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Conversations about food allergy risk with restaurant staff when eating out: A customer perspective

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ABSTRACT

A significant proportion of food-induced allergic reactions occur whilst dining outside the home, often due to failures in communication. This study aimed to examine the nature of conversations about risk that customers with food allergies have with restaurant staff when eating out. A secondary analysis of qualitative data, generated through interviewing 39 consumers with severe food allergies across three primary studies, was conducted. Thematic analysis was used to process the data. Conversations with staff about risk were commonly initiated under circumstances of uncertainty, unfamiliarity and lack of knowledge and information. Re-establishing a 'contract of care' with familiar food venues and perceived shortcomings in early interactions with staff were further drivers of initiating risk conversations. Two major constraints to risk conversations were identified: being seen as 'fussy' or as a 'nuisance'. To avoid them being perceived as 'fussy' by asking questions about food, consumers framed their conversations with staff in terms of risk, revealing their allergy and its possible impact on health to validate their enquiries. Paradoxically, declaring the allergy and seeking staff acknowledgment of the severity of the condition could make participants feel that they were perceived by staff as a nuisance. These dilemmas sometimes limited conversations and constrained customers' risk management. Experiencing trustworthy interactions with staff was not only contingent on evidence of their knowledge about the food contents and understanding of food allergies but was also based on manifestations of genuine customer care. When managing a food allergy outside the home, establishing risk and safety are products of, and are embedded within, relations and interactions with others. Risk conversations seek to establish trustworthy interactions as the basis on which safety can be maximised and risks – both health and social – minimised.

1. Introduction

Food allergy (FA) is an abnormal immune reaction to a food (National Institute of Allergy and Infectious Diseases, 2012). Although the true prevalence rate is difficult to estimate and varies between countries (National Academies of Sciences Engineering and Medicine, 2017), FAs are not uncommon. They have been found to affect up to 10% of the general population (i.e., the reported rate from population-based study of challenge-confirmed food allergy among infants in Australia; Osborne et al., 2011), with increasing prevalence in the last 2 to 3 decades (Sicherer & Sampson, 2018). In the US nearly 11% of adults (Gupta et al., 2019) and 8% of children (Gupta et al., 2018) are estimated to have FAs based on clinical assessment of self-reports, though prevalence studies based on medically supervised oral food challenges suggest much lower rates (Nwaru et al., 2014). As there is no cure, management of the condition consists of strict avoidance of allergen exposure and prompt treatment with epinephrine in the event of an allergic reaction (Sicherer & Sampson, 2018). Although individuals with FAs enjoy good health in the absence of allergen exposure, their quality of life is adversely affected by anxiety and uncertainty (Antolín-Amérigo et al., 2016).

Provision of information about the presence of an allergen in a food is an important tool for risk management as consumers with FAs often rely on labelling (i.e., ingredients list; advisory and precautionary labelling) to assess the safety of pre-packed foods. This information is deployed and interpreted in complex ways (Barnett et al., 2011a, 2011b) and used in conjunction with other risk management strategies, such as reliance on past experience of consuming a food product, sensory appreciation of risk, and assessment of product qualities – for example, the product category or the country of origin – that are perceived to signify risk (Barnett, Vasileiou, Gowland, Raats, & Lucas, 2013). Written allergen information provision for pre-packed foods is

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legally mandated in both the US (Food Allergen Labelling and Consumer Protection Act of 2004 [FALCPA]) and the UK (EU Food Information for Consumers Regulation No 1169/2011 [EU FIC]). Where foods are not pre-packed, customers are also dependent on oral communication. In the UK, EU legislation (EU Food Information for Consumers Regulation No. 1169/2011 [EU FIC]) was introduced in December 2014. This requires food businesses, such as restaurants, to make allergen information available to the customer. Allergen information can be provided either in written or verbal form at the discretion of food businesses.

Despite this legal provision, eating outside the home, where other parties are responsible for food preparation and provision, presents a greater risk than in the home setting. Evidence shows that a significant percentage of fatal anaphylactic reactions occur in eating out situations. Of the 63 fatal anaphylactic cases (32 cases in 1994–1999; 31 cases in 2001–2006) reported in a national registry in the US, the majority of lethal reactions (i.e., 48; 76%) occurred away from home, for example, at a restaurant, at a friends' home, or in work, school or college. Sixteen (25%) of these fatalities happened in eating out establishments (Bock, Muñoz-Furlong, & Sampson, 2001; 2007). Similarly, in England and Wales, of the 124 deaths attributed to ingestion of a food allergen between 1992 and 2012, 25 fatalities (20%) occurred in restaurants (Turner et al., 2015).

Fatal food-induced anaphylaxis is clearly a rare event (rates range from 0.03 to 0.3 deaths per million inhabitants per year; Pouessel et al., 2018). However, an increased incidence in non-fatal acute reactions has been observed (Turner et al., 2015; Turner et al., 2017). In the US just over 200,000 emergency department visits annually were estimated to result from food-induced acute allergic reactions, of which 90,000 were classified as anaphylactic reactions (Clark, Espinola, Rudders, Banerji, & Camargo, 2011). Similarly, a considerable proportion of non-fatal allergic reactions happen away from home. In a prospective study of patients with confirmed FAs (Michelsen-Huisman et al., 2018) that collected data about the frequency, causes, severity, and medical treatment of accidental allergic reactions, 24% of reported reactions (n = 153) were during a meal outside the home, with 68% of these reactions occurring in restaurants.

Poor communication about the FA risk is commonly implicated in allergic reactions that occur while eating out. Examining such reactions, research shows that 62% of these episodes were the result of failures in communication about risk, with consumers, acting on the assumption that the food was safe, not notifying food establishment staff of their allergy (Furlong, DeSimonea, & Sicherer, 2001). Similarly, in Michelsen-Huisman et al.'s (2018) prospective study, 20% of the sample reported that they never communicated their special dietary requirements when eating out. Perhaps more concerning is that 70% of eating-out reactions in this study occurred despite consumers having called the restaurant before visiting or having informed the cook, chef or waiter (Michelsen-Huisman et al., 2018).

Prior research demonstrates that provision of clear allergen information in written form is a clear preference for consumers with food hypersensitivity[1] when dining out (Begen et al., 2016). Nevertheless, knowledgeable and reliable oral provision of information is greatly appreciated and enhances the quality of the eating out experience (Begen et al., 2016). Consequently, conversations about the FA risk is a primary strategy that consumers use to manage risk when eating out (Leftwich et al., 2011) and equipping children with self-assertion skills so that they can declare their FA and clearly communicate dietary needs is a priority for caregivers (Begen et al., 2018a).

Research conducted after the implementation of the EU-FIC legislation in the UK showed that, despite still favouring written allergen information, consumers with FAs felt more confident and empowered to ask staff about allergens; their anticipation that staff would be a useful source of information also increased (Begen et al., 2018b). However, this increased sense of confidence and entitlement to initiate risk conversations with staff post-legislation varied between consumers with different FAs or food intolerances. Reactions to some allergens were considered to be less recognised and understood (e.g., milk) and those seeking to avoid these allergens expressed greater reluctance to start risk conversations with staff, perceiving an absence of, or little improvement in, relevant allergen information provision (Barnett, Begen, Gowland, & Lucas, 2018). Additional, language barriers, feelings of social embarrassment deriving from uneasiness about interrogating staff about allergen content of dishes, and unwillingness to disclose the allergy for fear of food venues refusing to serve them are major challenges that impede risk conversations at the expense of effective risk management (Leftwich et al., 2011).

A number of studies have examined food service staff knowledge of FAs and allergens, their attitudes towards accommodating the needs of consumers with FAs and their risk management practices (Wen & Kwon, 2016, 2017, 2019; Ajala et al., 2010; Common et al., 2013; Dupuis et al., 2016; Lee & Sozen, 2018; Soon, 2018; Young & Thaivalappil, 2018). Although food service staff often exhibit high levels of confidence and trust in their ability to provide safe meals to consumers with FAs, significant knowledge gaps and inadequate FA management practices have been documented. Common misconceptions include a belief that cooking the food would prevent the allergen from causing a reaction; that it is safe for food allergic consumers to eat a small amount of the allergen; that removing an allergen (such as nuts after the meal was cooked) would render it safe; equating lactose intolerance with milk allergy; and a lack of awareness that allergens can be transferred by food handling practices (Common et al., 2013; Lee & Sozen, 2018; Soon, 2018). A US survey of 187 restaurants indicated that although staff demonstrated good levels of awareness of food allergens as a hazard and a commitment to reducing the risk of adverse events, there were clear gaps in workers' knowledge of safe FA management practices (Dupuis et al., 2016). According to current research, staff rarely proactively ask customers about potential FAs, therefore leaving consumers to initiate communication with staff regarding their allergy (Wen & Kwon, 2016; 2019). These findings suggest that it remains vital to emphasise the importance of consumers remaining vigilant and clearly communicating their dietary requirements to staff particularly given that evidence indicates that initiating risk conversations is considered by food service staff as primarily the responsibility of the consumer (Lee & Sozen, 2018; Soon, 2018; Wen & Kwon, 2016; 2017; 2019).

Acknowledging the important role that the communication about FA risk plays in preventing allergic reactions, a growing body of literature is beginning to examine food establishments' written and oral communication as part of their FA risk management practices (Wen & Kwon, 2016; 2017; 2019). Although research with consumers has highlighted the significance of communicating about FAs as a risk management tool and pinpointed challenges that are experienced by consumers (Begen et al., 2016; Leftwich et al., 2011), little attention has been given to the nature of risk conversations consumers with FAs have with staff when eating out (Janković, Raljić, & Đorđević, 2017). The present article reports findings from a secondary analysis of qualitative data collected across three primary studies with severely allergic individuals and aims to explicate (a) the circumstances under which customers are more likely to initiate conversations with staff about FA risk, (b) the perceived constraints to communication about FA risk and (c) how the trustworthiness of communicative acts is constituted.

2. Materials and methods

2.1. Design

A secondary analysis of qualitative data was carried out re-using interview data from three different primary research projects

[1] The term *food hypersensitivity* is used to denote food allergy and food intolerance.

examining the risk assessment and risk management practices of people with FAs. According to the typology proposed by Heaton (2000, 2008), the present secondary analysis can be characterised as *supplementary*, in that "a more in-depth analysis of an emergent issue or aspect of the data is undertaken" (Heaton, 2008, p. 39) and *amplified* as it "combines data from two or more primary studies for purposes of enlarging sample" (Heaton, 2000, p. 10) in order to examine common themes across datasets. JB and JSL were members of the research teams in all three primary studies and they shared the anonymised data with KV[2] for the purposes of the present secondary analysis.

2.2. The primary studies and participants

All three primary studies were conducted in the UK and approved by institutional research ethics committees (Appendix A provides information about each primary study and lists the publications[3] produced from each study). Primary study 1 (PS1) was cross-sectional qualitative research conducted in 2010. Semi-structured interviews were carried out with 15 adults who had been prescribed epinephrine auto-injectors. The study investigated the barriers to adhering to the management best practice recommendation to carry the epinephrine auto-injector at all times and to its deployment when needed. Primary study 2 (PS2), conducted in 2009–2010, was a cross-sectional multi-method qualitative research study with 32 adults who were allergic to peanut and/or tree nuts. Using participant observation (i.e., participants were accompanied whilst shopping and were asked to 'think aloud' about their food purchases), qualitative interviews, and a product choice reasoning task, this study aimed to understand the risk assessment decisions made by these adults when purchasing food and the challenges they face when they eat outside the home. Finally, primary study 3 (PS3) was a longitudinal, mixed-method research programme that employed qualitative interviews and surveys and took place pre-legislation in 2014 and post-legislation in 2016. PS3 aimed to investigate the preferences of consumers with FA or food intolerance for written and verbal allergen information when eating out. This study further examined the impact of the EU-FIC legislation on the behaviours, experiences, and attitudes of consumers.

The level of severity of participants' FA across the three primary studies was assessed by JSL (an allergy specialist) based on the nature and speed of onset of participants' self-reported worst ever reaction. Participants' FA was, in this way, classified as mild, moderate or severe. For the purposes of the present secondary analysis, we deliberately chose to revisit data generated from the interviews with *severely allergic consumers* because verbal communication about FA risk is likely to be an important risk management tool for this population due to potentially fatal outcomes from failures in communication (i.e., anaphylaxis). Moreover, previous research shows that consumers with severe FA are more likely to adhere to self-care and risk management practices, including communication of their allergy and dietary requirements when dining out (Jones et al., 2014, 2015); as a result, verbal risk exchanges with restaurant staff might be initiated more frequently by these consumers and subsequently narrated as part of their eating out experiences.

In total, interview transcripts from 39 adults with severe FA were re-used in the present secondary analysis. Eleven participants were male and 28 were female with an average age of 35 years (min age = 16; max age = 72). Out of the 15 participants in PS1, 7 were selected for the current study; out of the 32 participants in PS2, 18 were selected; and out of the 39 participants in PS3, 14 were chosen for the purposes of the present study. Most participants (n = 34) had a peanut and/or tree nut allergy with the other five participants reacting to other allergens (e.g., crustaceans, eggs). Seven participants in our sample were allergic to multiple allergens.

2.3. Analytic approach

The principles of thematic analysis (Braun & Clarke, 2006) were employed to analyse the interview transcripts that were examined from a realist standpoint, that is, participants' reported experiences and views are seen to reflect their empirical world. Assisted by computer software (NVivo 10), KV conducted initial processing of the data and themes and subthemes were developed in regular meetings with JB. Initial reading of the transcripts helped to familiarise the researcher with the data, after which accounts of eating out experiences, narrated by participants either spontaneously or after interviewer prompt (Appendix A provides the interview questions relating to managing a FA when eating out), were separated for analytic processing. The content of eating out accounts was then coded focusing on the circumstances that elicited risk conversations, the challenges consumers face and the characteristics of communication that seemed to be experienced as trustworthy. A preliminary analytic report was then produced which was discussed among the researchers with a view to refining the developing themes and subthemes. The final analytic report is presented below, and interview extracts are used to illustrate the analytic points (Tong, Sainsbury, & Craig, 2007). Extracts are identified by participants' unique code, gender, age, allergy and the primary study they participated in.

3. Results and discussion

The analysis is divided into three thematic domains: (a) drivers of initiating conversations about FA risk; (b) constraints to communication about FA risk; and (c) trustworthy communicative acts. Fig. 1 presents the analytic themes and subthemes that fall within each thematic domain.

3.1. Drivers of initiating conversations about risk

Three sets of drivers of initiating conversations with restaurant staff about risk were identified in the analysis. The first set concerned (a) missing or insufficient written information and (b) uncertainty about the contents of the food. These drivers can be considered as being situated within the food establishment. The second set of drivers stemmed from the consumer and concerned (a) the lack of prior experience of a restaurant or a dish and (b) recent experiences of allergic reactions. The third set of drivers of instigating risk conversations was located within the quality of relationship or interaction that consumers experienced with food venues and concerned (a) the re-establishment of a 'contract of care' and (b) protecting communication about risk from perceived or anticipated failures.

3.1.1. Drivers situated within the food establishment

Lack of or inadequate written information about the ingredients of a food, primarily on the menu, but occasionally on the food venue's website, was unsurprisingly a major trigger for initiating risk exchanges, often in the form of interrogating staff about what the food

[2] The researcher who conducted the initial stages of the secondary analysis (KV) was already familiar with the dataset from primary study 2 as part of her involvement in another publication (i.e., Barnett, J., Vasileiou, K., Gowland, M. H., Raats, M. M., & Lucas, J. S. (2013). Beyond labelling: what strategies do nut allergic individuals employ to make food choices? A qualitative study. *PloS one, 8*(1), e55293.).

[3] For further details about each primary study, the following publications are suggested (for PS2 and PS3, the publications suggested are the most relevant to the contents of the present manuscript):• PS1: Money, A. G., Barnett, J., Kuljis, J., & Lucas, J. (2013). Patient perceptions of epinephrine auto-injectors: exploring barriers to use. *Scandinavian Journal of Caring Sciences, 27*, 335–344.• PS2: Leftwich, J., Barnett, J., Muncer, K., Shepherd, R., Raats, M. M., Gowland, M. H., & Lucas, J. S. (2011). The challenges for nut-allergic consumers of eating out. *Clinical & Experimental Allergy, 41*, 243–249.• PS3: Begen, F. M., Barnett, J., Payne, R., Roy, D., Gowland, M. H., & Lucas, J. S. (2016). Consumer preferences for written and oral information about allergens when eating out. *PloS one, 11*, e0156073.

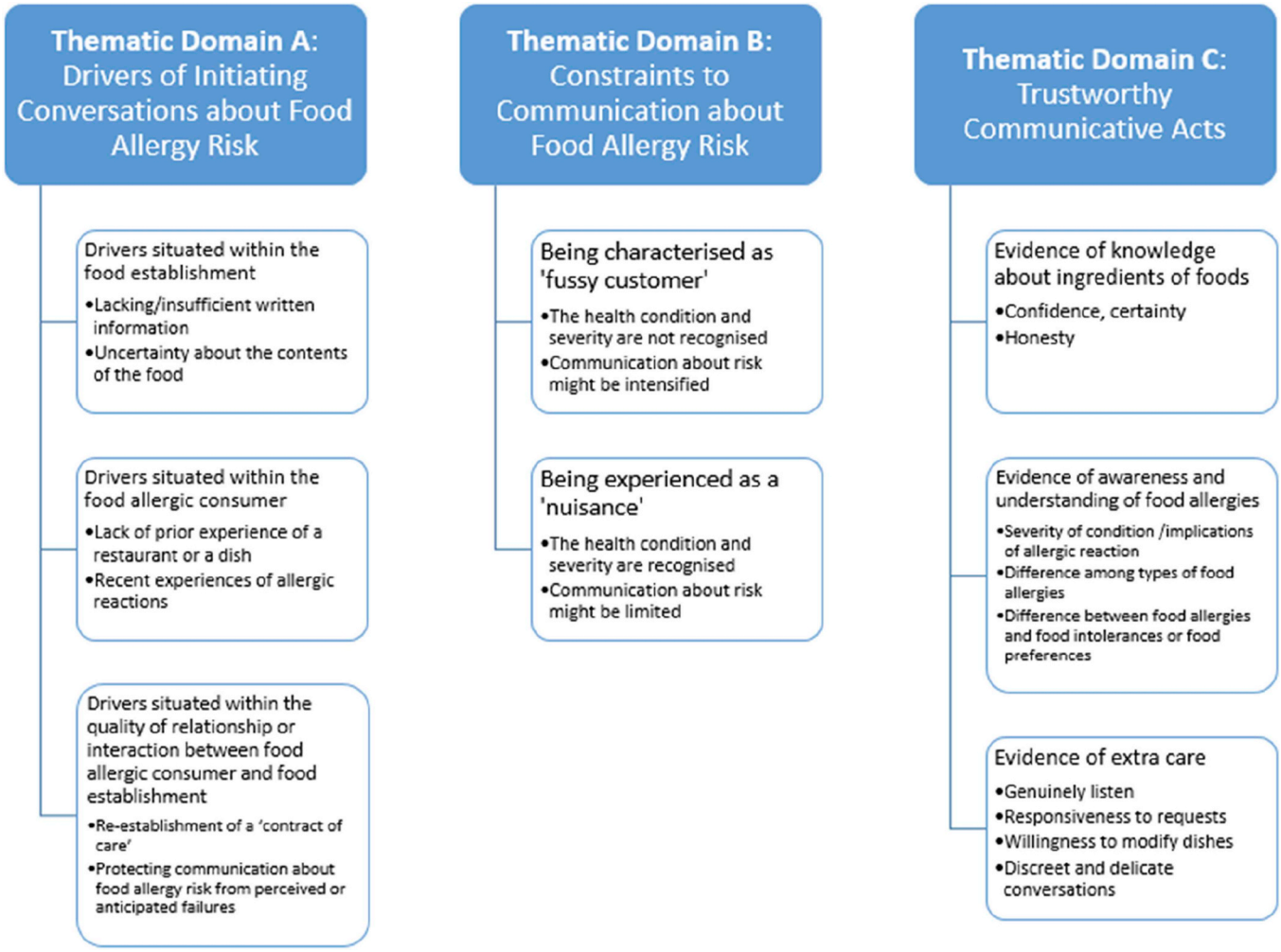


Fig. 1. Analytic themes and subthemes.

contains. In line with existing evidence (Begen et al., 2018b) detailed written allergen information was appreciated by consumers with FAs as they felt this enabled them to readily assess the risk and make their decision whilst obviating the need to initiate risk conversations with staff. Presenting food options on chalkboards or specials' boards was most commonly identified as the type of menu that was lacking sufficient information which then needed to be sought through verbal communication. Certain food venues, such as coffee shops or sandwich bars, were also pinpointed as establishments whereby consumers had to start conversations with staff due to lack of information about foods. Occasionally, and as illustrated by participant's narrative below, absence of any written reference to FAs or other special dietary requirements on the menu was interpreted as a potential lack of awareness and understanding of the problem and signalled the need to speak to staff.

P: But in terms of the actual … how the organisation are dealing with allergy, em … I don't know, like if there's no reference to allergy at all, in any of their menu, I would worry a bit then, because usually it will say something.

I: And what would that mean, that you'd leave?

P: No, I'd just ask. I'd just say "I've got an allergy – what should I avoid?" (P36, female, 34, tree nuts, PS3)

Uncertainty about the nature of the contents of a dish also motivated consumers to initiate risk conversations with staff. Categories of food that were perceived to be of high risk, such as sauces or desserts, lack of knowledge of a particular ingredient, or when language barriers impaired the ability to understand risk information (e.g., menu in a foreign language) were all circumstances that triggered enquiries to staff about the food. Reflecting upon a problematic food category (i.e., dessert), the participant below said:

Pudding comes along, have a look at it … Often, I'll ask with a pudding, because you just can't tell. You know, it could be ground almond or something not obvious. (P25, female, 38, peanut & tree nuts, PS2)

Although the presence of written allergen information was valued and acted reassuringly, it should be noted that the reduced inclination to start conversations with staff may be problematic insofar as it does not enable consideration of the risks of cross-contact during the preparation of the meal or to exclude the possibility of a potential change in ingredients. Indeed, the EU-FIC legislation introduced in the UK concerns allergens that are intentionally included in foods and does not cover the issue of cross-contact.

3.1.2. Drivers situated within the consumer with FA

Lacking prior experience of an eating out venue or of a dish was a further driver of initiating risk conversations with staff. As illustrated in the extract below, consumers with FAs were more likely to start enquiring about the food and reveal their allergy in food establishments they were not familiar with. This was sometimes done in spite of sufficient information on the menu, or when they wanted to try a new dish. A few participants noted that they would contact a restaurant they had never been to before in advance of their visit to ensure that the establishment would be able to cater for their FA.

I do still try things, but I always tell the waiter that I do have a severe nut allergy – "Is there anything that I should stay away from?" if it's a restaurant I don't know or if it's a dish I don't know that I would quite like to try. (P18, female, 48, peanut & tree nuts, PS2)

Recent experience of allergic reactions also triggered or intensified communication about risk as part of participants' effort to implement, or revert to, a stricter risk management behavioural pattern. After describing his latest episode of an allergic reaction, a participant noted:

I'd say I've been a lot more vigilant and asked questions more about when I go into restaurants and stuff like that, make them aware that I am … I do have a nut allergy. (P13, male, 44, peanut & tree nuts, PS2)

3.1.3. Drivers situated within the quality of relationship or interaction between consumers and food venues

Although risk conversations were most commonly initiated in circumstances of uncertainty, lack of knowledge and unfamiliarity, a few participants still held these conversations in eating out venues they frequently visited and where their allergy was known to staff. Risk conversations in this instance functioned as an attempt to re-establish a 'contract of care' with the food venue in order to remind staff and reiterate the importance of considering the customer's needs. This reiteration of the allergy and of the foods that must be avoided appeared to have a reassuring effect by lessening the risk of unsafe food provision through inadvertent neglect.

With some places, like [name of restaurant], the waiters know us, and they're like, right – I still say I've got the allergies, you know, and they're like, yeah, okay, you know, no problem. (P38, female, 34, peanut & celery, PS3)

Participants typically directed initial risk enquires to the serving staff. Nevertheless, when there was not a satisfactory resolution in this initial conversation – or it was anticipated that there would not be – participants escalated their communication, suggesting that consumers with FAs did not only envisage potential failures in risk exchanges but they were also strategic in targeting communication as much as possible. For instance, participants sought to speak directly to the restaurant manager and/or chef when they felt that the serving staff were not very knowledgeable about the food, did not provide satisfactory answers, when they appeared unaware of the seriousness of allergies or when staff were so busy that it raised concerns that they might inadvertently fail to effectively convey the special dietary requirements to other staff. Participant decisions to direct communication about risk to senior staff invoked accountability and sought to commit the establishment to ensuring suitable food provision. A participant recounted the following instance:

Well, I went into a restaurant and the girl was so vague there, I just said, "You know, well, can I speak to the manager or the chef?" (P28, female, 72, peanuts, PS3)

Ordering food on the phone from takeaway establishments was also seen to pose threats to effective communication about FA risk. Some thought that the lack of their physical presence might make takeaway establishments less attentive to special dietary requests or that the various roles staff involved in the operation of a takeaway establishment increased the chances for miscommunication. On these occasions, participants intensified their communication about risk by double checking with the venue about the safety of the food. Expressing worry about ordering food from takeaways, a participant reasoned:

You're not seeing the people preparing it, they could just say anything over the phone to you, like it's a different person that picks up the phone and a different person that cooks and different person that brings it, and so therefore there could be a lot of miscommunication, all over the board really. (P34, female, 20, peanut, tree nuts, milk & egg, PS3)

3.2. Constraints to communication about FA risk

Adopting a pragmatic approach towards the need to initiate conversations with staff about the risk of FA when dining out in order to ensure health safety, several participants clearly felt confident to initiate discussions with staff and reported taking an assertive approach to finding out about the safety of the foods and to making specific requests (e.g., speak to the manager; possible modification of a food choice; seeking to eliminate the risk of cross-contact). Participants sometimes explicitly narrated that failing to initiate risk conversations with staff rendered them culpable of any problems that followed. This was evident in narrations of past episodes of allergic reactions – as illustrated by the quote below – with participants attributing them to their own failure to enquire about the safety of the food. Developing confidence and assertiveness in instigating risk conversations was seen by some as the result of managing a FA for many years. These participants noted that they were more reluctant to have these conversations in the early years of managing the condition.

I'd had a couple of drinks as well, so I didn't read the menu properly, so … and I should ask, and it is my responsibility to ask, em, so fair enough, that [allergic reaction] was my fault. (P06, male, 36, all nuts, PS1)

3.2.1. 'Fussy customer'

Despite some participants' confidence and assertiveness, initiating risk conversations with staff when dining out presented threats of a social nature for many; feelings of embarrassment, uneasiness, and awkwardness were spontaneously mentioned as participants were describing their verbal risk exchanges with staff. This discomfort often resulted from participants' expectations (or actual prior experience for some) of how they will be perceived by both staff and those they were with who might be unaware of their FA. For example, some narrated that instigating a conversation about the food would be seen as 'making a fuss', particularly when dining with people they did not know. Moreover, conversations about the food often meant that the condition was revealed, which could provoke discussions around allergy that were not necessarily welcome. One participant characteristically said:

Like, for example, if I go out with a group of friends for dinner, and I know some of them and not all of them, that's my kind of worst situation, because I have to make a fuss – I have to say to the waiter, "Excuse me, I've got a nut allergy – would you mind letting the chef know and can you tell me if this has got nuts in?" People hear and they say, "Oh, so you've got a nut allergy?" I really … I just … want to clam up and not really talk about it. (P21, female, 24, tree nuts, PS2)

Being seen as a 'fussy', 'awkward' or 'difficult' customer were thus characterisations consumers anticipated (and some had experienced) upon starting to enquire about the food. The possibility that they may be perceived in such pejorative terms suggested that others might not appreciate the reasons behind questioning and/or understand the severity of the allergy. To legitimise questioning about food and resist the attribution of negative character traits, as exemplified by the participant's quote below, participants felt that they had to reveal their allergy and explain the importance of allergen avoidance. Several expressed frustration around the delicate communicative negotiations required; others resisted being positioned as 'fussy' as this characterisation invalidated their health status and downplayed the severity of their condition.

You always have to be that awkward dinner guest, that awkward customer, giving somebody 20 questions about what's in it or what's not in it […] I sometimes feel like I'm being a bit difficult or being a pain, and I always feel like I've got to explain myself, say … basically explain I'm allergic and I need to check. (P05, female, 30, peanut & stoned fruits, PS1)

3.2.2. 'Nuisance'

The social threat of being seen as a 'fussy customer' was perceived to entail a risk of the condition potentially being underestimated, thus leading to a disclosure of the allergy and explanation of its severity. Paradoxically on other occasions participants anticipated that to disclose the allergy would provoke anxiety in staff and result in poor service which made some participants feel more inclined to conceal it. Participants described several incidents whereby the food venue either refused to serve them altogether or provided them with very few food options as a result of taking an overcautious approach to risk management citing their inability to exclude the risk of cross-contact. To avoid causing others (e.g., staff, social companions) inconvenience and potentially being denied the service, a few participants deliberately downplayed or did not mention their allergy in risk conversations and chose to ignore or minimise the risks of cross-contact. To circumvent scenarios of worry and anxiety, others intentionally limited the extent of their risk exchanges with staff and opted for food options they were more confident about (e.g., because of prior experience) or avoided eating altogether. In these instances – and despite the fact that the food allergy was acknowledged and understood (unlike the scenario of being seen as a 'fussy customer') – participants' experience of eating out was again unfavourably affected; this was because they felt that they were inconveniencing restaurant staff, by placing unreasonable and excessive demands. The quote below illustrates how prior experience of causing anxiety and inconvenience upon declaration of the allergy has led this participant to become more restrained about disclosing his allergy.

> *When I was a bit younger, say in my mid-twenties, I would always – I would say to the waiter, "I'm nut-allergic," and blah, blah, blah, but then that just seems to panic everyone! It's not … it's not embarrassing, but it's more … you don't want to be a pain in the neck really. And then you feel bad for everyone at your table because everyone's "Oh, there's a nut allergy, nut allergy, table seven, nut allergy, table seven – you've got to look out!" and you just think … oh no! So now, I just tend to double-check when I go to a restaurant what I'm going to have, and then, if I don't know something that's in that – like for instance, if it's all in French, I would say, "Okay, what's in that?" I would ask what was in it. If I don't recognise an ingredient, I would say … at that point, that's when I say "I'm allergic to nuts – is there any nuts in that?" It's more something, I think, for me to be aware of than them really. (P24, male, 34, peanut & tree nuts, PS2)*

Whilst previous research has identified these challenges when food allergic consumers resort to verbal communication to manage the risk of an allergic reaction (Leftwich et al., 2011), the present analysis stresses the relational nature of both the social (i.e., negative characterisations) and health risks (i.e., potential risk-taking by obscuring or downplaying the condition). As consumers anticipate how they will be seen or treated by food venues, health and social risks are produced which need to be negotiated and managed. Conceiving FA risk in relational terms helps to counter an overly individualistic approach to FA risk management. Decisions and behaviours around managing a FA are not solely located within the individual but are produced by, and embedded within, social interaction. Moreover, such an approach draws attention to the dynamics and content of inter-personal exchanges, highlighting the sensitivities that people bring into social situations. In this way, not only do social risks (e.g., attribution of pejorative character traits) acquire visibility and recognition but the synergies and interplay between health and social risks are brought to the forefront.

3.3. Trustworthy communicative acts

3.3.1. Knowledge about the contents of foods

Showing knowledge and answering confidently and with certainty about what ingredients foods contained and which foods could be safely consumed or avoided were highly valued qualities of the food venue's FA-related communication because this enabled participants to assess the risk and make safe choices whilst enjoying the eating out experience. On the contrary, vague or uncertain responses about food ingredients impeded the process of risk assessment, leading consumers to typically opt for food choices they were certain would be safe. Easy access to the chef was also valued as participants believed this would maximise the likelihood of receiving accurate information about the food and avoided troubling the serving staff and 'making a fuss'. Food suggestions by the establishment that were suitable for the needs of the consumer further contributed to building trust and functioned to reassure, since they signified that the allergy issue had been considered. The importance of confident communication is exemplified in the extract below:

> *Generally, you can tell by the way they reply. If they seem confident about it, it makes you feel more confident. (P35, male, 18, peanut & tree nuts, PS3)*

Minimal communication on the part of serving staff, even if confidently delivered, sometimes raised suspicion in unfamiliar venues or where people had limited prior experience of them. Consumers with FAs thus did not always take responses at face value and often sought to discern whether the establishments were honest and truthful in their communication. Non-verbal communication was also considered in efforts to determine the sincerity of responses whilst the mistrust that was expressed by some seemed to be founded on prior experiences of deceitful communication, as demonstrated by the following quote.

> *I mean that was really, really bad, because they could have so easily just said, "We're not sure," or "Cross-contamination is an issue," and that's fine. So that's one example where people have blatantly lied. (P23, female, 37, peanut & tree nuts, PS2)*

3.3.2. Awareness and understanding of food allergies

Indications of awareness and understanding of FAs on the part of food establishments were important components of their communication about risk that helped people feel reassured and confident to eat at those venues. Serving staff's awareness of allergies was sometimes inferred by their ability to answer more extensively than was warranted by the question. The availability of written information about FAs and other special dietary requirements (e.g., on menu) was also a strong signal of organisational awareness. Lack of it sometimes caused concern and motivated participants to verbally explore with staff whether the venue would be able to accommodate their needs. Talking about a certain restaurant chain, one participant stated:

> *They seem to be aware of it and you know they are as soon as you go in, that they've dealt with all of people's intolerances and proper allergies. (P36, female, 34, tree nuts, PS3)*

Moreover, showing an understanding of the seriousness of FAs in terms of the consequences an allergic reaction could cause, of the different types of FAs and of the difference of FAs from food intolerances and food preferences were all important indications of the depth of knowledge and awareness. A participant described how he would refrain from further enquiring about the food if he felt that the eating out establishment did not really understand the problem of allergy. This suggests that a generic awareness of the health condition acted as an important foundation upon which the specifics of verbal risk exchanges could then be developed. However, current evidence suggests that there are significant gaps in food establishment staff's knowledge about allergies, allergens and the risk of cross-contact (Common et al., 2013; Lee & Sozen, 2018; Soon, 2018) highlighting the need for training. Proactive reference to any potential allergies by the serving staff was a powerful manifestation of organisational awareness and by extension of venue's capability to safely cater for these consumers, as illustrated in the participant's narrative below. Nevertheless, research indicates that serving staff seldom proactively ask consumers about potential FAs (Wen & Kwon, 2019).

They … like, when we had the children, they brought out these pizzas, and everything was in bowls and he said, oh, this is this, this is that. He asked if any of the children had any allergies. They were just much more aware. (P30, female, 61, Cereals, gluten & milk, PS3)

3.3.3. Manifestations of extra care

Beyond knowledge of the contents of foods and understanding of FAs, manifestations of extra care on the part of food establishments were characteristics of, and underlying qualities in, communication about risk that cultivated further reassurance and significantly enhanced participants' eating out experience. Genuinely listening to the allergy issue through taking the time to speak to the person and paying attention to what they say; prompt responsiveness to requests for information and elimination of the risk of cross-contact; willingness to modify a plate in order to accommodate consumers' needs; and being discreet and delicate whilst holding risk conversations were powerful signs of extra care and respect. Given the significant restrictions for consumers with severe FAs, the readiness of food establishments to adapt the dishes whilst respecting consumers' food preferences and desire to try out different foods was also highly valued. Reflecting on why they frequent a specific restaurant, a participant reported:

Why do we go there? Because they listen, again, because of allergies. They're very, very good there. You can haul the chef out of the kitchen and explain exactly what the allergy is, and they'll do it. They'll cook everything with separate utensils, and they'll even change the menu to accommodate you. (P13, male, 44, peanut & tree nuts, PS2)

4. Conclusions

FA is unique in that it is a chronic and episodic health condition that is largely asymptomatic unless a reaction occurs (Jones et al., 2014, 2015). Constant vigilance and adherence to risk management practices is required, so that individuals with FAs minimise the risk of an allergic reaction. Communicating the health condition and special dietary requirements to others when eating out has been conceptualised in literature as one important behavioural manifestation of self-care (Jones et al., 2014, 2015), yet little attention has been paid to the nature of these communicative exchanges (Janković et al., 2017). Although the responsibility for revealing the allergy and communicating dietary requirements is currently seen to lie primarily with the consumer (Lee & Sozen, 2018; Soon, 2018; Wen & Kwon, 2016; 2017; 2019), the present analysis, in line with previous research (Stjerna, 2015; Stjerna, Worth, Harden, & Olin Lauritzen, 2017), demonstrates that notions of risk and safety in the context of managing a FA emerge from, and are embedded in, interactions with others. This relational view of risk and safety is exemplified particularly well in eating out situations where consumers have no control over the food preparation and where – unlike prepacked food where ingredient labelling is mandatory – conversations about risk are required to discern the ingredients and where food preparation practices make the possibilities of cross-contact more salient (Barnett et al., 2011a, 2011b).

This paper has sought to show that managing a FA outside the home involves dilemmas of managing health and social risks, and the visibility of these management strategies. Through risk conversations with restaurant staff, consumers clearly tried to negotiate a fine balance between the need to receive care in relation to their allergy, without being labelled as a 'fussy' or 'awkward' customer and being denied the service as a result of an overcautious approach to risk management. Verbal risk exchanges also – implicitly at least – entail a negotiation about the assumption and division of responsibility between customers and food establishments for managing the risk. Accordingly, signs and signals that meaningfully convey that customers are invited and welcome to declare and discuss FAs – for example, proactive exploration of relevant dietary requirements by serving staff – would help consumers feel that such conversations are welcome and valid, would alleviate potential anxieties, and indicate that businesses are both knowledgeable and inclined to accommodate the needs of these customers.

Given that the risk of consuming a food they are allergic to, as well as social risks (e.g., being attributed undesirable traits) are generated in relation to and in interaction with others, the risk conversations with restaurant staff essentially embody consumers' effort to negotiate and establish a trustworthy relationship with others from which safety will be maximised and risks minimised. This suggests the need to shift the focus of analysis from the behaviours of individuals with FAs to the social interactions, relationships and situations within which they find themselves and from which risk and safety are constructed, negotiated and managed (Rhodes, 1997). Furthermore, our results showed that establishing a trustworthy relationship was not limited to staff exhibiting competence, that is, knowledge of allergenic foods and awareness of FAs, but it extended to qualities of communication that expressed honesty, genuine care and respect. This resonates with literature on trust development proposing that in transactional interactions a party is perceived to be trustworthy based on the attributes of ability, benevolence and integrity (Mayer, Davis, & Schoorman, 1995).

4.1. Strengths and limitations of the present study

We chose to focus this secondary analysis on the accounts of adults whose worst ever reaction was classified as severe. Although the conditions under which communication about FA risk is likely to be initiated and the qualities identified as conducive to trustworthy communication are expected to be reflective of consumers with less severe FAs (i.e., moderate, mild), it is possible they might be different. For example, consumers with moderate or mild FAs might be more inclined to prioritise social risks, potentially leading to reducing attention to the health risk. Second, although qualitative interviews provide useful insights about people's perspectives on events or experiences, greater insight about the interactions between consumers and staff would have been gained through observation of naturally occurring exchanges. Despite the challenges such methods would pose from an ethical and practical point of view, they would enable study of more subtle forms of communication (e.g., non-linguistic communication) implicated in inferences of trustworthiness.

4.2. Implications of the present study

Understanding the drivers of, and constraints to, initiating risk conversations as well as the qualities of communication that inspire trustworthiness when eating out has important practical implications for the food industry. Food businesses that aim to develop appropriate FA risk communication would benefit from the insights of the present study about what constitutes trustworthy communication acts. For example, whilst knowledge of allergens/dish contents and understanding of allergies are prerequisites, food venues should also convey care and respect not only for the health needs of these customers but also for their social needs and sensitivities that are made salient in eating out situations. Particularly in eating out contexts whereby the display of written allergen information provision is not mandatory, verbal communication about risk is crucial in managing the risks pertaining to food allergens. For example in the US consumers are advised to request allergen information when eating out (Food and Drug Administration, 2018) and thus far, only a few states (i.e., Illinois, Virginia, Massachusetts, Maryland, Michigan, and Rhode Island) have laws requiring food establishments to display a FA awareness poster and to provide mandatory FA training to employees (Food Allergy Research and Education, 2019 n. d.). Where the provision of comprehensive written allergen information is at the discretion of food businesses, as is the case in the UK, verbal communication about FA risk remains not only an important tool for managing the risk of an allergic reaction but also the means through which trustworthy interactions and relationships

between customers and food venues can be built. Finally, those who have a role in supporting people with FAs, such as healthcare professionals and patient advocacy groups, should continue stress the importance of verbal communication with staff when eating out. Communication should not only be about the intentional inclusion of allergens in the dishes they are serving, but also about the risk of cross-contact. Consumers should be informed, and kept updated, about their legal rights (where applicable) and receive advice about how to feel confident and entitled to initiate and hold risk conversations.

Declaration of interests

The authors have no competing interests to declare.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.foodcont.2019.106858.

References

Ajala, A. R., Cruz, A. G., Faria, J. A., Walter, E. H., Granato, D., & Sant, A. S. (2010). Food allergens: Knowledge and practices of food handlers in restaurants. *Food Control, 21*, 1318–1321. https://doi.org/10.1016/j.foodcont.2010.04.002.

Antolín-Amérigo, D., Manso, L., Caminati, M., de la Hoz Caballer, B., Cerecedo, I., Muriel, A., et al. (2016). Quality of life in patients with food allergy. *Clinical and Molecular Allergy, 14*, 4. https://doi.org/10.1186/s12948-016-0041-4.

Barnett, J., Begen, F. M., Gowland, M. H., & Lucas, J. S. (2018). Comparing the eating out experiences of consumers seeking to avoid different food allergens. *BMC Public Health, 18*, 1263. https://doi.org/10.1186/s12889-018-6117-y.

Barnett, J., Leftwich, J., Muncer, K., Grimshaw, K., Shepherd, R., Raats, M. M., ... Lucas, J. S. (2011a). How do peanut and nut-allergic consumers use information on the packaging to avoid allergens? *Allergy, 66*, 969–978. https://doi.org/10.1111/j.1398-9995.2011.02563.x.

Barnett, J., Muncer, K., Leftwich, J., Shepherd, R., Raats, M. M., Gowland, M. H., ... Lucas, J. S. (2011b). Using 'may contain' labelling to inform food choice: A qualitative study of nut allergic consumers. *BMC Public Health, 11*, 734. https://doi.org/10.1186/1471-2458-11-734.

Barnett, J., Vasileiou, K., Gowland, M. H., Raats, M. M., & Lucas, J. S. (2013). Beyond labelling: What strategies do nut allergic individuals employ to make food choices? A qualitative study. *PLoS One, 8*, e55293. https://doi.org/10.1371/journal.pone.0055293.

Begen, F. M., Barnett, J., Barber, M., Payne, R., Gowland, M. H., & Lucas, J. S. (2018a). Parents' and caregivers' experiences and behaviours when eating out with children with a food hypersensitivity. *BMC Public Health, 18*, 38. https://doi.org/10.1186/s12889-017-4594-z.

Begen, F. M., Barnett, J., Payne, R., Gowland, M. H., DunnGalvin, A., & Lucas, J. S. (2018b). Eating out with a food allergy in the UK: Change in the eating out practices of consumers with food allergy following introduction of allergen information legislation. *Clinical and Experimental Allergy, 48*, 317–324. https://doi.org/10.1111/cea.13072.

Begen, F. M., Barnett, J., Payne, R., Roy, D., Gowland, M. H., & Lucas, J. S. (2016). Consumer preferences for written and oral information about allergens when eating out. *PLoS One, 11*, e0156073. https://doi.org/10.1371/journal.pone.0156073.

Bock, S. A., Muñoz-Furlong, A., & Sampson, H. A. (2001). Fatalities due to anaphylactic reactions to foods. *The Journal of Allergy and Clinical Immunology, 107*, 191–193. https://doi.org/10.1067/mai.2001.112031.

Bock, S. A., Muñoz-Furlong, A., & Sampson, H. A. (2007). Further fatalities caused by anaphylactic reactions to food, 2001-2006. *The Journal of Allergy and Clinical Immunology, 119*, 1016. https://doi.org/10.1016/j.jaci.2006.12.622.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*, 77–101. https://doi.org/10.1191/1478088706qp063oa.

Clark, S., Espinola, J., Rudders, S. A., Banerji, A., & Camargo, C. A. (2011). Frequency of US emergency department visits for food-related acute allergic reactions. *The Journal of Allergy and Clinical Immunology, 127*, 682. https://doi.org/10.1016/j.jaci.2010.10.040.

Common, L. A., Corrigan, C. J., Smith, H., Bailey, S., Harris, S., & Holloway, J. A. (2013). How safe is your curry? Food allergy awareness of restaurant staff. *Journal of Allergy & Therapy, 4*, 140. https://doi.org/10.4172/2155-6121.1000140.

Dupuis, R., Meisel, Z., Grande, D., Strupp, E., Kounaves, S., Graves, A., ... Cannuscio, C. C. (2016). Food allergy management among restaurant workers in a large US city. *Food Control, 63*, 147–157. https://doi.org/10.1016/j.foodcont.2015.11.026.

Food Allergy Research & Education. Food allergies and restaurants (2019). (n.d.) https://www.foodallergy.org/education-awareness/advocacy-resources/advocacy-priorities/food-allergies-and-restaurants, Accessed date: 5 June 2019 Retrieved from.

Food and Drug Administration (2018). *Food allergen labeling and consumer protection act of 2004 questions and answers.* Retrieved from https://www.fda.gov/food/food-allergens-and-gluten-free-guidance-documents-and-regulatory-information/food-allergen-labeling-and-consumer-protection-act-2004-questions-and-answers#q26, Accessed date: 5 June 2019.

Furlong, T. J., DeSimone, J., & Sicherer, S. H. (2001). Peanut and tree nut allergic reactions in restaurants and other food establishments. *The Journal of Allergy and Clinical Immunology, 108*, 867–870. https://doi.org/10.1067/mai.2001.119157.

Gupta, R. S., Warren, C. M., Smith, B. M., Blumenstock, J. A., Jiang, J., Davis, M. M., et al. (2018). The public health impact of parent-reported childhood food allergies in the United States. *Pediatrics, 142*, e20181235. https://doi.org/10.1542/peds.2018-1235.

Gupta, R. S., Warren, C. M., Smith, B. M., Jiang, J., Blumenstock, J. A., Davis, M. M., ... Nadeau, K. C. (2019). Prevalence and severity of food allergies among US adults. *JAMA network open, 2*. https://doi.org/10.1001/jamanetworkopen.2018.5630 e185630-e185630.

Heaton, J. (2000). *Secondary analysis of qualitative data: A review of the literature.* Retrieved from https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=2ahUKEwjQkP_q_NHiAhUFCuwKHfVCCQ0QFjAAegQIABAC&url=https%3A%2F%2Fs3-eu-west-1.amazonaws.com%2Fesrc-files%2Foutputs%2Fk7fxpLJE7E6XaRGsUgTWqg%2Fb_X-cCOEIE2Wniz5W8I_Uw.pdf&usg=AOvVaw17vjnw_MJHjrzsdk8nCKra, Accessed date: 5 June 2019.

Heaton, J. (2008). Secondary analysis of qualitative data: An overview. *Historical Social Research/Historische Sozialforschung, 33*, 33–45. https://www.jstor.org/stable/20762299.

Janković, V., Raljić, J. P., & Đorđević, V. (2017). Public protection–reliable allergen risk management. *IOP Conference Series: Earth and Environmental Science, 85*, 012009. https://doi.org/10.1088/1755-1315/85/1/012009.

Jones, C. J., Llewellyn, C. D., Frew, A. J., Du Toit, G., Mukhopadhyay, S., & Smith, H. (2015). Factors associated with good adherence to self-care behaviours amongst adolescents with food allergy. *Pediatric Allergy & Immunology, 26*, 111–118. https://doi.org/10.1111/pai.12333.

Jones, C. J., Smith, H. E., Frew, A. J., Toit, G. D., Mukhopadhyay, S., & Llewellyn, C. D. (2014). Explaining adherence to self-care behaviours amongst adolescents with food allergy: A comparison of the health belief model and the common sense self--regulation model. *British Journal of Health Psychology, 19*, 65–82. https://doi.org/10.1111/bjhp.12033.

Lee, Y. M., & Sozen, E. (2018). Who knows more about food allergies–restaurant managerial staff or employees? *British Food Journal, 120*, 876–890. https://doi.org/10.1108/BFJ-07-2017-0387.

Leftwich, J., Barnett, J., Muncer, K., Shepherd, R., Raats, M. M., Gowland, M. H., et al. (2011). The challenges for nut-allergic consumers of eating out. *Clinical and Experimental Allergy, 41*, 243–249. https://doi.org/10.1111/j.1365-2222.2010.03649.x.

Mayer, R. C., Davis, J. H., & Schoorman, F. D. (1995). An integrative model of organizational trust. *Academy of Management Review, 20*, 709–734. https://www.jstor.org/stable/258792.

Michelsen-Huisman, A. D., van Os-Medendorp, H., Blom, W. M., Versluis, A., Castenmiller, J. J., Noteborn, H. P., et al. (2018). Accidental allergic reactions in food allergy: Causes related to products and patient's management. *Allergy, 73*, 2377. https://doi.org/10.1111/all.13560.

National Academies of Sciences, Engineering, and Medicine. (2017). *Finding a path to safety in food allergy: Assessment of the global burden, causes, prevention, management, and public policy.* Washington, DC: The National Academies Press. https://doi.org/10.17226/23658.

National Institute of Allergy and Infectious Diseases. (2012). *Food allergy: An overview. NIH Publication No. 12-5518.* Retrieved from https://www.iddba.org/training-materials/pdfs/foodallergy.aspx?ext=.pdf, Accessed date: 5 June 2019.

Nwaru, B. I., Hickstein, L., Panesar, S. S., Roberts, G., Muraro, A., & Sheikh, A. EAACI Food Allergy and Anaphylaxis Guidelines Group. (2014). Prevalence of common food allergies in Europe: A systematic review and meta-analysis. *Allergy, 69*, 992–1007. https://doi.org/10.1111/all.12423.

Osborne, N. J., Koplin, J. J., Martin, P. E., Gurrin, L. C., Lowe, A. J., Matheson, M. C., et al. (2011). Prevalence of challenge-proven IgE-mediated food allergy using population-based sampling and predetermined challenge criteria in infants. *The Journal of Allergy and Clinical Immunology, 127*, 668–676. https://doi.org/10.1016/j.jaci.2011.01.039.

Pouessel, G., Turner, P. J., Worm, M., Cardona, V., Deschildre, A., Beaudouin, E., et al. (2018). Food-induced fatal anaphylaxis: From epidemiological data to general prevention strategies. *Clinical and Experimental Allergy, 48*, 1584–1593. https://doi.org/

10.1111/cea.13287.
Rhodes, T. (1997). Risk theory in epidemic times: Sex, drugs and the social organisation of 'risk behaviour'. *Sociology of Health & Illness, 19*, 208–227. https://doi.org/10.1111/1467-9566.ep10934410.
Sicherer, S. H., & Sampson, H. A. (2018). Food allergy: A review and update on epidemiology, pathogenesis, diagnosis, prevention, and management. *The Journal of Allergy and Clinical Immunology, 141*, 41–58. https://doi.org/10.1016/j.jaci.2017.11.003.
Soon, J. M. (2018). 'No nuts please': Food allergen management in takeaways. *Food Control, 91*, 349–356. https://doi.org/10.1016/j.foodcont.2018.04.024.
Stjerna, M. L. (2015). Food, risk and place: Agency and negotiations of young people with food allergy. *Sociology of Health & Illness, 37*, 284–297. https://doi.org/10.1111/1467-9566.12215.
Stjerna, M. L., Worth, A., Harden, J., & Olin Lauritzen, S. (2017). Risk as a relational phenomenon: A cross-cultural analysis of parents' understandings of child food allergy and risk management. *Health, Risk & Society, 19*, 351–368. https://doi.org/10.1080/13698575.2017.1409887.
Tong, A., Sainsbury, P., & Craig, J. (2007). Consolidated criteria for reporting qualitative research (COREQ): A 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care, 19*, 349–357. https://doi.org/10.1093/intqhc/mzm042.
Turner, P. J., Gowland, M. H., Sharma, V., Ierodiakonou, D., Harper, N., Garcez, T., ... Boyle, R. J. (2015). Increase in anaphylaxis-related hospitalizations but no increase in fatalities: An analysis of United Kingdom national anaphylaxis data, 1992-2012. *The Journal of Allergy and Clinical Immunology, 135*, 956–963. https://doi.org/10.1016/j.jaci.2014.10.021.
Turner, P. J., Jerschow, E., Umasunthar, T., Lin, R., Campbell, D. E., & Boyle, R. J. (2017). Fatal anaphylaxis: Mortality rate and risk factors. *The Journal of Allergy and Clinical Immunology: In Practice, 5*, 1169–1178. https://doi.org/10.1016/j.jaip.2017.06.031.
Wen, H., & Kwon, J. (2016). Food allergy risk communication in restaurants. *Food Protection Trends, 36*, 372–383.
Wen, H., & Kwon, J. (2017). Restaurant servers' risk perceptions and risk communication-related behaviors when serving customers with food allergies in the US. *International Journal of Hospitality Management, 64*, 11–20. https://doi.org/10.1016/j.ijhm.2017.03.009.
Wen, H., & Kwon, J. (2019). Food allergy information sharing and communication strategies in full-service restaurants in the US. *Journal of Foodservice Business Research, 22*, 50–65. https://doi.org/10.1080/15378020.2018.1546074.
Young, I., & Thaivalappil, A. (2018). A systematic review and meta-regression of the knowledge, practices, and training of restaurant and food service personnel toward food allergies and Celiac disease. *PLoS One, 13*, e0203496. https://doi.org/10.1371/journal.pone.0203496.

Appendix A: Supplementary Material

Further information about the primary studies

Primary Studies (PS)	Primary Study 1 (PS1): 'Epipen project'	Primary Study 2 (PS2): 'Labelling project'	Primary Study 3 (PS3): 'Legislation project'
Research aims	To explore the barriers to (a) adhering to the management best practice recommendation of carrying the epinephrine auto-injectors at all times and (b) the deployment of the medical device when needed	To understand how consumers with nut allergies make choices about what food to eat and buy. More specifically: - how people with nut allergies use labels and other pack information - what rules of thumb they may use when purchasing or consuming food - what their main criteria are for food choices and what strategies they use when selecting food, including their approach to risk assessment	To assess whether food hypersensitive consumers (i.e. consumers with food allergies or food intolerances) and parents/carers of children with food hypersensitivity reported any changes in their eating out experiences after the implementation of new legislation in the UK (EU Food Information for Consumer Regulation No. 1169/2011 [EU FIC]) that required retailers of non-prepacked foodstuffs to provide customers with information relating to the presence of 14 allergens
Research design	Cross-sectional, qualitative research	Cross-sectional, multi-method qualitative research	Longitudinal, mixed methods research
Method(s) of data collection	Qualitative, semi-structured interviews	- Participant observation through an accompanied shop whereby participants were asked to 'think aloud' - In-depth, semi-structured interviews - Product choice reasoning task	- Qualitative, semi-structured interviews - Surveys
Period of data collection	2010	2009-2010	*Interviews* - Pre-legislation: Jun-Aug 2014 - Post-legislation: Jun-Jul 2016 *Surveys* - Pre-legislation: Oct-Nov 2014 - Post-legislation: Nov-Dec 2016
Ethics approval	Ethical approval was obtained from Brunel University Research Ethics Committee	Ethical approval was gained from the National Research Ethics Service and the University of Surrey Ethics Committee	Ethical approval was obtained from the University of Bath, Department of Psychology Ethics Committee

Recruitment sites/routes	A twofold recruitment strategy was used: - an email was sent out to all staff and students at Brunel University London - an advertisement was placed in two freely circulated London newspapers	Participants were recruited from three sources: - specialist allergy clinics at Southampton University Hospital Trust (SUHT) - from primary care settings - from staff and students of the University of Surrey	A specialist market research agency (Acumen Fieldwork- Medical) recruited 75 participants with food hypersensitivity from across the UK to take part in the *qualitative interviews*. Thirty-nine participants had a food allergy. *Survey participants* were recruited from across the UK using the websites and mailing lists of three UK-based charities: Allergy UK, Anaphylaxis Campaign and Coeliac UK, and a professional market research agency: Acumen Fieldwork-Medical
Volunteer allergy screening	The severity of participants' worst ever allergic reaction was graded by an allergy specialist using a classification previously used for peanut allergy	The severity of participants' worst ever reaction to nuts was graded by an allergy specialist using a classification previously used for peanut allergy	The severity of participants' worst ever reaction was graded by an allergy specialist using a classification previously used for peanut allergy
Sampling and sample size of primary studies	- Convenience and purposive sampling - 15 participants	- Purposive sampling - 32 participants	*Interviews* - Purposive sampling - Pre-legislation: 39 participants with food allergy Post-legislation: 28 participants with food allergy *Surveys* - Pre-legislation: 397 participants with food allergy - Post-legislation: 129 participants with food allergy
Participant characteristics	- 10 women; 5 men - Age range = 22–65 years; mean age = 41 years - 13 described themselves as 'White'; 1 as 'Asian Pakistani', and 1 as 'Black Caribbean' - All participants had been prescribed epinephrine auto-injectors - 11 participants described previous severe reactions **(for 7, severe reactions were caused by an allergenic food),** and 4 moderate reactions	- 23 women; 9 men - Age range = 16–70 years - 22 were recruited from specialist allergy clinics; 4 from primary care settings; 6 from University staff and students - 5 had peanut allergy alone; 9 tree nut allergies alone, and 18 had both - Participants had been diagnosed for 20 years on average (range 1–63 years). - All participants had a clinical history compatible with IgE-mediated reactions to peanuts or tree nuts	Characteristics of the 39 food allergic participants who took part in pre-legislation qualitative interviews and whose data are reused for the purposes of the present secondary analysis: - 32 women; 7 men - 15 from England, 10 from Scotland, 10 from Wales, and 4 from Northern Ireland - 30 were adults and 9 were parents/carers of a child with a food allergy - **Of the 30 food allergic adults, 14 described previous severe reactions**

		- **18 described previous severe reactions**; 12 moderate, and 2 mild	
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Publications	Money, A. G., Barnett, J., Kuljis, J., & Lucas, J. (2013). Patient perceptions of epinephrine auto-injectors: exploring barriers to use. *Scandinavian Journal of Caring Sciences, 27*, 335-344.	Barnett, J., Leftwich, J., Muncer, K., Grimshaw, K., Shepherd, R., Raats, M. M., ... & Lucas, J. S. (2011). How do peanut and nut-allergic consumers use information on the packaging to avoid allergens?. *Allergy, 66*, 969-978. Barnett, J., Muncer, K., Leftwich, J., Shepherd, R., Raats, M. M., Gowland, M. H., ... & Lucas, J. S. (2011). Using 'may contain' labelling to inform food choice: a qualitative study of nut allergic consumers. *BMC Public Health, 11*, 734. Leftwich, J., Barnett, J., Muncer, K., Shepherd, R., Raats, M. M., Gowland, M. H., & Lucas, J. S. (2011). The challenges for nut-allergic consumers of eating out. *Clinical & Experimental Allergy, 41*, 243-249. Barnett, J., Botting, N., Gowland, M. H., & Lucas, J. S. (2012). The strategies that peanut and nut-allergic consumers employ to remain safe when travelling abroad. *Clinical and Translational Allergy, 2*, 12. Barnett, J., Vasileiou, K., Gowland, M. H., Raats, M. M., & Lucas, J. S. (2013). Beyond labelling: what strategies do nut allergic individuals employ to make food choices? A qualitative study. *PloS one, 8*, e55293.	Begen, F. M., Barnett, J., Payne, R., Roy, D., Gowland, M. H., & Lucas, J. S. (2016). Consumer preferences for written and oral information about allergens when eating out. *PloS one, 11*, e0156073. DunnGalvin, A., Barnett, J., Begen, F. M., Ryan, K., & Lucas, J. S. (2018). Development and preliminary validation of the food intolerance Quality of Life Questionnaire (FIQLQ): Adult Form. *Quality of Life Research, 27*, 1109-1116. Barnett, J., Begen, F. M., Gowland, M. H., & Lucas, J. S. (2018). Comparing the eating out experiences of consumers seeking to avoid different food allergens. *BMC Public Health, 18*, 1263. Begen, F. M., Barnett, J., Payne, R., Gowland, M. H., DunnGalvin, A., & Lucas, J. S. (2018). Eating out with a food allergy in the UK: Change in the eating out practices of consumers with food allergy following introduction of allergen information legislation. *Clinical & Experimental Allergy, 48*, 317-324. Begen, F. M., Barnett, J., Barber, M., Payne, R., Gowland, M. H., & Lucas, J. S. (2018). Parents' and caregivers' experiences and behaviours when eating out with children with a food hypersensitivity. *BMC Public Health, 18*, 38.
Interview questions relating to	In this project, participants described incidents of allergic reactions when eating out as part of their food allergy history. Aspects relating to	Can you give me an example of eating out at a restaurant that was: (a) Bad; (b) good	I would like to ask you a bit about how things are for you when you are eating out. How important is it to you to be able to eat out?

managing a FA when eating out	communication about FA risk and the challenges they face when eating out were narrated spontaneously.	Can you tell me more about the situation/experience? What happened? What were the consequences? What was done to manage the situation? What could have prevented it?	Does it play a big part in your life? What sort of places do you like to go to when you eat out? What is it about a place that makes you feel more confident to eat in? Overall, when you are choosing a place to eat, how big a part does your allergy play in this decision? Imagine that you had to choose a place to eat out in a town that you had not visited before, how would you go about doing this? How strict are you about the foods you try to avoid? Would this vary depending on (e.g. quality of outlet, trust in brand, type of occasion, company)? I would like to understand a bit about how you make decisions about what you can eat. Can you take me through how you would normally do this? Now let's take an example of a place you don't know very well. Imagine you're looking for something for you to eat for lunch. So put yourself in that situation and take me through it. [prompting participant to think about sources of information e.g., past experience, menu, asking serving staff/chef] Great, now I would like to look at this from the other direction and ask you when you would ever use these different sources of information. I would like to understand when you think that they would be more or less useful to you in making a decision to choose a particular meal. So, let's start with the menu itself and the information that this provides you with. What about if there is a chalk board providing information (not a printed menu) And what about asking the staff... serving staff; the chef.

			So, if we think again about the sources of information that we have talked about < description of the product; menu; chalk board, serving staff/chef and others that have been mentioned> overall, how helpful would you say this is as a source of information? So, we have been talking about lots of different places where you can eat out and different sorts of occasions when you can do this. Overall what do you think of the information that is provided for people with food allergies or food intolerance? Have you ever complained about lack of information? In what sorts of ways do you think it could be better than it is at the moment? Have you ever had a reaction that you put down to the information you had about the food being wrong? Did you complain, what did you do, and what happened? ***Use of scenario*** Imagine that you are at a pizza restaurant and although you are familiar with the name of the chain you have not been to this particular branch. Everyone has a menu, people can order what they like and the serving staff are coming round the table to take each person's order individually. Can you take me through what would you do to be confident that the meal did not contain any ingredients that you would have a reaction to? Talk me through how you think things would go; what you would do.