptions underlying the participants' accounts (24).

Procedure and materials

All children were confirmed as food-allergic by a general practitioner, paediatrician or allergy consultant and all had been issued with an anapen/epipen. Fifteen age-appropriate focus groups were held in Dublin, Cork and Galway with 62 children/teenagers. All focus group locations had a room where the parents could wait separately. After mothers and children were greeted by the trained focus group facilitator, they were informed of the purpose of the study and encouraged to ask questions. When the children were relaxed and familiar with the facilitator, they were asked if they would like to come to another room to take part in the focus group. If they agreed, parent and child signed a consent form.

Vignettes

Vignettes, or hypothetical stories, were designed from information given in pilot focus groups with parents, with food-allergic children themselves, and members of the Irish Anaphylaxis Campaign. Vignettes engage children's interest and protect their self-esteem by allowing them to make statements about story characters in the third person (25).

Vignette 1: A scenario in which children were faced with adapting standardized information to a specific social situation

Rachel, aged 11, helps out every week in a afterschool playgroup. One day, the parents of one of the playgroup children held a birthday party. The mother had made some cakes, which she offered to everyone as well as to Rachel. Rachel refused the home made cakes and said she was allergic to nuts, but the other parents thought she was just being fussy and insisted there were no nuts in the cakes and that she should try some.

Data analysis

All transcripts were audiotaped, transcribed and then coded according to grounded theory (22), a qualitative data analysis methodology, particularly suited to exploratory research.

Open coding. Transcripts of the interviews were scrutinized. Phrases that were meaningful in the context of the research were highlighted and a descriptive code applied. The codes were explored in subsequent interviews to test their relevance and to explore insights and emerging hypotheses. The list of codes was constantly checked to ensure that similar codes were merged and redundant codes removed. Gradually, the remaining codes were collated and assembled under broader themes that captured the essence of the subsumed codes.

Axial coding. The codes were then grouped according to conceptual categories. Categories are more abstract than initial codes so that they can be analytically developed. For example, a quote by one of the children 'I think that I don't like cake because I never had it ...but if I had it maybe I would like it, but I decided I don't like it' generated the following codes: meanings of food, coping mechanism, cognitive appraisal, adaptive. Categorization was complete when no further codes emerged from the data and key themes had been established.

Development of theory explaining 'growing up' and 'coping' with FA

In order to understand what it was like to live with FA, the data were verified: 'Who? What is happening here? What is he/she/they feeling? When does it happen? Why does it happen? What are the consequences?' These questions capture the structure (the context for actions/interactions) and process (how children cope by particular actions/interactions), which are both inextricably linked and central to grounded theory as a scientific method of theory development (22). Finally, a theoretical framework was developed that encompassed the themes and addressed precipitating events (stressful events in the children's lives caused by FA-related factors); context; psychological impact; and behavioural consequences or coping strategies.

Validity and reliability

The categorization and interpretation generated by the principal author were checked by the second author. Agreement was generated by: searching for negative cases (incidences where the emerging interpretation was not supported); responder validation (final focus groups were used to ensure that no further themes emerged and to validate and explore themes in more depth); and calculating percentage of agreement using Cohen's kappa.

Results

The sample

Sixty-two children/teenagers, 52% female, aged 6–15 years took part in 15 age-appropriate focus groups. All children had been issued with an anapen/epipen (Table 1).

Inter-rater reliability

Inter-rater reliability was high for all categories (kappa 0.82 to 0.94).

Qualitative analysis

Six key themes emerged from the analysis: 'meanings of food'; 'autonomy'; 'control and self-efficacy'; 'peer rela-

tionships'; 'risk and safety'; 'self/identity'; 'active and interactive strategies to cope with growing up with food allergy'.

Meanings of food

Discussing food generates anxiety in the children 'I think about it all the time' and is often associated with physical reactions: going to hospital and physical illness. Children are very aware of the possible consequences of eating; even the younger children could describe the symptoms of an allergic reaction and knew the difference between a mild reaction 'get spots out' and a severe one 'you feel like you are choking'; 'you have to get given the pen and then go to the hospital' (Kim, aged 6); 'I get lumps in my stomach and my eyes get red and I'm in agony' (Danny, aged 10). For older children, fear of death is linked to uncertainty about food and is particularly associated with not being able to breathe, which is the 'scariest symptom' as in the following passage 'You know your throat is meant to be this size [indicates] and it swells to about this size [indicates]. It gets really hard to breath...I can't get my breath...and you feel scared...so scared' (Tina, aged 12).

However, a physical reaction can also have both social and emotional consequences, depending on the context in which the event took place. At school, for example, this resulted in 'being looked at by other children'; feeling self-conscious 'weird'; and guilt, for example, 'On Christmas day at a party I had a Galaxy bar, just a small bit and I had an awful reaction and it ruined the party' (Michael, aged 10). Children need not have had a recent reaction to feel anxiety at the prospect of possible future reactions 'I never had a reaction...but I worry about it' (Aileen, age 7). A strong emotional representation of FA appears to be associated with psychological distress.

Sense of identity

Developmental differences become clear when self-descriptions are sought from the children. Children in the 6–8-year age group described the food they eat as 'special', 'Mum calls it my special chocolate' and also described themselves in this manner. However, a transition point occurs around 8 years when children begin to describe themselves as 'different' and the term 'special' is ascribed to parents and regarded with scepticism 'I can't have chocolate, just special chocolate...that's what my mum calls it anyway' (Jill, age 10). This awareness of parental (special) vs child (different) characterization of food is common across genders. Although the appraisal of chocolate as 'special' may appear to be positive, it appears in the context of the use of explicit negatives of actions by the children 'not being able to eat what you want'; 'I can't have chocolate...just special chocolate'; 'being different from everyone else'. Children also begin to mention that they are 'fussy' with regard to food 'I just have some things that I like to eat and I don't want anything else' (Mary, age 11).

Table 1. Description of the sample

Age group	No.	Sex		Peanuts/ nuts only	Milk/ egg only	Fish/shellfish only	Multiple foods
		M	F				
6–8 years	22	10	12	5	4	3	10
9–11 years	25	12	13	8	3	2	12
12–15 years	15	7	8	8	0	1	6

Following the transition point, children begin to use direct comparative assessment: 'unlike my friends, I always have to be on your guard...I envy them not having to be' (Jade age 14). Children also begin to speak about how 'being different' has consequences for how they are perceived by others: 'they say you're just looking for attention' (Patrick, age 12). In addition, the term 'food - allergic' is used more frequently when children are asked 'three best words to describe themselves'. The evolution of a food-allergic identity – in fully integrating a food-allergic aspect of the self – appears to occur over the middle childhood years, even if this is not revealed to others. The majority of teens said that FA had a strong impact on who they were: 'the type of friends you choose, where you go, how you feel about yourself would probably be different if I didn't have food allergy' (Lisa, aged 14). Although some felt that this had a positive effect, the majority felt that there was 'nothing good' about being food-allergic.

Peer relationships

Growing up with FA impacts on the relationship between personal and social identity development: 'being special is good 'cause you get treats...but you it makes you different from everyone else too' (Karl, aged 8). The process by which this occurs can be illustrated by 'birthday parties' which provide an example of children's complex feelings towards FA. When asked to comment on Vignette 3 (a photograph of a young boy named David eating a cake, with no accompanying text) children attributed feelings of loneliness, frustration 'tired of having to [sit alone]'; isolation 'wanting to eat with the others'; and 'sadness' to David. These representations are related to the children's developmental stage when social comparison becomes a key factor in the development of identity. In terms of FA, we can clearly distinguish between cognitive appraisal in terms of an objective health threat and appraisal in terms of the emotional response to a health threat. For example, 'normal' food is seen as a potential threat to children's safety 'he has to sit away from others in case he gets allergic' (objective health threat); however, David feels 'left out' (emotional response).

Although most children had friends who were supportive, 40% of children described incidences where they were teased, and 20% related incidents of bullying: 'On Halloween, they throw peanuts at you and you can't really say anything or they'll think you're a whiney baby' (Tim, age 9). Such incidences have consequences for the children's developing identity and coping strategies, for example, younger children were quite happy to tell a wide range of children and adults about their FA, whereas, children aged 9–11 years told only 'best friends' and many of teens' peers were not aware that they were food-allergic: 'I'd only mention it if it came up...if I had to say why I couldn't have something, I'd say that I

didn't like it or I wasn't hungry' (Peter, aged 12). When asked why they wouldn't tell people, lack of understanding on the part of others and social embarrassment, were mentioned most often. However, there were gender differences in how negative attitudes were experienced: 'Sometimes the guys give you a hard time in class but you just have to joke at it...If you get odd or make a big deal out of it, it just gets worse' (Joe, age 13); 'It's not the teasing...it's the isolation...that's what gets you' (Lisa, age 14). Thirty per cent of the teens admit to 'just chancing it will be ok' when in the company of others.

Risk and safety

There was agreement among the children that 'you must not eat any food about which you are unsure'. Younger children (6–8 years) are more confident in social situations because of their natural reliance on parents and on adults: 'I'm fine because Mum brings my own food to parties' (Sarah, age 7). Parents, particularly mothers, are an important safety mechanism for young children. Mothers inform other parents, friends, teachers, and after-school activity and restaurant staff.

However, a transition point occurs at approximately 8 years, after which we see a change in the way children think about risk and safety and, thereafter social events become sources of anxiety and uncertainty: 'I was at a barbecue and Mum forgot to ask what was in the burger..... there were eggs in the burger and my eyes and lips swelled up and it was scary' (Jane, age 9). 'There's always food around you know...it doesn't have to be a food party' (Jimmy, aged 10). 'When I take a first bite, there's a moment when you think, is this it?' (Lisa, 14 years). Labelling was also mentioned as a significant source of stress for most children: 'nearly everything says "may contain" so what can you eat?' (Sally, age 10).

Uncertainty also stems from a lack of general awareness of the potential seriousness of FA 'they think you will just get a rash' (Kevin, age 11). This lack of awareness is reflected in shops, restaurants and coffee shops: 'When I was in France we went to a restaurant and we told them that I couldn't have egg or dairy. They gave me a salad with egg on it and Mum had told them and we sent it back and they just scraped the egg off the plate and sent it back' (Katie, age 9). Therefore, as children grow, a strong dichotomy forms between 'safe places' and 'risky places', which eventually extends to 'safe people' and 'risky people': 'if you just stay with the people that know you, you will be ok' (Mary, age 11).

Autonomy, control and self-efficacy

As already noted, in most children under the age of 9 years there is a certainty of parental knowledge and control of events relating to FA. However, in older

children, there is a growing awareness of parents' inability to provide complete safety in social situations 'My Mum read the ingredients on an icecream when I was about 8 and it was safe but I just started eating it and my throat was swelling up and it turned out I was having an allergic reaction' (Sally, age10).

Low self-efficacy results from an inability to exert control over a stressful situation (25). Control in this case refers to the outcome of the stressor and not to the controllability of the cause of the disease: 'It's so confusing that you can eat some things and not others...on Christmas I ended up in the hospital and I couldn't speak...I couldn't tell them how I felt' (Danny, age 10).

This is a developmental stage when children are beginning to gain autonomy and self-belief in their ability to control events in their lives. The effort by children to control their own lives is accompanied by pressure on the family to renegotiate the power balance between parent and child (26). In children with FA, this struggle takes place against a backdrop of anxiety on the part of both children and parents.

Constant worry on the part of parents is seen as a normal part of family life by children with FA of all age groups. Mothers are perceived to 'worry more' than fathers. This worry is justified by young children's causal attributions such as: 'well, something serious could happen...you don't know; 'if you eat something by mistake...and get sick'. The use of the condition underlines that uncertainty, extreme vigilance and a lack of personal control are a central part of growing up with FA. The transactional nature of child adjustment to FA is evident in that comments and worries attributed to parents by younger children are mirrored when the older children talk about their own worries. Twenty per cent of children stated that parents encouraged them to be independent from a young age: 'she trusts me to do the right thing, and so mostly I do' (Jason, age 14). However, there is also evidence of resentment among teens which was not apparent in children under 12 years: '...the same thing again and again...be careful, be careful...do you have your pen...watch what you eat...I need to have a life' (Tom, age 15).

Active and interactive strategies to cope with FA

Coping strategies (emotional, cognitive, and behavioural) were found to fall on a continuum from generalized anxiety/avoidance (Box A) through to minimization/risk (Box B). Coping strategies have more than one function for children and teens.

Avoidant strategies (40% of children and teens). Following the transition point, avoidant strategies are increasingly used by children, from avoidance of places associated with food to generalized avoidance. Generalized avoidance

appears to be associated with high levels of anxiety, low self-efficacy and a full integration of a food-allergic identity as part of the self-concept. They have been divided into: (a) strategies to manage risk/emotions (e.g. anxiety) and (b) strategies to manage identity (social and personal), although there is overlap between the two categories in that there are bi-directional effects.

(a) Strategies to manage risk/emotions (e.g. anxiety). Examples: 'I prefer to go to parties where there is no food'; 'it is better to not go to restaurants... you never know...the waiters don't know'; 'I only go to places where I know I am safe'; 'We wouldn't go to restaurants because they are not safe'; 'I only go to friends houses who I know for ages...it's safer that way'.

(b) Strategies to manage identity/emotions (e.g. others' perceptions). Examples: 'I have the same friends since I was a baby...they really understand'; 'The girl next to me in school always has nuts...and I feel worried but I don't like to say anything'; 'nobody needs to know'; 'In my new school, nobody knows except the teachers...it's better that way'; 'On halloween they throw nuts at me but you can't tell the teacher or they'll say you're a whiney baby'; 'you only tell your best friends'; 'I only told my best friend but she told everyone....and then I was teased'.

Box A

Transcript 5: Katie (age 9) multiple allergies.

Katie: When I was in France we went to a restaurant and we told them that I couldn't have egg or dairy. They gave me a salad with egg on it and Mum had told them and we sent it back and they just scraped the egg off the plate and sent it back...that happens a lot, you know...lots of people don't understand.

Moderator: Like who?

Katie: Like in your class at school .they say you're just looking for attention or...if you go to someone's house that don't know you.

Moderator: How did this make you feel?

Katie: Well it makes you fed up cos you just don't know what could of happened if I had eaten it in that restaurant...you can't trust them [restaurants]...it's better not to go because you can't relax...you never know ... I got a reaction from it one time, it was really scary.

Moderator: I just go to my friends house 'cause she understands I'm different and her Mum knows what to do if anything happens...so I'm safe there.

Moderator: Have you been friends for a long time?

Katie: Since we were babies...I don't like making new friends

Moderator: Why not?

Katie: Because they mightn't understand

Minimization strategies (30% of children and teens). Cognitive minimization, rejection of a food-allergic identity, and 'risky' actions are increasingly mentioned by the children as parent control wanes and is not replaced by intrinsic motivation to self-care over and above social context (e.g. peer acceptance). They appear to be associated with lower expressed levels of anxiety. Although some risky behaviour may be developmentally appropriate for teens, boys who experienced bullying or teasing about FA were more likely to use these strategies. In contrast, girls who spoke about being teased tended to become avoidant with regard to both people and places.

Examples : 'I just want to be like the other kids...and bringing up about the allergy, that just makes you weird'; 'Sometimes I 'forget' my pen on purpose'; 'you just got to chance it will be ok...you'd go mad otherwise'; 'I had sesame seeds on a breadstick on purpose...I was a bit scared but I didn't feel that bad...I went into the toilets for awhile and then I was ok'; 'when I went to my new school, I never mention food allergy...it's better that way'; 'I was sitting in a friends house with a group of guys and they started firing peanuts at me...they didn't know, I don't tell people but that was a freaky moment'.

Box B

Transcript 10. Danny (age 10) Allergic to peanut, nut, and soya.

Moderator: Any good stuff about food allergy?

Danny: Nothing...not a thing

Moderator: Ok what about the bad stuff?

Danny: Everything!

Moderator: Can you tell me about it?

Danny: Friends having to wash their hands before they play with you...not being able to join in...having to think about it all the time...having to remember the pen...lots of stuff that marks you out.

Moderator: Are your friends supportive?

Danny: Well you know in my last school, I had to fight a lot'

Moderator: Why was that?

Danny: Because...they just didn't get it...they thought I was a wuss. I had to try and explain all the time

Moderator: What about the teacher...did you tell her or your parents?

Danny: She didn't know it was happening ...anyway that would have made it worse, and it would only have worried [my parents] more. In my new school only the teacher knows...it's better that way

Moderator: What do you do if you are offered something that you are allergic to?

Danny: Oh...I'd have a bit... I had sesame seeds on a breadstick on purpose...I was a bit scared but I didn't feel that bad...I went into the toilets for awhile and then I was ok

Adaptive strategies (30% of children and teens). Adaptive strategies relate to positive emotional, cognitive or behavioural strategies used to cope with the everyday experience of living with food allergy and lie at the centre of the continuum. Children whose parents encouraged independence and self-management were more likely to describe positive coping strategies.

Examples: 'If I am embarrassed about telling someone to stop eating a snickers or something like that, I just say to myself "It's my life" '; 'if there's food around, I will be careful, but otherwise I don't think about it'; 'I'm lucky 'cause I don't like cake...well if I tried it, I might like it, but I decided I didn't like it'; 'I always tell people I'm food allergic...it's safer that way and then you don't have to keep explaining'.

Discussion

This study represents a first attempt to provide an integrated developmental framework to explain the onset, development and maintenance of FA-related cognitions, emotions and behaviour. Coping consists of more than mere technical competence or functional adaptation (9). Our findings indicate that coping is more than simply a strategy, it is a cumulative history of interactive processes (both age- and disease-specific) that are embedded in a child's developmental organization.

Through qualitative enquiry, a novel framework for evaluating children with FA was developed. Developmentally appropriate techniques were designed to stimulate discussion, maintain interest and minimize threat to the child's self-esteem. Six main themes emerged from the analysis that encompassed precipitating events (stressful events in the children's lives caused by FA-related factors); psychological impact (cognitive appraisal and emotional effects); and behavioural consequences or coping strategies. The integrated developmental framework is shown in Fig. 1.

In most children under the age of 8 years, there is a certainty of parental and adult knowledge and a consequent sense of control of events relating to FA. However, a transition point occurs when children learn or feel that parents (and therefore children themselves) cannot conclusively prevent an allergic reaction, after which we see a change in cognitions, emotions and behaviour. The majority of children used avoidant strategies to cope with living with FA. Many clinicians assume that these strategies are necessary and adaptive, if they are proportionate. However, we found that high levels of anxiety, vigilance and generalized avoidance of situations and people not directly related to food consumption are associated with maladaptive avoidant strategies, at the high end of the continuum. Minimizing strategies are also maladaptive in that children who use them also engage in risky behaviour. Opportunities to engage in risky behaviour increase as children enter their teens. Another

Developmental pathways in food allergy

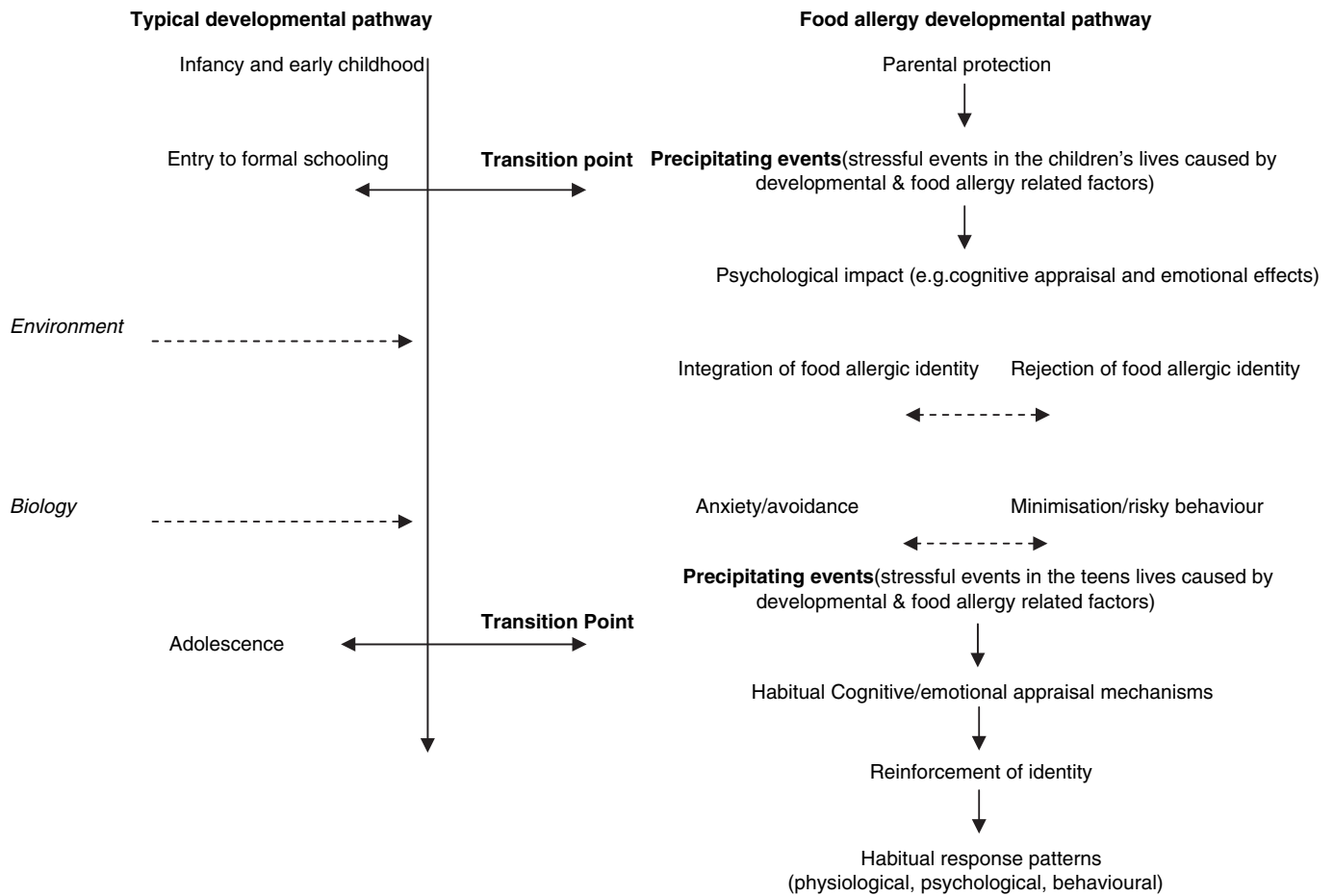


Figure 1. Developmental framework model illustrating the integration of food allergy-specific pathway within the normal trajectory: example of a vignette.

surprising finding is that anxious children and teens are not necessarily those who experience the most or recent reactions. For example, many of the children who described themselves as anxious or worried about FA could not remember ever having had a serious reaction. It may be inferred that these children have been programmed to be anxious or even over-anxious by parents and doctors, who may be perceived by the children to have little else to offer them, except generally negative advice about allergen avoidance and self-injection of adrenaline. These findings can be explained by the dynamics involved in the development of coping strategies which appear to be shaped partly by normative developmental pressures, partly by FA-related factors.

First, children have been made aware, either through parents or through direct experience that a clear dichotomy exists between safe places and safe people. This implicit rule, which is obviously an oversimplification, applies to teachers, school friends, general friends, sleeping over, parties, shops, restaurants, coffee shops, unfamiliar places and other parents.

Secondly, parental perceptions of level of threat and consequent anxiety has a profound impact on the way that children themselves perceive risk. Recent findings by Bollinger et al. (15) suggest that 'children with food allergy may be at an increased risk of social-emotional developmental difficulties'. Many parents admitted to overprotecting their children through an understandable desire to ensure their children's safety. However, such restrictions can stunt children's social and emotional development and increase children's perception of 'illness intrusiveness' (27).

Thirdly, as a child's self-concept becomes increasingly socially based and less family-based, he or she must learn to balance threats to personal safety with threats to their social identity. We have shown that food-allergic children's identity is closely tied to the dietary restrictions that come with their condition. As these children begin to make causal connections between experiences in the world at large and inner feelings, a strong negative association can develop between appraisal in terms of an objective health threat and appraisal in terms of the emotional response to a health threat. Thus, food-allergic

children describe themselves as 'different'. This perceived difference is isolating and has consequences for how children perceive themselves and how they feel they are perceived by others. In older children we see either an integration or rejection of FA as an aspect of the self. Finally, increasing coordination and integration of the mostly physiological regulatory systems (e.g. information processing) over the course of development means that by the time children reach their teens, self-perception, emotional reactions and cognitive appraisal mechanisms have become relatively stable and consistent.

The psychological impact of sensitizing events on children with FA appears to depend on the frequency and the degree to which each event is experienced, suggesting a cumulative or 'feed-forward' model of development. Additionally, variables such as personality traits and gender are likely to moderate individual impact. For example, girls were more likely to describe themselves as worried or anxious, and boys were more likely to say that 'they could handle it'. However, boys did ascribe such emotions to characters in the vignettes 'he's probably really worried he'll get a reaction', thus protecting their self-concept.

Research and clinical implications

A developmental framework has the potential to link formerly disparate concepts such as health-related quality of life and the maturation of the immune system, and delineate mechanisms linking psychological stress, per-

sonality and emotion to neuroimmunoregulation as well as to increased risk of negative impact. Such a model may be used to explain both physiological and psychological phenomena and their interaction, and consequently provide a shared language as a basis for multidisciplinary studies in FA.

For clinicians, the early recognition and incorporation of a developmental framework into a treatment plan is essential and sets the stage for an effective medical care and the eventual transition from paediatric to adult care. One of the major aims of investigating illness-specific patterns of adaptation is to foster the specificity of intervention programmes. However, many studies fail to take contextual factors, and development, into account (8–10). Our findings suggest that the goal of an intervention should not only be to change the mean level of a coping strategy but, in addition, to create a stable growth dynamics by including issues that are FA-specific, as well as age- and context-specific. In children and teens, each of these components has a particular connotation. For example, the objective stressor may not be FA itself but its impact on self-concept.

Food-allergic children have different views of their allergy and different coping strategies that evolve in response to age-, gender- and context-specific stressors. These variations constitute a disease-specific psychological burden that needs to be factored into the planning of their health care. Clinicians and other health professionals need to address this burden more effectively than they do at present to ensure more positive future outcomes for these children.

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