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# Determining motivation to engage in safe food handling behaviour

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ABSTRACT

*Purpose:* To apply the protection motivation theory to safe food handling in order to determine the efficacy of this model for four food handling behaviours: cooking food properly, reducing cross-contamination, keeping food at the correct temperature and avoiding unsafe foods.
*Design:* A cross-sectional approach was taken where all protection motivation variables: perceived severity, perceived vulnerability, self-efficacy, response efficacy, and protection motivation, were measured at a single time point.
*Findings:* Data from 206 participants revealed that the model accounted for between 40 and 48% of the variance in motivation to perform each of the four safe food handling behaviours. The relationship between self-efficacy and protection motivation was revealed to be the most consistent across the four behaviours.
*Implications:* While a good predictor of motivation, it is suggested that protection motivation theory is not superior to other previously applied models, and perhaps a model that focuses on self-efficacy would offer the most parsimonious explanation of safe food handling behaviour, and indicate the most effective targets for behaviour change interventions.
*Originality:* This is the first study to apply and determine the efficacy of protection motivation theory in the context of food safety.



## 1. Introduction

Food poisoning, also known as foodborne disease, refers to any illness that occurs following ingestion of contaminated food or drink. It is a public health issue in both developed and underdeveloped countries (Kuchenmüller et al., 2009). Common pathogens implicated in food poisoning include Campylobacter, Salmonella and Escherichia coli. According to recent estimates foodborne illness affects a quarter of the population in the developed world (Food Safety Information Council, 2014; McKercher, 2012; Scallan et al., 2011), which corresponds to nearly 6 million people in Australia. The consequences of food poisoning can be severe, with an average of 120 deaths annually in Australia, at a cost of $1.25 billion (Hall et al., 2005; NSW Food Authority, 2015). Similar statistics have been reported in the United Kingdom (Adak, Meakins, Yip, Lopman, & O'Brien, 2005; Food Standards Agency, 2002; Redmond & Griffith, 2006) and the United States of America (Mead et al., 1999). It is likely, however, that the true incidence of food poisoning is higher than that described, as not all cases are reported (Crerar, Dalton, Longbottom, & Kraa, 1996; Mead et al., 1999). Indeed, it has been estimated that reported cases of foodborne illness represent only 10% of all cases (Lacey, 1993; see also Majowicz et al., 2005).

Importantly, many cases of foodborne disease could be prevented if consumers practiced safer food handling behaviours, including implementing hand hygiene techniques and avoiding cross-contamination (Food Safety Information Council, 2014). However, despite the prevalence of foodborne illness and the relative ease of preventing the majority of cases, the literature on interventions attempting to target consumer food safety behaviours is currently sparse. A recent systematic review found only ten relevant studies (Milton & Mullan, 2010), with only two of these classified as using a theory-based approach to change behaviour. Moreover, many of the interventions relied on education or instruction as their primary mode of change; despite knowledge that these are ineffective when used in isolation for changing health behaviour generally (Rimal, 2000), and food-safety behaviour specifically (Mullan & Wong, 2010). Given that interventions based on a theoretical framework are more effective than non-theory-based interventions (Michie, Johnston, Francis, Hardeman, & Eccles, 2008), these findings demonstrate the need for further

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research into the use of theory-based approaches to prevent foodborne illness.

### 1.1. Use of theoretical frameworks

A variety of theoretical models have been developed in order to explain and predict behaviour (Conner & Norman, 2005; Schwarzer, 1992), and social cognition models in particular are commonly used and known to be effective for developing theory-based health interventions (Jenner, Watson, Miller, Jones, & Scott, 2002). A core assumption of social cognition models is that people make rational decisions based on cost/benefit analysis of the potential outcomes of behaviour (Conner & Norman, 2005). Such models have been found to successfully predict health behaviours such as physical activity (Young, Plotnikoff, Collins, Callister, & Morgan, 2014), health eating (Stacey, James, Chapman, Courneya, & Lubans, 2014) and condom use (Snead et al., 2014); however, few have investigated safe food handling behaviour.

There are currently a number of commonly used theories in health psychology (for overview, see: Conner & Norman, 2015), but the Theory of Planned Behaviour (Ajzen, 1991) is the most frequently used model in food research (e.g., Kim, Jang, & Kim, 2014; Kothe, Mullan, & Butow, 2012; Sainsbury, Mullan, & Sharpe, 2013), and has specifically been applied to food handling behaviour in both adolescents (Mullan, Wong, & Kothe, 2013) and adults (Mari, Tiozzo, Capozza, & Ravarotto, 2012). In this theory, attitude, perceived societal pressure, and perceived control over behaviour, are said to influence whether one intends to perform a behaviour, which in turn influences actual performance (Ajzen, 1991).

Despite its established utility, the Theory of Planned Behaviour has received strong criticism regarding the suitability of the model for designing behaviour change interventions (e.g., Hardeman, Kinmonth, Michie, & Sutton, 2011). Several recently published theory of planned behaviour-based interventions have failed to confirm the meditational hypotheses specified by the theory suggesting that alternate mechanisms are driving any observed changes – that is, changes in attitude, subjective norm, and perceived behavioural control do not necessarily account for observed changes in intention, while changes in intention and perceived behavioural control do not predict changes in behaviour following intervention participation (e.g., Hardeman, et al., 2011; Kothe & Mullan, 2014). Based on these problems, it has therefore been suggested that rather than adding to a model that has been shown to consistently fall short, other theoretical approaches should be explored (Sniehotta, Presseau, & Araújo-Soares, 2014). One such model that may have application to safe food handling is protection motivation theory (PMT; Rogers, 1975; Rogers, Cacioppo, & Petty, 1983).

#### 1.1.1. Protection motivation theory

PMT (Rogers, 1975; Rogers et al., 1983) was developed initially as a framework for understanding the impact of fear appeals on attitudes and behaviour. It was later revised in order to extend to persuasive messages in general (Norman, Boer, Seydel, & Mullan, 2015; Rogers, 1975; Rogers et al., 1983). A message may be seen as threatening (threat appraisal) if an individual believes they are vulnerable to the threat and that the outcome would be severe. Following the perception of a threat, the message recipient then selects an adaptive or maladaptive way in which to reduce the negative emotional state induced by the threat (coping appraisal). Adaptive coping responses include following behavioural advice, whereas a maladaptive coping response (if following the advice does not reduce fear, or no advice was presented) may be to avoid or deny the message altogether (Norman et al., 2015).

The probability of performing an adaptive response is related to both the belief that the recommended behaviour will effectively reduce the threat (response efficacy), and the belief that the individual is capable of performing that behaviour (self-efficacy; Norman et al., 2015). As self-efficacy is the extent of one's belief in one's own ability to complete a task, while response efficacy is referred to one's belief whether a certain action will avoid the threat, the former is more “subjective”, while the latter is more “objective”. According to PMT, these variables, in turn, contribute to protection motivation, which is the intention to follow the behavioural advice and is considered a proximal determinant of behaviour. However, research has demonstrated that threat perceptions are more likely to influence protection motivation if an individual believes they can cope with the threat (Ho, 1992; Maddux & Rogers, 1983; Schwarzer & Fuchs, 1995). Thus, high levels of vulnerability and severity are more likely to lead to motivation at high levels of efficacy (Maddux & Rogers, 1983).

In relation to the behaviour of interest here (safe food handling), in order for an individual to properly clean their hands they would need to believe that food poisoning is a severe outcome to which they are susceptible. They would additionally need to believe that hand washing is an effective way to minimise the threat of food poisoning, and that they are capable of correctly carrying out this behaviour. Despite the apparent relevance of this theory for safe food handling, to date very few studies have investigated the application of PMT to this behaviour. One study involving American school students found that severity and self-efficacy were correlated with behaviour, while perceived susceptibility was not (Haapala & Probart, 2004). Importantly, in this study response efficacy was not investigated, as the authors argued that the students, having no previous instruction on safe food handling, would be unable to respond to this aspect appropriately. It may therefore be the case that response efficacy is more applicable for an adult population. Using the Health Action Process Approach but measuring similar constructs in a young adult population, risk awareness, vulnerability and self-efficacy were found to be important predictors of intentions to perform food-safety behaviours (Chow & Mullan, 2010).

### 1.2. Aims and hypotheses

The aim of this study was to examine the utility of PMT in the context of safe food handling in order to determine effective targets for interventions. It is hypothesised that higher levels of perceived severity of a negative outcome and perceived vulnerability to experiencing that outcome will relate to greater protection motivation to engage in safe food handling behaviour. Additionally, it is hypothesised that greater self-efficacy and response efficacy will relate to greater protection motivation to engage in safe food handling behaviour. Finally, it is hypothesised that perceived severity and vulnerability will be more strongly related to protection motivation when self-efficacy and response efficacy are high.

## 2. Material and methods

### 2.1. Design

The study employed a cross-sectional design, where all variables hypothesised to predict protection motivation to perform behaviour were measured at one time point. The primary outcomes of interest were protection motivation to engage in four distinct safe food handling behaviours: 1) Cook food properly; 2) Reduce cross-contamination; 3) Keep food at the correct temperature; and 4) Avoid unsafe foods. These four broad behaviours were informed by the Australian Food Safety Information Council guidelines (Food Safety Information Council, 2014).