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The management of food safety—the role of food hygiene training in the UK service sector

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Abstract

This paper reviews the literature pertaining to the role of food hygiene training in a strategy to manage food safety.

Traditional assumptions that the provision of knowledge alone will lead to changes in attitudes and thus performance has been shown to be ill founded. A multitude of factors relating to the course itself, and events pre- and post-training have been shown to mitigate the effectiveness of training in bringing about desired changes in behaviour. Effective and relevant food hygiene training delivered with the support of the organisation, adequate resources and the peer support of colleagues will have a greater effect on intention and actual behaviour of the food handler, increasing the likelihood that safe working practices are carried out at all times. Such approaches are necessary if hygiene training is to have an impact on food safety management. Further investigation into the motivational factors and beliefs of the food handler in relation to food hygiene training, its relevance in their working environment and its effectiveness are needed to aide the development and delivery of more effective food hygiene training methods.

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1. Introduction

Foodborne illnesses have been described as one of the most widespread problems of the contemporary world ([Wheelock, 1989](#); [Notermans, et al., 1994](#)) and their notified incidence has increased significantly ([Todd, 1989](#); [Mossel, 1989](#)). [Wheeler et al. \(1999\)](#) estimated that for every infectious intestinal disease (IID) case detected by national laboratory surveillance, of which foodborne disease is only a part, there are 136 in the community. Therefore, the actual incidence of foodborne illness throughout the world could be much higher than official statistics suggest. The recent increase in incidence of certain foodborne diseases has been attributed to many different factors, including, population growth, rapid urbanisation, changes in food preparation habits, a growth in food service establishments, increased consumption of food outside the home, and a lack of food safety training and education amongst food handlers and consumers ([Motarjemi and Käferstein, 1999](#)).

Analyses of foodborne disease notifications throughout the world have shown that the majority of outbreaks result from malpractice during food preparation in small food businesses, canteens, residential homes, and other places where food is prepared for human consumption ([Motarjemi and Käferstein, 1999](#)). Ninety-nine per cent of all food operations in the UK are classified as small food businesses ([DTI, 1999](#)), with the vast majority of retailers and caterers in particular, defined as ‘micro’ businesses, as they employ fewer than 10 food handlers ([Mortlock et al., 1999](#)). Therefore, a lack of adequate training and education of the food handlers within such premises could pose significant public health risks.

For many years, based on associations between poor hygiene practices in food premises and levels of staff food hygiene training ([Audit Commission, 1990](#)), the UK food industry has relied on nationally accredited/foundation level food safety education or training to provide the knowledge food handlers need to make safe and informed decisions about their food safety practices. Unfortunately, few hygiene courses have been properly evaluated and although positive responses towards, and knowledge of good hygiene practices have been indicated, these do not necessarily translate into positive behaviours ([Mathias et al., 1994](#); [Ribben et al., 1994](#); [Powell et al., 1997](#)). Commercial catering outlets (restaurants, hotels, public houses, canteens, and caterers), in the UK, were associated with 53.6% of the total foodborne outbreaks surveyed by the Public Health Laboratory Service–Communicable Disease Surveillance Centre between 1995 and 1996 ([Evans et al., 1998](#)). [Griffith \(2000\)](#) estimated that 70% of foodborne outbreaks originated in the food service sector, and the UK Food Standards Agency ([FSA, 2001](#)) set the figure even higher at 88%, thus justifying a focus on the food service sector in the FSA’s strategy to reduce the incidence of foodborne disease. Some authors, however, suggest that these figures, to some extent at least, reflect the higher levels of notification of such incidences ([Potter, 1994](#); [Wall et al., 1996](#)). Under notification has previously been attributed to doctors’ ignorance of the legal requirements ([Harveys, 1991](#); [Voss, 1992](#)) and their failure to appreciate the importance of notification ([Warden, 1998](#); [Heap, 1992](#)).

This paper explores the role of food hygiene training as a critical element in the management of food safety within the service sector, and thus as a means of reducing the incidence of foodborne illnesses throughout the UK. Examining the current nature of food hygiene training within the UK, the physical and psychological barriers to training, the transference of knowledge into practice, the evaluation techniques currently used to assess the effectiveness of training, whilst making recommendations for the extension of some previous evaluation models.

2. Training and education of the food handler

Current UK regulations require that food handlers are supervised and instructed and/or trained commensurate with their work activities ([The Food Safety \(General Food Hygiene\) Regulations, 1995](#)). Such training may be classroom-based, computer-based or hands-on, and may or may not be formally accredited. Whilst practical in-house hands-on training is still the traditionally favoured approach for smaller businesses ([Hendry et al., 1992](#)), accredited food hygiene courses are offered by a number of awarding bodies including the Chartered Institute of Environmental Health, The Royal Institute of Public Health; The Royal Society for the Promotion of Health; The Royal Environmental Health Institute of Scotland and The Society of Food Hygiene Technology. These awarding bodies offer different levels of training; designed to match the levels of occupational structure found in most food businesses, from trainee to management. The courses aim to give the candidate relevant knowledge at a specific level so that the candidate can make informed decisions about food safety. Whilst, it is important to recognise that formal training might ensure greater consistency and quality ([Manning, 1994](#)), improper training could present a greater risk to food safety than no training at all ([Ackerley, 1989](#)).

The Joint Hospitality Industry Congress ([JHIC, 1997](#)) prepared an “*Industry Guide to Good Hygiene Practice: Catering Guide*” ([IGGHP](#)), translating legislative requirements (including training) into practical actions. It suggests various levels of training depending upon the food handler’s competence, experience, and career development; in summary the [IGGHP](#) suggests a simple framework for training commensurate with the employee’s duties. An example is shown in [Table 1](#).

Three stages of training are described beginning with the essentials of food hygiene (Stage 1), which should take place before commencing work and can be incorporated into the company induction programme. This induction training must cover personal hygiene, personal health and essential kitchen hygiene ([Worsfold, 1996](#)). Any new food handlers in Categories A, B, or C must receive written or verbal instruction in the above areas. [Billsborough \(1999\)](#) suggested that between half and 1 h should be allowed for this type of training, as further training will follow.

Hygiene awareness instruction (Stage 2) develops further hygiene awareness and the [IGGHP](#) recommends that it be provided within 4 weeks of starting work, although this may be extended to 8 weeks for part-time staff ([UK Department of Health, 1997](#)). The basic principles of food hygiene should be covered and related to the business and the jobs of individual employees. Training at this level should take

Table 1
Food handlers and training requirements

Category	Activity	Training requirement
A	Handle low-risk or wrapped food only	Stages 1 and 2 (informal induction training + further instruction within 4–8 weeks)
B	Prepare or handle open high-risk food	Stages 1, 2 and 3 (Stages 1, 2 + training beyond informal)
C	Food handlers with a supervisory role	Stages 1, 2 and 3 ^a (Stages 1, 2 + training commensurate with a level 1 qualification)

^aFormal training (Stage 3) is subdivided into levels 1–3. (Adapted from JHIC, 1997, p. 10).

about 3 h and can be provided in modules. This has the advantage of giving the trainee the opportunity to assimilate each module before starting on the next.

The final stage is for food handlers with high-risk duties (Categories B and C) who require training beyond the informal Stage 2 in order to comply with legislation, although this need not lead to a qualification (UK Department of Health, 1997). Formal training or Stage 3 is subdivided into three levels and should be similar in content to that provided by courses leading to a recognised qualification. Level 1 training requires about 6 h of education and should be provided within 3 months of employment (UK Department of Health, 1997). It should provide training in the basic principles of food hygiene, similar to Stage 2 but with the addition of design of premises and legislation. Levels 2 and 3 of training cover food hygiene in more detail, as well as the management of Hazard Analysis Critical Control Point (HACCP) systems. Formal certificated training (Stage 3) is offered by all of the previously mentioned awarding bodies.

Much has been written about training in the general business field, but surprisingly little has been written specifically on training in the food industry, and much of what has been written is rather specific in nature and has been limited to discussions of single segments—primarily hotels and restaurants (Barrows, 2000).

3. Barriers to training and education of food service personnel

As indicated previously, small companies account for 99% of all food operations in the UK (DTI, 1999), and the vast majority of retailers, and caterers fall into this category (Mortlock et al., 1999). The House of Commons Agriculture Committee on Food Safety (HCACFS, 1998) noted that medium and smaller-sized businesses do not have access to the same level of food safety expertise as larger premises and, even when undertaken, training may not be of sufficient quality. Safe food handling and the effective implementation of training programmes depends essentially on well-trained, knowledgeable, and positive minded managers within food businesses. A lack

of technical resources, poor working conditions, high staff turnover (particularly amongst smaller-sized businesses) and the withdrawal of mandatory funding of food hygiene courses by the Further Education Funding Council have all had a negative impact on food quality and standards (HCACFS, 1998).

Employers in the UK have therefore sought not to compete by long-term investment in employee development, preferring when possible to use lower skilled and lower cost labour or to recruit trained people directly from the external labour market (Finegold, 1991). Turnover amongst such staff is likely to be higher, and commitment, possibly, lower. Richmond (Committee on the Microbiological Safety of Food, 1991) noted that over 50% of the 2 million catering employees in 1987 worked part time, and that many were agency or temporary staff. Smaller businesses tend to rely heavily on part-time or temporary staff, estimated by West (1992) to constitute half of the total catering workforce. More recently the Hospitality Training Foundation's 'Labour Market Review' (2000) estimated that part-time or temporary staff constituted 57% of the hospitality industry's workforce, equating to an estimated 1.01 m people in 1999 (HtF, 2000). In some sectors of the industry the percentage of part-time staff was even higher, particularly in pubs, clubs and bars (67%) (Pratten and Curtis, 2002).

Few employers perceive a relationship between investment in their human resource assets and successful business performance (HtF, 1998) and training is often only undertaken to meet perceived statutory or inspection requirements (Pratten and Curtis, 2002). Calder (1993) states that the major disadvantages to the employer of providing or sponsoring a full training programme for existing staff is cost, and the risk of the loss of their investment should an employee leave. The employee may well be the main beneficiary of training, and even where the employer accepts that it is of commercial benefit to invest in education and training, the question of which form that provision should take still arises. The more generalised the training, the more 'portable' will be the value of that training to the individual, leading to greater job mobility and possibly increased status and pay. It could, therefore, result in greater turnover of staff for the employer unless the company recognises the greater worth of the employee in some way.

There are many proposed reasons for the lack of impact of training initiatives in small food businesses, including recruitment from lower socio-economic classes with low educational levels (Clingman, 1977; Oteri and Ekanem, 1989), rapid staff turnover (Burch and Sawyer, 1991), high level of seasonal staff (Travis, 1986), cost involved with food hygiene courses (Tebbutt, 1992) and poor motivation due to low pay and job status (Rennie, 1995). Harris (1995) found that most hospitality firm training executives agreed that the unresolved issues with regard to training included, but were not limited to, the following factors:

- the background of the trainee;
- the quality of the programme delivered;
- the relative flexibility of the programme delivery format;
- the high costs associated with traditional programme delivery; and
- the problems of tracking both effectiveness and costs of training.

4. Barriers to carrying out safe food handling practices

Mutch (2001) estimated the UK's hospitality industry will need to fill 300,000 new jobs before the year 2009 and one of the skill requirements for this group will be food hygiene training. However, following training, whatever its quality, the food handler may face further barriers when trying to carry out safe food handling practices at all times, these may be categorised as *The effect of significant others* and *The effect of physical and psychological job-related barriers*.

4.1. *The effect of significant others*

Ultimately, proprietors are responsible for the manufacture and sale of safe food products, as well as the provision of sufficient food-handler training to achieve this aim, but on many occasions proprietors delegated training responsibilities to managers. If managers or peers downplay, ridicule, or pay mere lip service to training, individuals will go into training with negative attitudes, will not put effort into their training, and will not incorporate what they learn in their jobs (Tracey and Tews, 1995). Motivation plays an important part in influencing a trainee and Cohen (1990) found that trainees with supportive supervisors entered training with stronger beliefs that training would be useful. Other studies have also noted management commitment as an important element of ensuring good hygienic standards, citing both a lack of management awareness and negative attitudes towards hygiene among the top five factors contributing to a business representing a significant or high risk to public health (Audit Commission, 1990). Another issue is that most managers perceive their businesses to be low risk regardless of the foods they are handling (Mortlock et al., 2000). The authors stated that unless managers can fully appreciate the inherent risks involved in their food-handling practices, they are unlikely to recognise either the need to train or the contribution that training can make to the food industry and society as a whole.

The prevailing attitudes, standards and morale within a business form part of the organisational culture, which has an influence on the motivation of employees to transfer training to the workplace. Research (Seyley et al., 1998; Noe, 1986) has shown that environmental factors such as supervisor support, supervisor sanctions, peer support, situational constraints and resources used in the job setting in which the training is to be used, have a significant influence on trainees' motivation to transfer training to the workplace (Worsfold and Griffith (2003). Cohen (1990) suggested that supervisors could show their support by discussing the training objectives with the trainees prior to training, providing adequate release time to prepare and attend training, and generally encouraging trainees. Baldwin and Magjuka (1991) established that when trainees receive relevant information before training, they recognise the accountability of learning, and perceived training as mandatory. The trainee also reported greater intentions to transfer learning back into their jobs. Thus, the information a trainee receives prior to training may serve as a cue or signal about the value of training, which in turn influences his/her preparation and motivation for training.

4.2. *The effect of physical and psychological job-related barriers*

Jobs in the hospitality industry often inflict many demands and pressures on the food handler, which in turn, can have a significant impact on the extent to which they can adequately prepare for training or use newly acquired skills. Tracey and Tews (1995) state that an individual cannot apply what has been learned if he/she is continually engaged in “fire-fighting” activities, or if the daily routine is so hectic that he/she cannot practice those new skills. To transfer skills after training, Tracey and Tews (1995) state that employees must have an opportunity to practice and refine them; otherwise the knowledge learned will likely be forgotten. Rennie (1994) suggested that improvements in food hygiene practices could be fostered by the provision of a physical and social environment that supports the application of appropriate food handling behaviours. She mentioned that training activities closely associated with such an environment would be more appropriate than food hygiene courses that operate divorced from the workplace and use solely knowledge-based assessment techniques.

Very little research has been carried out to determine the barriers and problems that may prevent food handlers from implementing good practice in a commercial setting (Clayton et al., 2002). In their own research Clayton et al. (2002) revealed that the main barriers to food safety behaviours were lack of time, staff, and equipment, with costs also being identified. Mathieu et al. (1992) found that trainees who reported many “situational constraints” within their work environment (e.g. lack of resources, improper equipment, and inadequate time) entered training with lower levels of motivation than individuals who reported a less constrained work environment. The study demonstrated that the presence or absence of tools, equipment, supplies, time and other resources might influence perceptions about the value or importance of training, which subsequently influenced motivation to attend and perform during training.

5. **Evaluating training in the service sector**

Most of the research in the general business field of training uses trainees’ reactions to a course and their beliefs about the amount they have learned to assess its effectiveness (Axtell et al., 1997). This information is usually gathered at the time of training (Saari et al., 1988), and little work has been undertaken to examine the extent to which trainees effectively apply the knowledge, skills and attitudes acquired in a training context once they are back in their job (Tannenbaum and Yuki, 1992; Tracey et al., 1995). Kirkpatrick (1967) states that evaluation is needed in order to improve future programs and to eliminate those programs which are ineffective. Four primary criteria for evaluating the effectiveness of any type of training program were outlined by Kirkpatrick (1967). The criteria are defined as (1) *Reaction*: trainees’ affective responses to the training experience and their perceptions of its value; (2) *Learning*: the extent to which trainees know more after training than before; (3) *Behaviour*: changes in job-related behaviour and performance that result

from training; and (4) *Results*: tangible improvements at organisational level, results such as increased customer satisfaction and greater profitability. While Kirkpatrick (1967) has provided a comprehensive and user-friendly guide to evaluating training programs, few hospitality organisations have made full use of this tool (Tracey and Tews, 1995).

Of the hospitality organisations surveyed by Conrade et al. (1994) less than 10% conducted formal evaluations of their training programmes.

5.1. *Food hygiene training*

Despite an increase in the number of food handlers receiving food hygiene training, a high proportion of food poisoning outbreaks still occur as a result of poor food handling practices (Clayton et al., 2002). The disparity between providing a food handler with educational knowledge and this influencing their food handling practices occurs because most formal certificated food hygiene training programmes are designed using the KAP model (Rennie, 1995). The KAP model assumes that an individual's behaviour or practice is dependent on their Knowledge (K) and suggests that the mere provision of information will lead directly to a change in Attitude (A) and consequently a change in performance (P; behaviour) (Worsfold et al., 2004). Many authors (Rennie, 1994, 1995; Ehiri et al., 1997; Howes et al., 1996; Powell et al., 1997) have criticised the effectiveness of the KAP model applied to food hygiene training, stating that it may bring about an increased knowledge of food safety issues, but it does not always bring about a positive change in food handling behaviour.

5.2. *Evaluation methods currently used to assess food hygiene training*

Examinations into one particular 6-h basic training course in the UK, using knowledge and attitude surveys, concluded that participants “seem to be” more able to identify food safety hazards and risks (Worsfold, 1993). Phillips (1986) found that prior education and work experience had more influence on knowledge levels in food industry personnel than participation in basic hygiene courses, and the same course evaluated in a different location found that the course had little influence on knowledge levels, as knowledge levels were high before participation (Laverack, 1989). The latter course did result in positive attitudinal changes among students, possibly by reinforcing their understanding of the need for suitable food handling practices; however, no improvement in intended behaviour was identified. The study therefore concluded that the expectations of the food industry—improvements in food handling practices—were not being met by basic level food hygiene education. A more recent study found significantly lower levels of contamination of food contact materials in premises where managers had been trained, most had attended the 6-h basic course (Sagoo et al., 2003). This raises the issue of who should be trained.

Mathias et al. (1994), Riben et al. (1994) and Powell et al., (1997) used a mixture of pre- and post-course knowledge assessments and attitudinal surveys to evaluate food

safety training and found little evidence that the food safety training had any impact generally on hygiene standards. Other researchers (Oteri and Ekanem 1989; Howes et al., 1996; Worsfold et al., 2004) have also shown that positive responses towards, and knowledge of, good hygiene practices do not necessarily translate into positive behaviours.

Although many reports (Rennie, 1994; Little et al., 2003; Worsfold et al., 2004) indicate the failure of formal courses to generate improvements in food handling practices, investigators almost invariably concluded that food hygiene education programmes should be encouraged. The reasons for the continued use of formal food hygiene education courses are usually concerned with the presentation of a good public image between the enforcement agencies and the personnel in the food industry. Rennie (1994, p. 25) stated: *“If such image and public relations improvements are the goal of food hygiene education then it can be perceived as successful. If, however, the goals are improvement in the hygienic handling of foodstuffs and a reduction in the incidence of food-borne disease, then formal educational programmes might be an inappropriate strategy and resources may be being misdirected”*.

6. The future of training

As food businesses review the costs incurred by employee development, concern is rightly focusing on the impact of continuing with the use of traditional training methods, with some food businesses now opting for alternative training methods, such as computer based training (CBT). CBT has been used successfully for improving training in customer service and the management of information in many firms (Harris, 1995). Food safety education delivered through CBT, although not fully evaluated in the UK, has been shown to be as effective as classroom style delivery in the USA (Shanley et al., 2004).

Clearly the success with which individuals apply new skills in the workplace is of importance both to those attending training programmes and to employing organisations who continue to invest heavily in such development activities (Axtell et al., 1997). Tracey et al. (1995) noted that the few studies that have examined the application of trained skills to the job tend to consider immediate transfer, rather than examining it over a longer time frame. Baldwin and Ford (1988) noted that there was a lack of theory guiding the research into the transfer of training, and the authors proposed a model containing three types of influences on transfer: aspects of the course, characteristics of the trainee, and features of the work environment.

The literature identifies a number of important predictors of training effectiveness that can be placed into the three proposed categories:

- Aspects of the course: the relevance or usefulness of the course to the trainee’s job (Baldwin and Ford, 1988; Goldstein, 1986) and principles of the learning used (Decker, 1982).
- Characteristics of the trainee: self-efficacy (Ford et al., 1992; Gist et al., 1990; Tannenbaum et al., 1991), motivation (Mathieu et al., 1992; Noe, 1986;

Tannenbaum et al., 1991), job involvement (Mathieu et al., 1992; Noe and Schmitt, 1986) and ability (Roberston and Downs, 1979).

- Features of the work environment: managerial support (Ford et al., 1992; Huczynski and Lewis, 1980), the amount of control or autonomy available in an employee's job (Huczynski and Lewis, 1980; Vandenput, 1973), and more generally, transfer of training climate (Tracey et al., 1995).

Axtell et al. (1997) adapted the Baldwin and Ford (1988) model and used it to test the hypothesis that transfer a year on is expected to relate to transfer after one month, due to suggestions that the immediate period on the job after training is critical to longer term transfer (Gist et al., 1990; Baldwin and Ford, 1988; Noe, 1986). The Axtell et al. (1997) study looked at one of six training courses aimed at developing interpersonal skills at work. They found that if new skills are to be transferred to the workplace, trainee's first need to feel that the course is relevant to their jobs, and must also be committed to using what they have learned. The importance of these variables was consistent with findings in previous research (Goldstein, 1986; Mathieu et al., 1992). After 1 year the most important factors influencing trainees' self-rated transfer appeared to be the amount they believe they have transferred after 1 month, the degree of autonomy in their jobs, and their original motivation to use what they have learned. Thus, the key predictors to transfer after 1 year were slightly different from those after 1 month (Axtell et al., 1997), but the trainees' self-rated transfer of training at 1 month was a significant predictor of trainee-rated transfer after 1 year. As in other studies (Baldwin and Ford, 1988; Noe, 1986), the results imply that the period immediately after the course may be critical in laying foundations for future skill use (Axtell et al., 1997). Rennie (1994) recommends the introduction of reliable work site evaluations of food handler's after training, this would take into account the fact that knowledge alone does not lead to changes in food handling practices and any non-compliance actions could be corrected straight away. She (Rennie, 1995) later stated that the provision of formal food hygiene training without co-ordinated workplace reinforcement or incentives to adopt new or positive behaviours is unlikely to have any major effect on food hygiene standards.

7. Educational models and their use in food hygiene education

Traditionally, there has been an assumption that provision of knowledge leads to changed attitudes and thus to changed practices (KAP model; Rennie, 1994). However, this assumption is not supported by evidence (Ehiri et al., 1997; Rennie, 1994; Coutts and Hardy, 1985). The effectiveness of food hygiene training could be greatly improved where training is based on a suitable constellation of approaches designed in line with effective health education theories and models (Ehiri et al., 1997). Such models could contribute to the development of approaches, that consider not only the provision of information aimed at modifying attitudes and behaviours, but also social and environmental factors which impinge on food safety.

Social cognitive models for example are based on similar concepts, in that they look to establish the relationships between a client's knowledge, attitudes, beliefs and values ([Whitehead, 2001a](#)). Other models can be used to explain, predict and evaluate behaviour, including The Health Belief Model ([Becker, 1974; Tones, 1977](#)), which has been expanded to incorporate the Concept of Self-Efficacy ([Bandura, 1977](#)), The Trans-theoretical Model ([Prochaska et al., 1994](#)), The Health Action Model ([Tones, 1987](#)), and The Theory of Reasoned Action Model ([Ajzen and Fishbein, 1980](#)).

A multitude of literature exists that defines, describes and critiques these models (e.g. [Conner and Norman 1995; Ogden, 2000](#)) and whilst the models share similarities, subtle differences make some models more suitable than others in certain contexts.

The Health Belief Model (HBM) has been used as a framework for determining mediators of food safety behaviour ([Becker and Maiman, 1975](#)). [Griffith et al. \(1994\)](#) highlighted that the important factors in this model were 'cues to action'—factors that finally make people change behaviour. [Schafer et al. \(1993\)](#) also used the model in a study of consumers' food safety behaviour. [Sheeran and Abraham \(1996\)](#) critically reviewed the model and concluded that the model's variables correlated only weakly with behaviour and had weak predictive validity. [Armitage and Connor \(2000\)](#) also reported poor definition of constructs, a lack of combinational rules and no evidence of discriminant validity between HBM components and variables from other models. The inclusion of self-efficacy, the belief that one can successfully execute the behaviour ([Bandura, 1977](#)), into this model added a powerful predictor of health behaviour ([Abusabha and Achterberg, 1997](#)).

The trans-theoretical model developed by [Prochaska et al. \(1994\)](#) has been applied to evaluations of food safety and nutrition education programmes. Its most popular construct has been the Stages of Change, which reflects the temporal dimension of health behaviour change ([Prochaska and Velicer, 1997](#)). It relates to the personal readiness of an individual to adopt change and has been split into six stages: pre-contemplation (not seriously considering making a change), contemplation (seriously considering a change), preparation (making small change), action (making changes to an appropriate level), maintenance (sustaining the change over time) and termination (eliminating the risk of relapse) ([Courneya and Bobick, 2000](#)). The position of an individual in these six stages can be determined and the appropriateness of educational materials to an individual can be assessed in relation to their stage of change. [Armitage and Connor \(2000\)](#) identified a number of limitations to this model, for instance that it tells researchers little about the role of variables in the change process, about how and why people change or what makes some people more successful.

The Theory of Reasoned Action ([Ajzen and Fishbein, 1980](#)), and its extension the Theory of Planned Behaviour ([Ajzen, 1985](#)) have been successfully applied in the field of hygiene ([Clayton et al., 2002; Jenner et al 2002](#)), and will be used in further research by the authors of this paper. It describes behaviour as being immediately preceded by intention to perform the behaviour. This intention is determined by a person's attitude to that behaviour and views on what others think they should do

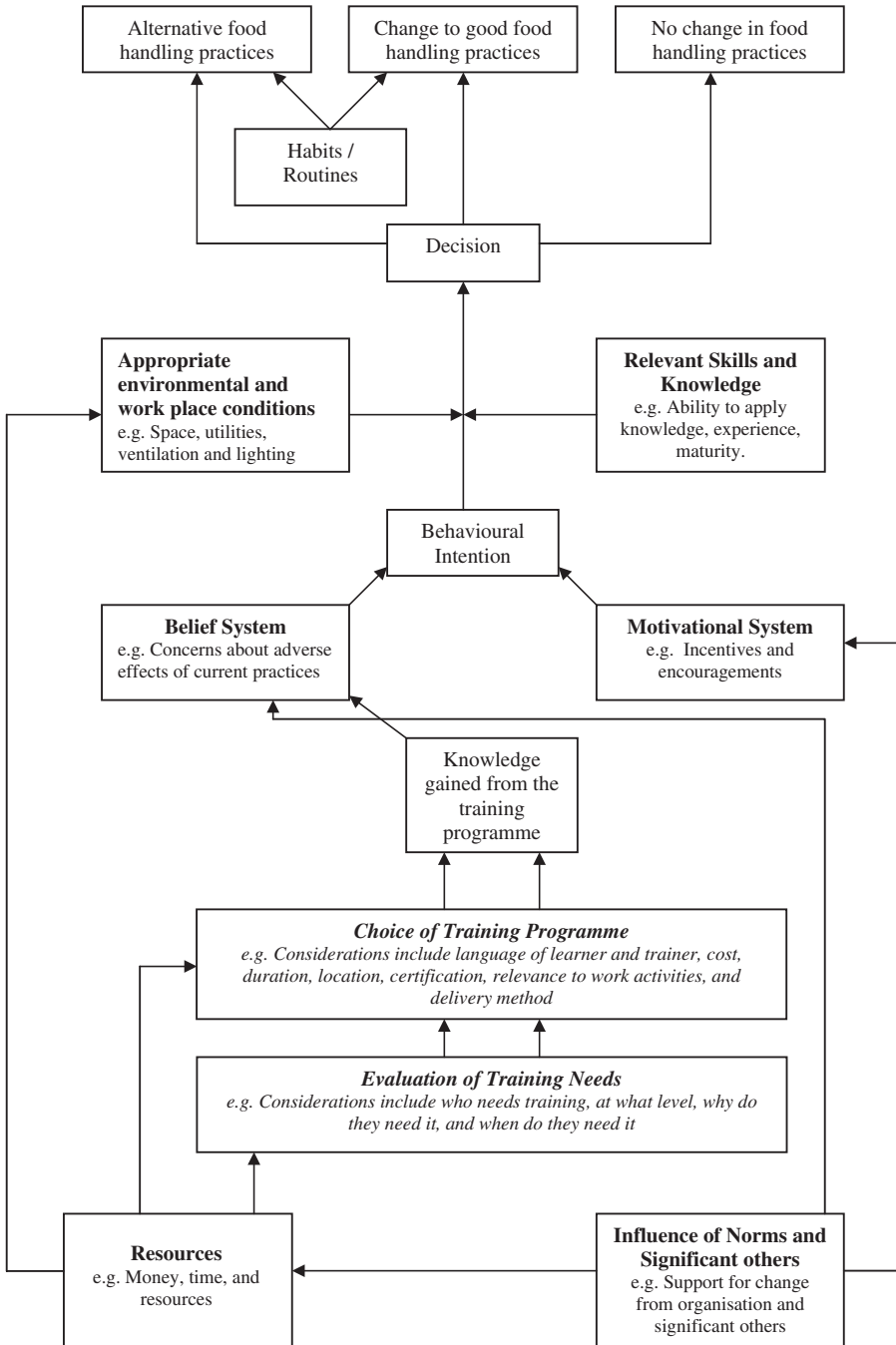
(subjective norm). Attitude is determined by beliefs about performing the behaviour and subjective norm, what other, specific, individuals think they should do (weighted by the motivation of the respondent to do what these individuals think they should do). The model was extended to include perceived behavioural control, to form the Theory of Planned Behaviour (Ajzen, 1985). The model is assumed to reflect the importance of both internal factors (e.g. ability, skill) and external factors (e.g. time, resources) to the intention to perform a given behaviour (Ajzen and Timko, 1986). The Health Action Model, however, probably gives the most thorough description of factors that may influence behaviour change following training, including hygiene training.

7.1. *The Health Action Model applied to food hygiene education*

The ‘Health Action Model’ (Tones and Tilford, 1994) could, if effectively applied to the design and administration of food hygiene training programmes, contribute immensely to the goals of food hygiene training (Ehiri et al., 1997). Rennie (1995) illustrated the application of the ‘Tones’ Health Action Model to food hygiene education, and although not widely tested it recognises most of the influencing factors that may affect the food handlers’ behaviour following training. The model incorporates—the knowledge about food hygiene obtained from a food hygiene course; the influence of norms which could be altered by the provision of support for changes in food handling practices from management and colleagues in the food industry; some incentives to change behaviour (perhaps improved job satisfaction or financial inducements); the facilitating effects of a workplace which provides a suitable range of equipment and facilities; and the development of personal skills to apply the knowledge gained from a course. This model has many strengths, however, extensions to the framework are proposed. The extensions take into account the evaluation of a food handlers training needs and the choice and relevance of the training programme to the food handler. These proposed extensions could affect the food handler’s level of motivation on undertaking a course and thus behaviour and intentions to carry out safe working practices at all times. They are therefore worthy of investigation. A representation of Rennie’s, (1995) Health Action Model applied to food hygiene education, complete with the proposed extensions, is illustrated in Fig. 1. The extensions, *Choice of training Programme* and *Evaluation of Training Needs*, are presented in italics.

8. Discussion—a holistic approach

In the face of increasing incidence of foodborne disease, there is a need to find effective ways to manage food safety. The service sector has been linked to a large proportion of foodborne disease outbreaks and as such has been targeted for improvements in food safety management. Food hygiene training (and/or supervision and instruction) is a legal requirement within the food industry and should be only one part of an effective food safety management strategy. Training will,



Key: - *Italics* = Model extensions

(Adapted from Rennie, 1995:p.77)

Fig. 1. Proposed considerations for effective food hygiene training.

however, only lead to an improvement in food safety if the knowledge imparted leads to desired changes in behaviour in the workplace. Few thorough evaluations of the effectiveness of training have been carried out. Some evidence links improved hygiene in premises with the presence of trained staff. Such circumstantial evidence is, however, confounded by other factors that might also lead to improved hygiene (e.g. the presence of adequate facilities or management commitment to food safety), and does not address the effectiveness of training per se. Similarly, some studies address immediate transfer of knowledge or change in behaviour, but do not test for how long such knowledge or behaviours persist once back in the workplace.

Research to date suggests that knowledge imparted by traditional training courses cannot be assumed to translate into the desired changes in behaviour. As well as the appropriateness of material conveyed during a course, influences pre- and post-training are suggested as factors that influence the extent to which desired behaviour changes take place. Motivation from managers and selection of an appropriate course are important in determining the attitude that the trainee has to entering training, whilst trainees' post-training must be given adequate support, both through expressed management commitment to good hygiene practices and the availability of appropriate facilities to allow newfound skills to be employed. The latter are likely to be a manifestation of management commitment. It has been suggested that the period immediately following training is critical in determining long-term hygiene-related practices, and that in this period mentoring of the trainee in translating knowledge into practice is important. Thus management motivation of staff and commitment to food hygiene are critical to the success of hygiene training, and thus to food safety management. Without this, investment in training is less likely to be rewarded by improved hygiene standards.

A model for hygiene training is needed that takes a holistic approach to training, encompassing and recognising all the various influences on training and its translation into desired outcomes. Similarly there is a need for more research to thoroughly assess the effectiveness of training and the personal and physical barriers that prevent the acquisition of knowledge leading to desired changes in behaviour. A review of the evaluation techniques currently used to assess the effectiveness of food hygiene training in the UK demonstrates that researchers, hospitality organisations and training providers do not use the suggestions made by Kirkpatrick (1967) or take into account all the factors that may influence training outcomes. Therefore, serious consideration now needs to be given by researchers and evaluators, to an alternative model, that does encompass the factors previously noted.

Effective and relevant food safety training delivered with the support of the organisation, adequate resources and peer support of colleagues will have a greater effect on intention and actual behaviour of the food handler, ensuring that safe working practices are carried out at all times. Such approaches will be necessary if hygiene training is to have impact on food safety management. Further investigation into the motivational factors and beliefs of the food handler into food hygiene training, its role in their working environment and its effectiveness is needed to aide the development of more effective methods of food safety training delivery.

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