



Consequences of perceived food intolerance for welfare, lifestyle and food choice practices, in a community sample

R. C. KNIBB, D. A. BOOTH, R. PLATTS, A. ARMSTRONG,
I. W. BOOTH & A. MACDONALD

University of Birmingham, UK

Abstract *The objective of this study was to investigate the consequences for lifestyle, welfare and dietary practices of perceiving food intolerance, in a community sample. Questionnaires enquiring about adverse symptoms attributed to foods and other agents were sent to randomly identified householders in diverse electoral wards in the Birmingham area. A total of 300 respondents with perceived food intolerance (PFI) were recruited for interview about their reactions to foods and effects on their welfare, lifestyle and dietary practices. Respondents who did not attribute any symptoms to a food ($n = 937$) were designated controls and sent a mailed questionnaire, of which 529 were returned. PFIs were predominantly female, aged 45–65 years, but there were no other demographic differences from controls. PFIs (32%) reported taking more time off work in the last year than did controls (19%) ($p < 0.001$) and almost half of them had taken time off work at some time for food-related symptoms. Only 2% of PFIs felt their income had been affected by their food-related symptoms, although 5% did report higher dietary costs. Physical activity or daily routine was affected in 17% of PFIs. More PFIs (48%) than controls (35%) used food supplements ($p < 0.001$), but PFIs were less likely than controls to check food labels (53% vs 71%) or to use supermarkets' nutritional literature (8% vs 21%) ($p < 0.001$). Despite these differences, perception of food intolerance did not have substantial effects on welfare or lifestyle of those with food-attributed symptoms.*

Introduction

Wide media coverage has drawn the public's attention to the potential for allergic reactions to foods (Sloan & Powers, 1986). This may have contributed to the high prevalence of perceived food intolerance (PFI) in the United Kingdom. Community studies have found reports of food intolerance to be as high as 33% (Bender & Matthews, 1981) and more recently 20% (Young *et al.*, 1994). However, discrepancies have been found between perception of food intolerance and those that can be confirmed using double-blind placebo-controlled food challenges (DBPCFC) (Bock, 1987; McGowan & Gibney, 1993; Young *et al.*, 1994). On the basis of these findings, the prevalence of actual food intolerance in the

Address for correspondence: Dr Rebecca Knibb, School of Nursing, Postgraduate Division, Medical School, B Floor, West Block, Queen's Medical Centre, Nottingham, NG7 1BR, UK. Tel: + 44 (0115) 9249924, ext. 44097; Fax: + 44 (0115) 9709955; E-mail: Rebecca.knibb@nottingham.ac.uk

general population of the UK has been estimated to be as low as 1–2% (Anderson, 1991; Sampson, 1988; Young *et al.*, 1994).

Young *et al.* (1994) have noted that, in addition to self-diagnosis, few people with PFI seek medical advice regarding their perceived symptoms, opting to either treat themselves or to endure their symptoms. McGowan and Gibney (1993) recruited 323 individuals with self-reported food allergy through advertisements in the media. They found that 36% of recruits had diagnosed the food allergy themselves and 57% reported that they nearly always avoided the offending foods. Similarly, up to a third of parents who believe their child is suffering from adverse symptoms to food do not seek any professional advice before omitting foods from the child's diet (Rona & Chinn, 1987).

It therefore appears that a large number of people in the UK mistakenly believe that they are suffering from a food intolerance or allergy and this is affecting their behaviour in that they are avoiding foods, possibly unnecessarily. However, little is known about what effect perceived food intolerance may have on general welfare, lifestyle and food choice practices of these sufferers.

Most of the studies on food intolerance have been conducted within the clinic setting (Atkins *et al.*, 1985; Parker *et al.*, 1990; Pearson, 1988; Pearson *et al.*, 1983). These types of study focus on highly self-selected groups and concentrate on investigating the prevalence of the misperception of food intolerance through the use of DBPCFC. They have examined the impact of PFI on the psychological health of their patients, but have not examined the effects such perception can have on the daily lives of their patients.

Peveler *et al.* (1996) have conducted the only community study investigating the effect of perceived food intolerance on daily life. They enquired after effects PFI may have on everyday life, eating habits and attitudes and health-consulting behaviour. The authors found that only about 12% of people with PFI reported moderate or great effects on aspects of everyday life such as daily work routine, outings and social and family life.

Nor did their sample appear to display over-valued attitudes to food. Eating attitudes test scores were similar to those seen in the general population and dieting to lose weight was reported by 27% of females and 12% of males. However, this sample of PFIs was not compared to people in the community who did not perceive themselves to be food intolerant. General population norms or people suffering from diabetes mellitus were used as comparison groups. It is highly probable that a percentage of people in these groups would have perceived food intolerance, thus possibly reducing the significance of any difference between the groups. The study also investigated psychological consequences of PFI and so did not investigate impact on welfare or food choice practices in any great depth.

Many studies have been conducted to investigate the effect food intolerance may have on nutrient intake (David *et al.*, 1984; Davidovitz *et al.*, 1993; Devlin *et al.*, 1989; Lloyd-Still, 1979; McGowan & Gibney, 1993; Paganus *et al.*, 1992; Price *et al.*, 1988; Roesler *et al.*, 1994). However, they have been mainly focused on quantifying deficiencies in nutrient intake of children with medically confirmed or suspected food allergies, such as cows' milk allergy. The main cause of the deficiencies in nutrient intake found by these studies was avoidance of the foods or food groups thought to be the cause of the allergic reaction. None of the studies highlighted other food choice practices that may lead to nutrient deficiencies, such as exclusion of foods due to religious reasons, dieting behaviour or vegetarianism. Nor did they investigate practices that could combat nutrient deficiencies such as the use of nutritional supplements or checking of food labels.

Thus the main purpose of the present study was to examine in detail the effects of PFI on lifestyle, welfare, dietary practices and food labelling issues. This was investigated by comparing two groups of people drawn from the community; a group who believed them-

selves to be food intolerant and a group with no perceptions of food intolerance. Given that a large proportion of people in the UK have perceived food intolerance that has been self-diagnosed and self-treated through avoidance of the food, it was felt that it was important to investigate all reports of food intolerance, not just ones that had been medically confirmed.

Methods

Subjects and procedure

People with and without perceived food intolerance were recruited by mailing a questionnaire to randomly selected individuals from 16 electoral wards within the West Midlands, which ranged widely in inner urban to rural urban development and socio-economic deprivation or affluence. The questionnaire was a six-page booklet similar in design to that of Young *et al.* (1994), designed for each person in the household to complete one page. A list of adverse symptoms was given and each person was asked if they had attributed any symptoms to any of the foods or environmental agents given on a separate list. Respondents who attributed symptoms to food were categorized as perceived food intolerant (PFI). Those who volunteered for further research ($n = 300$) were contacted again to arrange an interview. Volunteers not attributing symptoms to foods were recruited as controls and sent a questionnaire to complete ($n = 529$).

Data were collected from all willing respondents, none were excluded on the basis of age, gender or ethnicity. All volunteers who participated in the research were assured that they could withdraw at any time and that all information received would be treated confidentially. This procedure was approved by the ethics committee of the School of Psychology, University of Birmingham, UK.

Interviews and questionnaires

Interviews of people with PFI were conducted by two researchers in accord with a protocol of questions enquiring in detail about history and type of reaction, foods implicated and symptoms experienced. Questions about medical history, lifestyle and dietary changes made as a result of PFI and use of nutritional supplements were included.

It was not practicable to meet controls for a relatively short interview in order to obtain information on these latter items. For this reason controls were sent a questionnaire which enquired about demographics, health behaviour and medical history, following closely the relevant questions asked of people with a PFI in interview. The questionnaire consisted of a series of independent items, not susceptible to psychometric assessment of inter-item consistency or validity.

At present there are no psychometrically assessed measures available for obtaining information on perceived food intolerance. Questionnaires used in previous studies are varied and no formal structure exists for obtaining histories for suspected food intolerance or for the consequences PFI may have for sufferers' daily lives. It was therefore necessary to compile our own interview and questionnaire items for the purposes of this research.

Data management and analysis

Data obtained from interview were logged onto a specifically designed Microsoft Access database. Where possible, data for PFIs were compared to those for controls. As females with

PFI were over-represented relative to female controls (see Results section), all comparisons were split by gender. Minitab software was used to perform χ^2 analysis on frequencies of characteristics and of consequences.

Results

Response rates

A total of 5,013 questionnaires were issued and 2,081 individual replies were received from 1,003 households, a total response rate of 20%. Food intolerance was reported by 489 individuals (24% of the respondents), of whom 300 volunteered and were interviewed. A total of 1,592 replies were received from controls, of whom 937 volunteered for further research. Each of these controls was sent a questionnaire and 529 replied, a response rate of 56%.

Respondents were mainly European. Proportions of ethnic origins did not differ between the PFI and control groups. The adult PFI group (those over the age of 16 years) comprised of 63% females and 37% males, compared to the control group of 54% females and 46% males. Adult females were over-represented in the PFI group compared to the control group $\chi^2(1) = 4.5$, $p < 0.05$, although adult males were not significantly underrepresented. The proportion of women was also higher in the PFI and control groups (55%) than the West Midlands Regional Health Authority figure of 49% (1991 census data), $\chi^2(1) = 14.5$, $p < 0.001$. There was no significant gender difference in the reporting of food intolerance amongst children.

There were no significant differences in the age distributions between PFIs and controls, with the exception of more male controls than male PFIs over the age of 65 years, $\chi^2(1) = 6.22$, $p < 0.01$. There was no difference between the PFI and control groups in mean social deprivation as measured by Townsend scores (Townsend *et al.*, 1989).

Welfare consequences of symptoms attributed to foods and other causes

Time off work due to food-related illness. Estimates of days taken off work or school because of food-related illnesses were obtained for 219 of the PFI interviewees. Half the PFIs (45% of women and 47% of men) had taken at least one day off work or school at some stage due to a food-related illness (Table 1). However, of the 105 adults working at the time of interview, only ten individuals reported taking at least one day off work in the previous 12 months because of a perceived food-related illness. Five were absent due to a gastrointestinal illness attributed to food. Time taken off work is likely to have been reduced if symptoms remitted or came under control by avoiding or reducing intake of the blamed food.

Time off work due to illness not related to food. More people with PFI than controls reported taking between four and 28 days off sick in the last 12 months for any illness not related to food (Table 2), $\chi^2(1) = 6.9$, $p < 0.01$.

Prescription exemption. Slightly but not significantly more people with PFI than controls reported that they were exempt from prescription charges: male PFIs 49%, controls 45%; female PFIs 44%, controls 36%. Most exemptions reported were for those above age of retirement. Therefore, PFI was not substantially associated with this welfare cost.

Table 1. Percentage of men and women with PFI who reported number of days taken off work in the last 12 months because of food-attributed illness, and their average annual absenteeism rate

Days absent	Last 12 months (%)		Annual average (%)	
	Males <i>n</i> = 41	Females <i>n</i> = 64	Males <i>n</i> = 23	Females <i>n</i> = 40
None or less than 1	93	89	4	35
1–3	2	6	70	43
4–6	5	4	17	10
7–13	0	0	9	5
14–28	0	0	0	5
Over 28 days	0	0	0	2

Sickness benefit claims. Only 1% (*n* = 3) of the people with PFI reported claiming sickness benefit for food-attributed illness. Sickness benefit for illnesses not attributed to food had been claimed by more controls than people with PFI, $\chi^2(1) = 10.6$, $p < 0.001$. A total of 16% of male controls compared with 5% of men with PFI had claimed benefit, $\chi^2(1) = 6.2$, $p < 0.01$; 10% of female controls compared to only 4.5% of female PFIs had claimed benefit at some point in their lives, $\chi^2(1) = 3.7$, $p < 0.05$.

Effects of PFI on income. Only 2% (*n* = 6) of people with PFI felt that their income had been affected in any way because of their food-attributed symptoms. The effects were mostly loss of wages and additional costs of medication and food supplements.

Cost of food was reported to have been affected for 13% (*n* = 39) of people with PFI; 16 felt their diet cost more because of the need to buy substitute products such as soya milk, decaffeinated coffee and additive- and gluten-free foods. On the other hand, reduction in food bills was reported by eight people, because they attributed their symptoms to relatively expensive food items, which were no longer purchased.

Lifestyle effects of PFI

Effects on lifestyle were attributed to PFI by 17% of the interviewees attributing adverse symptoms to foods. Adults experiencing skin complaints reported a restriction on sporting

Table 2. Percentage of PFIs and controls who reported number of days taken off work in the last 12 months because of illness not attributed to food, split by gender

Days absent	PFI (%)		Controls (%)	
	Males <i>n</i> = 39	Females <i>n</i> = 63	Males <i>n</i> = 105	Females <i>n</i> = 129
None	46	41	57	41
1–3	20	22	22	30
4–6	13	19	6	13
7–13	10	6	5	5
14–28	8	8	4	5
Over 28 days	3	3	7	6

activities and children with symptoms affecting the skin such as eczema were reported to feel too embarrassed to play with other children. Lower levels of activity were reported by those with joint symptoms. Those who suffered gastrointestinal complaints were less willing to travel and more likely to remain in their homes. Some migraine sufferers reported that severe attacks were temporarily totally debilitating.

Positive effects on lifestyle were reported by two interviewees. One felt she was more active as a result of the dietary change, while the other had taken up exercise to relieve gastrointestinal symptoms.

Only three interviewees felt that their PFI had affected their use of public services, generally because of limited availability of toilet facilities. More interviewees (9%) had changed their shopping practices by avoiding particular establishments where they believed that they had purchased an item which caused an episode of food poisoning, or by being more selective in their food choice generally. Three individuals reported a change in use of food manufactures by changing brands or by using manufacturers that produced food organically.

Diet of PFIs and controls

Effect of PFI on diet. Among the PFI group, 65% reported a change in their eating habits, whether avoiding or reducing intake of the blamed food, substituting other foods into their diet or changing their cooking methods. A fifth of the PFIs reported an effect on the eating habits of their family as a result of their PFI, generally because of avoidance of the blamed food. However, only 4% sought dietary advice from health professionals such as general practitioners, dieticians and nurses.

Dietary changes not related to PFI. More women with PFI than female controls had changed their food choices or excluded certain foods from their diet for reasons unconnected to PFI (Table 3). Women with PFI were more likely than female controls to have excluded certain foods for religious or moral reasons, $\chi^2(1) = 15.8$, $p < 0.001$, healthy eating, $\chi^2(1) = 11.7$, $p < 0.001$, weight loss, $\chi^2(1) = 4.0$, $p < 0.05$ and vegetarianism, $\chi^2(1) = 4.4$, $p < 0.05$. There was no difference between the male PFI and control groups in incidence of reporting dietary changes.

A small percentage of people with PFI (9%) and a slightly larger number of controls (15%) felt that the cost of their food bill had changed because they had altered their diet for reasons other than PFI. Mainly increases were reported, due to the extra expense of buying special dietary items such as low-fat foods.

Only 10% of PFI interviewees, who had changed their diet for reasons other than their PFI, felt that their family's eating habits had changed as a result, while 17% of controls on diets reported an effect on their family's eating habits. Diets for weight loss resulted in the greatest effect on family eating habits, with 14% of families of a PFI compared to 50% of the control families changing their eating habits, $\chi^2(1) = 4.3$, $p < 0.05$. There were no significant differences in changes to family eating habits between controls and PFI groups when males and females were analyzed separately. Thus, although women with a PFI had a general tendency to change their diet, they appeared to prevent this affecting their expenditure or family diet.

Professional advice about diet was received from GPs, dieticians, specialists, nurses, health visitors and alternative practitioners by 18% of PFIs and 31% of controls (Table 4). People with PFI on diets for medical reasons were less likely to have been professionally

Table 3. *Percentage of PFIs and controls giving reasons for dietary changes unrelated to PFI, split by gender*

Reason for dietary change	PFI (%)		Control (%)	
	Males <i>n</i> = 122	Females <i>n</i> = 178	Males <i>n</i> = 246	Females <i>n</i> = 283
Medical	15	13	11	8
Healthy eating	6	15	5	5
Weight loss	2.5	6	4	2.5
Vegetarian/moral	2.5	10	4	5
Religious	1	3	2	3
Worries about BSE*	1.5	4	4	3.5

*Bovine Spongiform Encephalopathy.

advised about going on a diet than were controls, $\chi^2(1) = 8.3$, $p < 0.01$. Females with a PFI on a diet were less likely than female controls to have been advised about the diet, $\chi^2(1) = 5$, $p < 0.05$. Thus, those with PFI appear neither to seek nor to be offered help from health professionals as much as people without PFI.

Use of nutritional supplements. More people with PFI than controls used at least one nutritional supplement (Table 5), $\chi^2(1) = 12.9$, $p < 0.001$. More men with PFI (43%) than male controls (28%) took at least one supplement, $\chi^2(1) = 7.8$, $p < 0.005$. Similarly, more female PFIs (51%) than controls (41%) took at least one supplement, $\chi^2(1) = 4.5$, $p < 0.05$.

Of the women taking supplements, more females with PFI used cod liver oil than did female controls, $\chi^2(1) = 5.1$, $p < 0.05$. Men and women with PFI also used more B vitamins than controls, $\chi^2(1) = 19.2$, $p < 0.001$.

Use of labelling and other sources of nutritional information

Checking labels. For the people with PFI on whom we have information on use of food labelling, 20% reported checking labels specifically for food related to an adverse reaction. Only three individuals reported that the labels were unhelpful when looking for specific

Table 4. *Number of PFIs and controls changing diet for reasons unconnected to PFI and the percentage of them receiving advice*

Reason for diet	PFI		Control	
	On diet <i>n</i>	Advised %	On diet <i>n</i>	Advised %
Medical	41	37	51	67
Healthy eating	33	12	27	15
Weight loss	14	7	16	31

Source of advice (note that advice may have been received from more than one source): PFIs: GP (7), dietician (5), specialist (2), therapist (1), works doctor (1), nurse (2), health visitor (1), naturopath (1), media (2).

Controls: GP (18), hospital (5), dietician (3), diabetes clinic (3), specialist (6), homeopath (2), family (1), nurse (5), weight watchers (3), book (1).

Table 5. Percentage of PFIs and controls taking different types of food supplements, split by gender

Type of supplement	PFI (%)		Controls (%)	
	Males <i>n</i> = 52	Females <i>n</i> = 91	Males <i>n</i> = 69	Females <i>n</i> = 116
Cod liver oil	31	47	46	32
Evening primrose oil	6	22	1	25
Multivitamins	48	31	33	34
Vitamin B	13	23	1	6
Vitamin C	21	18	16	12
Vitamin E	4	2	7	7
Vitamins (unspecified)	0	3	4	13
Garlic	8	8	9	4
Calcium	2	5	3	3
Zinc	4	1	3	2

ingredients. PFIs were less likely than controls, however, to check labels for other information, $\chi^2(1) = 24.2, p < 0.001$. Only 43% of men with PFI checked labels for other information, compared to 65% of male controls, $\chi^2(1) = 16.1, p < 0.001$. Similarly, fewer women with PFI (59%) checked labels for other information than female controls (74%), $\chi^2(1) = 11.2, p < 0.001$.

The type of information checked for on labels differed between PFI and control groups (Table 6). Proportionally more PFI interviewees than controls looked for information on additives, $\chi^2(1) = 13.3, p < 0.001$. Men with PFI were more likely than male controls to look for information on fats, $\chi^2(1) = 5.5, p < 0.01$, and animal products, $\chi^2(1) = 6.6, p < 0.01$.

People with PFI (9%) were less likely than controls (21%), however, to use supermarket nutritional literature, $\chi^2(1) = 16.2, p < 0.001$. This difference was significant for women with PFI (11%) relative to female controls (28%), $\chi^2(1) = 16.5, p < 0.001$, but not for males.

Ways of improving labelling. Controls (61%) were more likely than PFI interviewees (49%) to find food labelling unhelpful in some way, $\chi^2(1) = 12.6, p < 0.001$, and more likely to suggest improvements, $\chi^2(1) = 5.8, p < 0.01$. Female controls (58%) were more likely to

Table 6. Percentage of PFIs and controls looking for different types of information on food labels, split by gender

Type of information	PFI (%)		Control (%)	
	Males <i>n</i> = 42	Females <i>n</i> = 94	Males <i>n</i> = 155	Females <i>n</i> = 199
Ingredients	19	11	20	15
Additives	43	28	12	22
Fat	36	29	19	35
Sugar	2	16	15	15
Energy	7	17	8	19
Salt	7	5	6	4
Animal products	12	8	3	7
Beef	0	2	1	0.5

Table 7. *Percentage of PFIs and controls suggesting different improvements to food labels, split by gender*

Type of improvements	PFI (%)		Control (%)	
	Male <i>n</i> = 24	Female <i>n</i> = 43	Male <i>n</i> = 103	Female <i>n</i> = 118
Make easier to understand	33	42	52	55
More detail	29	16	11	13
More information on additives	21	23	5	5
Specific information included	0	12	11	11
Standardization	13	0	13	11

suggest improvements than women with PFI (46%), $\chi^2(1) = 3.8$, $p < 0.05$. There were no significant differences in men between PFIs and controls.

The type of improvements suggested differed between the PFI and control groups (Table 7). Men with a PFI were more likely than male controls to suggest more information should be provided about additives, $\chi^2(1) = 15$, $p < 0.001$, as were women, $\chi^2(1) = 11.6$, $p < 0.001$. Men with a PFI required more details generally on labels than male controls did, $\chi^2(1) = 5.5$, $p < 0.01$. Proportionally more controls, however, suggested labelling could be improved by making them easier to understand, $\chi^2(1) = 4.4$, $p < 0.03$, although this difference between PFIs and controls did not reach significance when men and women were analyzed separately.

Discussion

Welfare

Belief that one is allergic or sensitive to a food had statistically detectable effects on reported behaviour, but some of these effects were reduced incidences of problems and demands, such as a reduction in food bills for some, rather than the universal increases that might have been expected. Even when there was a reliable increase in a problem for people with PFI such as the amount of time taken off work or school, the consequences did not appear to be serious either on a personal scale or in the number of people involved. Indeed, time taken off work or school because of PFI-related illness was minimal in the year prior to this investigation, possibly indicating success for management of food-related symptoms. This finding is similar to that of a study of children with major atopic diseases (Freeman & Johnson, 1964) where only approximately two-thirds of a day had been missed due to allergic illness during the previous school year. Freeman and Johnson (1964) also noted that allergic males missed more days off school for all illness than non-allergic children did—a finding similar to that in this study where PFIs had taken more days off sick in the previous 12 months for non-food-related illness than had controls.

Nevertheless, the demand on public funds from food-related illness appeared to be minimal in our community sample since relatively few sick days were taken, claims made for sickness benefit were rare and only a small number of PFIs under retirement age were exempt from prescription charges. The finding that PFIs made fewer sickness benefit claims than controls may arise from a perception that the PFIs' illness was self-induced through their choice of food and they may have felt it was not a legitimate claim for sickness benefit.

Lifestyle

An effect on overall lifestyle was reported by 17% of PFIs in this study, which is slightly higher than the percentage of 12% reported in the study by Peveler *et al.* (1996). This may be due to the fact that Peveler *et al.* only reported those people attributing moderate or great impact on lifestyle, whereas the present study reported any impact. There were also differences in the type of effect described. Most of the impact described by PFIs in this current study was on sporting activities, playing with friends or travelling, whereas Peveler *et al.* (1996) reported effects mainly on daily work routine, housework and outings. These differences could have arisen because of differences in the wording of questions in the two studies.

Diet and food choice practices

The majority of people with PFI did report a change in their eating habits resulting from their PFI, such as avoiding a particular food, with very few seeking advice from a professional such as a general practitioner or dietician. This finding replicates those of previous community studies investigating PFI (McGowan & Gibney, 1993; Rona & Chinn, 1987; Young *et al.*, 1994). There were significantly more women with PFI than female controls who demonstrated health-related behaviour in their food choice practices. Female PFIs in this study were very conscious of healthy eating and related issues such as weight control and vegetarianism. This finding is in contrast to Peveler *et al.* (1996), who stated that over-valued ideas about diet and health were not evident in their study.

Women with PFI in the present study also tended to use nutritional supplements more than controls, in particular cod liver oil and B vitamins. Thus it appears that vitamins and mineral supplements tended to be taken as therapy or prophylaxis by those who attributed adverse symptoms to foods, even though the prevalence of other disorders such as anxiety or depression was not substantially higher in PFIs than in controls (Knibb *et al.*, 1999a).

Despite the focus on diet in the present study, these activities were not reported to have a great impact on dietary costs or eating habits of the families involved. This study can not determine whether the focus on food and diet stemmed from the realization that adverse symptoms may be caused by something they had eaten, or whether attribution of symptoms to foods was made more likely by acute awareness of their diet. Although there is considerable evidence that women are more focused on health and related issues than are men, the reasons for this are not entirely clear (MacIntyre *et al.*, 1996).

Food labelling

Despite the apparent focus on food and diet by women with PFI, inattention to general aspects of dietary health was seen in a lack of interest in supermarket literature on food and ingredients and in information given on food labels other than that relevant to PFI. It appears, therefore, that PFIs focus on information related to their condition, at the cost of missing generally relevant material.

This anomaly seems difficult to explain. However, it may have arisen from a difference in the ways in which questions about food labels were asked of PFIs and controls. PFIs had to answer these questions after a lengthy interview and may not have taken as much time to think about their behaviour as controls did in responding to the self-response questionnaires they were given.

General conclusions

Although many of the people reporting PFI will probably have misperceived the cause of their symptoms (Young *et al.*, 1994), the impact of such mistakes appears to be minimal in this community sample. This finding must be interpreted with some caution due to the low response rate to the initial questionnaires reducing the generalizability of the results and the unavoidable differences in data collection methods. However, apart from a greater percentage of female respondents (which was dealt with by splitting analysis by gender), there was little evidence to suggest that the PFI and control groups were significantly different in a range of other demographic variables. Thus one can be reasonably confident in comparing the two groups.

Therefore there is little basis for concern that might have led to the development of a policy which aims to reduce the impact of perceived food intolerance on welfare, lifestyle or food choices. It may be more helpful simply to provide generally applicable information about actual intolerance and the likelihood of misperception (Knibb *et al.*, 1999b). Even more useful would be means for members of the public to be alerted to the likelihood of an incorrect self-diagnosis, reducing the minor but often unnecessary effects reported by these interviewees. A tool for the use of the general public in assessing complaints of food intolerance is currently being developed by the authors (Booth *et al.*, 1999).

Acknowledgement

This work was supported by a research grant from the Ministry of Agriculture, Fisheries and Food (London, UK) to Professors David Booth, School of Psychology and Ian Booth, Institute of Child Health, University of Birmingham.

References

- ANDERSON, J. A. (1991) The clinical spectrum of food allergy in adults. *Clinical and Experimental Allergy*, 21, 304–314.
- ATKINS, F. M., STEINBERG, S. S. & METCALF, D. D. (1985) Evaluation of immediate adverse reactions to food in adult patients. I. Correlation of demographic, laboratory and prick skin test data with response to controlled oral food challenge. *Journal of Allergy and Clinical Immunology*, 75, 348–355.
- BENDER, A. E. & MATTHEWS, D. R. (1981) Adverse reactions to foods. *British Journal of Nutrition*, 46, 403–407.
- BOCK, S. A. (1987) Prospective appraisal of complaints of adverse reactions to foods in children during the first three years of life. *Paediatrics*, 79, 683–688.
- BOOTH, D. A., KNIBB, R. C., PLATTS, R. G., ARMSTRONG, A., BOOTH, I. W. & MACDONALD, A. (1999) The psychology of perceived food intolerance. *Leatherhead Food Industry Journal*, 2, 325–334.
- DAVID, T. J., WADDINGTON, E. & STANTON, R. H. J. (1984) Nutritional hazards of elimination diets in children with atopic eczema. *Archives of Disease in Childhood*, 59, 323–325.
- DAVIDOVITZ, M., LEVY, Y., AVRAMOVITZ, T. & EISENSTEIN, B. (1993) Calcium-deficiency rickets in a 4-year old boy with milk allergy. *Journal of Paediatrics*, 122, 249–251.
- DEVLIN, J., STANTON, R. H. J. & DAVID, T. J. (1989) Calcium intake and cows' milk free diets. *Archives of Diseases in Childhood*, 64, 1183–1193.
- FREEMAN, G. L. & JOHNSON, M. D. (1964) Allergic diseases in adolescents. I. Description of survey, prevalence of allergy. *American Journal of Diseases in Children*, 107, 549–559.
- KNIBB, R. C., BOOTH, D. A., PLATTS, R., ARMSTRONG, A., BOOTH, I. W. & MACDONALD, A. (1999a) Psychological characteristics of people with perceived food intolerance in a community sample. *Journal of Psychosomatic Research*, 47, 545–554.
- KNIBB, R. C., BOOTH, D. A., PLATTS, R., ARMSTRONG, A., BOOTH, I. W. & MACDONALD, A. (1999b) Episodic and semantic memory in accounts of perceived food intolerance. *Applied Cognitive Psychology*, 13, 451–464.
- LLOYD-STILL, J. D. (1979) Chronic diarrhoea of childhood and the misuse of elimination diets. *Journal of Paediatrics*, 95, 10–13.
- MACINTYRE, S., HUNT, K. & SWEETING, H. (1996) Gender differences in health: are things really as simple as they seem? *Social Science and Medicine*, 42, 617–624.

- McGOWAN, M. & GIBNEY, M. J. (1993) Calcium intakes in individuals on diets for management of cows' milk allergy: a case control study. *European Journal of Clinical Nutrition*, *47*, 609–616.
- PAGANUS, A., JUTENEN-BAKMAN, K. & SAVILHATI, E. (1992) Follow-up of nutritional status and dietary survey in children with cows' milk allergy. *Acta Paediatrica*, *81*, 518–521.
- PARKER, S. L., LEZNOFF, A., SUSSMAN, G. L., TARLOW, S. M. & KRONDL, M. (1990) Characteristics of patients with food-related complaints. *Journal of Allergy and Clinical Immunology*, *86*, 503–511.
- PEARSON, D. J. (1988) Psychologic and somatic interrelationships in allergy and pseudoallergy. *Journal of Allergy and Clinical Immunology*, *81*, 351–360.
- PEARSON, D., RIX, K. & BENTLEY, S. (1983) Food allergy: how much in the mind? *The Lancet*, 1259–1261.
- PEVELER, R., MAYOU, R., YOUNG, E. & STONEHAM, M. (1996) Psychiatric aspects of food-related physical symptoms: a community study. *Journal of Psychosomatic Research*, *41*, 149–159.
- PRICE, C. E., RONA, R. J. & CHINN, S. (1988) Height of primary school children and parents' perceptions of food intolerance. *British Medical Journal*, *296*, 1696–1699.
- ROESLER, T. A., BARRY, P. C. & BOCK, S. A. (1994) Factitious food allergy and failure to thrive. *Archives of Paediatric and Adolescent Medicine*, *148*, 1150–1155.
- RONA, R. J. & CHINN, S. (1987) Parents' perception of food intolerance in primary school children. *British Medical Journal*, *294*, 863–866.
- SAMPSON, H. A. (1988) IgE-mediated food intolerance. *Journal of Allergy and Clinical Immunology*, *81*, 495–504.
- SLOAN, A. E. & POWERS, M. E. (1986) A perspective on popular perceptions of adverse reactions to foods. *Journal of Allergy and Clinical Immunology*, *78*, 127–133.
- TOWNSEND, P., PHILLIMORE, P. & BEATTIE, A. (1989) *Health and deprivation: inequality and the north*. London: Routledge.
- YOUNG, E., STONEHAM, M. D., PETRUCKEVITCH, A., BARTON, J. & RONA, R. (1994) A population study of food intolerance. *The Lancet*, *343*, 1127–1130.