

# Food hygiene knowledge in adolescents and young adults

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Received 7 March 2013  
Revised 29 January 2014  
Accepted 4 February 2014

## Abstract

**Purpose** – The purpose of this paper is to utilise the comprehensive Food Safety Knowledge Instrument to compare food hygiene knowledge across a population of high school and university students in Australia and the UK.

**Design/methodology/approach** – In total, 475 students from secondary schools and universities in Australia and the UK took part in a survey, which included a Food Safety Knowledge Instrument and demographic items.

**Findings** – Food safety knowledge was generally very low. High school students had a mean score of only 38 per cent, while university students just reached a “pass” with a mean of 54 per cent. Demographics accounted for 41 per cent of variance in food knowledge scores. Female gender, being at university rather than high school, and living out of home rather than with parents were associated with greater food knowledge. Residing in Australia rather than the UK and being older were also associated with greater knowledge; however, these findings were subsumed by education group. Socio-economic status was not a significant predictor of food knowledge.

**Practical implications** – Identifying demographic and cultural differences in food knowledge can help to identify at-risk populations to better target in theory and knowledge-based interventions.

**Originality/value** – This study is the first to apply the knowledge instrument in an Australian population. Understanding the baseline knowledge in this population is an important first step at developing effective interventions for food safety.

**Keywords** Food safety, Food hygiene, Food knowledge, Foodborne illness

**Paper type** Research paper

Foodborne diseases encompass a wide spectrum of illnesses ranging from minor gastrointestinal problems to life threatening illnesses such as botulism, salmonella, cholera, and hepatitis A (World Health Organization, 2007). The number of reported foodborne illnesses in Australia and worldwide has increased over the past ten years (National Health and Medical Research Council, 2003). Approximately one-quarter of the population in most high-income countries, for example, Australia and the USA, experience foodborne illness annually (The Food Safety Information Council, 2008; Mead *et al.*, 1999). Consequently, food poisoning is one of the most widespread public health problems in high-income countries. In Australia, it has been reported that there is an average of 120 deaths at a cost of approximately \$1.25 billion annually (NSW Food Authority, 2009). In the UK, foodborne disease affects 5.5 million consumers annually, or one in ten people (Food Standards Agency, 2002). Foodborne illness causes 687 deaths (Adak *et al.*, 2005) and costs approximately £1.5 billion per year (Redmond and Griffith, 2006). In the USA, these numbers may be as high as 76 million cases of food poisoning per year with 325,000 hospitalisations and 5,000 deaths annually (Mead *et al.*, 1999). However, high as these figures are, they are believed to be consistently underestimates of true incidence rates, as not all cases of



foodborne illness are reported to the relevant authorities (Crerar *et al.*, 1996; Day, 2001; Mead *et al.*, 1999). Reported cases of food poisoning are thought to represent only 10 per cent of actual cases (Lacey, 1993).

There are several practices that the consumer can implement to prevent food contamination while preparing, cooking, and storing food. These include thoroughly reheating foods, washing cutting boards and utensils when switching between foods to prevent cross-contamination, storing foods appropriately, correct hand washing, storing foods at the correct temperature and maintaining good personal hygiene. It has been estimated that at least 60 per cent of food poisoning originates in the home rather than with food manufacturers of restaurants (Worsfold, 1997). It is because of principles like these that the last defence against food poisoning is often regarded as resting with the consumer (Gilbert, 1983). However, despite foodborne illness being a significant and persistent health issue is also one of the most preventable.

### The role of knowledge

It is a widely held belief that much of foodborne illness is the result of a lack of education and awareness of hygienic food handling practices, and that an increase in food hygiene education will lead to a comparative decrease in the instances of food poisoning (Griffith *et al.*, 1998). Participants in a study by Green and Selman (2005) identified education as an essential prerequisite for engaging in hygienic food handling behaviours and respondents' portray food safety knowledge and their perceived level of control over food safety practices as being the most significant factors in feeling confident as to the safety of food cooked at home. Knowledge as a predictor of behaviour has found support in other studies as well (Food Standards Australia New Zealand, 2008). In a comparable field, a meta-analysis of 35 studies by Shaikh *et al.* (2008) recognized knowledge as being one of the strongest predictors of fruit and vegetable consumption.

As has been argued in the context of other health guidelines (e.g. fruit and vegetable consumption: Kothe and Mullan, 2011), an appropriate level of knowledge may be a necessary, but not sufficient, determinant of adherence to safe food handling practices. Indeed the important role that knowledge plays in behavioural performance is recognised in both the Integrated Behavioural Model (Fishbein and Yzer, 2003) and the Information, Motivation and Behavioural Skills Model of behaviour (Fisher and Fisher, 2002). Both models would imply that knowledge of key food safety concepts is required to allow adherence to safe food handling practices.

While a steady increase in foodborne illness over the last ten years would suggest otherwise, consumers by and large believe that they have adequate knowledge of hygienic food handling practices (Haapala and Probart, 2004). This disparity between food handling knowledge and self-reported food handling behaviour is reflected in the literature (Bruhn and Schutz, 1999; Frewer *et al.*, 1995; Gettings and Kiernan, 2001; Haapala and Probart, 2004; Redmond and Griffith, 2003). For example, while 97 per cent of participants in a study conducted by Byrd-Bredbenner *et al.* (2007a) self-reported their hygienic food handling knowledge as at least fair, as many as 60 per cent failed to wash their hands following direct contact with raw poultry. Similarly Maurer (2006) found that whilst 76 per cent of young adults reported washing their hands properly all or most the time, only 53 per cent were actually observed performing the recommended hand washing practices. Perhaps even more troubling is that some studies have found as many as 10-50 per cent of individuals intentionally engage in risky food handling behaviours (Redmond and Griffith, 2003; Bruhn and Schutz, 1999)

as they believe themselves to be immune from foodborne illness, due to factors such as optimism bias.

Studies conducted on adults have indicated that food safety knowledge tends to increase with age and practice (Byrd-Bredbenner *et al.*, 2007a). Females tend to have higher scores than males in food safety knowledge, and younger consumers (under 19 years old) show the most inappropriate practices and significantly lower food hygiene knowledge. These groups may have the least food handling experience and it is further hypothesised that decreased knowledge may be due to changes in educational system (elimination of home economics classes), increased numbers of working mothers and a growing reliance on convenience, take away and restaurant foods (Williamson *et al.*, 1992; Altekruise *et al.*, 1999)

### *Food safety and age trends*

Childhood is an important time for developing knowledge and skills about food hygiene and preparation, however, teaching of these skills in schools is declining (Mullan, 2009). A study investigating primary and secondary schools in the UK found that teaching of food hygiene was not in the national curriculum in England and Wales (Mullan, 2009). There was a slight increase in the instruction of food hygiene between primary and secondary schools, however in secondary schools this was only in students who studied food-related areas. Haapala and Probart (2004) investigated food safety knowledge in a group of students from the USA (years seven and eight) and found that they only had a fair level of knowledge (mean of seven out of ten questions correct), with no difference between genders. Particularly, students performed badly on questions relating to cooking and cleaning (e.g. safe temperatures to cook chicken, cleaning cutting boards between raw meat and other food items). However, the majority of students (92 per cent) did prepare snacks and meals at home and 21 per cent reported they had been sick due to something they ate. One-fifth of the students also reported frequently taking risks in personal food handling, suggesting low perceived susceptibility. A recent study in the USA found that most children in early high school (mean age 12.6) did prepare food at least weekly and while they knew that food could make them ill they were unsure or unaware of the exact mechanisms (Byrd-Bredbenner *et al.*, 2010).

### *Aims*

The aim of this study was to utilise the comprehensive food-safety knowledge instrument developed by Byrd-Bredbenner *et al.* (2007a) to compare the food hygiene knowledge across a population of high school and university aged students. As mentioned, younger age groups are most at risk for inappropriate food handling behaviours and consequently foodborne disease. Byrd-Bredbenner *et al.* (2007b) found that young adults aged 17-19 had the lowest food safety knowledge; however, very few studies have investigated the food hygiene knowledge of children or adolescents. The questionnaire contains five scales which cover key food safety concepts. These include cross-contamination and disinfection procedures; safe times/temperatures for cooking/storing foods; groups at greatest risk for foodborne disease; foods that increase the risk of foodborne disease; and foodborne pathogens. This questionnaire has been shown to have good reliability ( $r = 0.92$ ) and validity, and is appropriate to use with a wide range of ages from adolescent to adults. This study is the first to apply the knowledge instrument in an Australian population. Understanding the baseline knowledge in this population is an important first step at developing effective interventions for food safety.

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## Method

### *Recruitment*

University aged participants were recruited from an undergraduate psychology population at an Australian University. The study was approved by the University's Human Research Ethics Committee. Participants received course credit for participating in the study.

Secondary school participants were recruited from Australia and the UK across 2007 and 2008. Participants were recruited from both a range of schools in urban and rural areas and of different types (e.g. public and private, single sex and co-education, religious, and secular). The study was approved by Human Research Ethics, and a separate ethics protocol was approved by the Catholic Education Office to recruit from Catholic schools. Schools were contacted from school directories, for example the National Education Directory in Australia and the Department of Education and Science in the UK. The researchers made e-mail or phone contact with the schools to determine if they were interested in participating in the study. If the school was interested, they were told to choose appropriate classes or years where the students were between 11 and 18 years of age. Although 25 schools agreed to participate initially, many did not continue on to be involved in the research, primarily due to time constraints, workload demands, or failure to correspond with the researchers. The final sample was recruited from three Australian schools in New South Wales (NSW), and four schools from the UK in areas such as Worcester, Gloucester, Yorkshire and Hampshire. Parent consent was obtained prior to student participation.

In total, 475 participants took part in the study; 205 were from secondary schools in Australia or the UK (113 females, 92 males), and 268 were university students (194 females, 74 males).

### *Materials*

Food safety knowledge was measured using an online version of the Food Safety Knowledge questionnaire (Byrd-Bredbenner *et al.*, 2007b). This is a validated and standardised questionnaire that covers many facets of safe food handling. The questionnaire is scored out of 89, with scores converted to a percentage and the pass rate set at 50 per cent. The 89 items assess knowledge across the five subscales listed in Table I. Participants received a score of one for each correct response. Each item was either a multiple choice question or true/false response. The total score was calculated as a percentage.

Demographic questions were also included. Participants were asked to state their age, and select their gender (male/female), the primary occupation of their father as a proxy for socio-economic status (higher managerial or professional/intermediate managerial or professional/supervisor or junior/skilled manual workers/semiskilled and unskilled manual workers/unemployed/student), and their living situation (with parents/rental property with friends/rental property with partner/catered or un-catered college/own home). Whether the participant was recruited from a high school or university, and their country of origin (Australia/UK) were also recorded.

### *Procedure*

The food safety questionnaire was administered online along with demographic items. Participants were provided with an individual identification number and a link to the online questionnaire. For school students, teachers assisted with the administration of the procedure and students completed the questionnaire.

**Table I.**  
Sample items and  
psychometric  
properties of each  
subscale of the food  
safety knowledge  
questionnaire

Scale	Sample item	Possible points	$r^a$
1. Cross-contamination prevention and disinfection procedures	The best way to keep from getting food poisoning from fresh fruits and vegetables is to wash them with (a) Regular soap (b) Hot water (c) Anti-bacterial soap (d) An anti-bacterial sponge (e) <i>Cool running water</i>	0-29	0.78
2. Times and temperatures for cooking and storing food	What is the recommended freezer temperature for preventing food poisoning? (a) <i>-18 degrees Celsius</i> (b) -8 degrees Celsius (c) -4 degrees Celsius (d) 0 degrees Celsius	0-14	0.72
3. The groups at greatest risk for foodborne disease	People should be especially careful about not eating raw seafood if they have (a) Diabetes (b) HIV infection (c) Cancer (d) <i>Any of these diseases</i>	0-28	0.87
4. Foods that increase the risk of foodborne disease	Chilling or freezing eliminates harmful germs in food (a) True (b) <i>False</i>	0-10	0.80
5. Common food sources of foodborne disease pathogens	Listeria bacteria are most likely with which food (a) Home canned foods (b) Raw or undercooked beef (c) <i>Deli meats</i> (d) Raw eggs or poultry (e) Do not know	0-8	0.72
Total		0-89	0.92

**Note:** <sup>a</sup>Livingston reliability coefficient from Byrd-Bredbenner *et al.* (2007b)

## Results

### *Demographics*

In total, 471 participants completed the study; 222 high school students and 249 university students, with 366 born in Australia and 97 born in the UK. Mean age of participants was 17.3 (SD = 4.8; range 11-52) years, and the majority were female (66.6 per cent) and lived with their parents (80.9 per cent). Regarding socio-economic status, the majority (56.8 per cent) of fathers of participants were employed in an intermediate or higher managerial position, 19.4 per cent were skilled labourers, 8.6 per cent were students, 5.6 per cent were supervisors or clerics, 4.5 per cent were unemployed, and 4 per cent were semiskilled or unskilled manual workers.

### *Food safety knowledge scores*

The results of the food safety questionnaire showed that in general, knowledge was very low (see Table II). Participants from the high school population had a mean score of only 38 per cent (SD = 11.3; range 21-45 per cent), while participants from the university population just reached a "pass rate" with a mean score of 54 per cent (SD = 9.9; range 26-70 per cent). Participants were most knowledgeable about foods

that increased risk of foodborne disease and least knowledgeable about common food sources of foodborne disease pathogens.

*Predictors of knowledge scores*

Univariate Analysis of Variance was used to explore socio-economic status (i.e. father's occupation) and living situation differences in knowledge. Significant differences in knowledge scores were found for individuals in different living situations, ( $f_{5,454} = 5.84, p < 0.001$ ). *Post hoc* tests using the Tukey HSD procedure revealed that those who lived with their parents had significantly lower knowledge scores ( $m = 40.80, SD = 6.14$ ) than those who were renting ( $m = 47.54, SD = 8.71; p = 0.001$ ) and those who were living in their own home ( $m = 52.40, SD = 7.03$ ). There were not significant differences in knowledge scores, depending on socio-economic status ( $f_{7,388} = 1.92, p = 0.065$ ).

Relationships between knowledge scores and the demographic variables of age, gender, country of birth and education group were investigated using a hierarchical multiple regression analysis (see Table III). Age, gender, and country of birth were entered in the first step, followed by education group in the second step, as it was assumed that age and education group would be confounded and may not explain additional variance above each other. However, being more highly educated may also explain additional variance over age trends, and therefore this variable was included in the second step.

	High school % (SD)	University % (SD)	Combined % (SD)
Cross-contamination	38 (17.4)	63 (13.8)	52 (19.7)
Safe times/temps	39 (17.4)	53 (16.7)	47 (18.3)
Food risk	39 (14.7)	49 (13.2)	45 (14.7)
Groups at risk	45 (20.3)	70 (19.7)	59 (23.4)
Pathogens	21 (16.3)	26 (19.2)	24 (18.2)
Total score	38 (11.3)	54 (9.9)	47 (13.3)

**Table II.**  
Knowledge scores (% correct)

	$\beta$	$t$	$\eta_p^2$	$R$	$\Delta R^2$	$p$
<i>Step 1</i>						
Age	0.320	7.48	0.108			< 0.001
Gender	0.303	7.73	0.114			< 0.001
Country of birth	-0.197	-0.47	0.045			< 0.001
				0.563		< 0.001
<i>Step 2</i>						
Age	0.062	1.34	0.004			0.181
Gender	0.244	6.77	0.090			< 0.001
Country of birth	0.052	1.14	0.003			0.256
Education group	0.559	10.14	0.181			< 0.001
				0.664		< 0.001
					0.124	< 0.001

**Table III.**  
Multiple regression analyses on knowledge scores and demographic variables

**Notes:**  $\beta$ , standardised regression coefficient;  $\eta_p^2$ , partial eta squared (proportion of independent variance explained)



In the first step the overall model was statistically significant, explaining 31.7 per cent of the variance in knowledge ( $f_{3,464} = 71.68, p < 0.001$ ). All three variables were significant independent predictors, with age accounting for 10.8 per cent of the variance, gender accounting for 11.4 per cent of the variance, and country of birth accounting for 4.5 per cent of the variance in scores, each controlling for the other variables. When education group was added in the second step, the overall model remained significant, explaining 44.1 per cent of variance in knowledge scores ( $f_{4,463} = 91.25, p < 0.001$ ). Gender and education group remained significant independent predictors, explaining 9.0 per cent and 18.1 per cent of the variance in knowledge scores respectively, whereas country of birth and age were not. Holding all other predictors constant, being of female gender and at university rather than high school were associated with greater levels of knowledge.

### Discussion

Foodborne illnesses have caused approximately 120 deaths in Australia and 687 deaths in the UK annually (NSW Food Authority, 2009; Food Standards Agency, 2002), with estimates of foodborne disease as high as one in ten people (Food Standards Agency). Food hygiene in the home has been identified as an important way to prevent foodborne illnesses (Worsfold, 1997; Gilbert, 1983). Despite findings, knowledge about food hygiene and the prevention of foodborne illnesses tends to be surprisingly low (Byrd-Bredbenner *et al.*, 2007a). The aim of this study was to explore food hygiene knowledge across high school and university aged students, and across two countries; Australia and the UK. Better understanding of food hygiene knowledge and the role of demographic factors is an important step in both developing effective interventions that may incorporate knowledge, as well as enabling more effective tailoring of such interventions to groups that are more at risk of foodborne illness.

Overall, low levels of knowledge were found in participants, with school students correctly answering 38 per cent of knowledge measure items, and university students correctly answering 54 per cent of the knowledge measure items. These levels of knowledge are even lower than those reported in Byrd-Bredbenner *et al.*'s (2007a) study. Low knowledge levels may therefore be a barrier to implementing safe food hygiene practices, particularly amongst school students who may not be aware of some of the sources of foodborne illnesses that can be avoided in the home.

As expected, demographic variables were significant predictors of food hygiene knowledge, and explained a substantial 44 per cent of the variance in knowledge. In particular, those who were female, and university (rather than school) students, living at home, and residing in Australia had greater levels of food hygiene knowledge; however age and country of birth effects were no longer significant when education group was included. These results will be explored in turn.

In the first step of the regression model, age was a significant predictor of food knowledge, and independently explained 11 per cent of the variance. This is as expected, and in accordance with previous research suggesting that knowledge increases with age. For example, Sanlier (2009) compared the food safety practices of young adults (14-19 years) and adults (20+) in Turkey, and found that young adults had poorer food safety knowledge and food safety preparation. The authors argued for the necessity to find ways to improve education and knowledge on food safety. It may therefore be useful to design food safety interventions that include knowledge components for younger individuals.

Age effects were, however, no longer significant when education group (i.e. university or school student) was included in the model, and education group explained

over 18 per cent of the variance in knowledge, representing a large effect size. That age was no longer significant with the addition of education group was not surprising, given that individuals at university are older than school students, and also that differences between these groups may be larger than small age variations within these populations. As such, it appears that age effects have been explained and accounted for by education group. It is also possible that those who are accepted into university are more intelligent, have higher socio-economic status, or may have better access to learning materials, thus offering a greater opportunity for those students to learn about food hygiene. This notion is supported by research suggesting that better educated individuals tended to have a better diet (e.g. less meat, more vegetables, and less unhealthy snacks) than those who had lower education levels; an effect that was not explained by age (Fraser *et al.*, 2000). Further research could explore the role of learning opportunities as a predictor of knowledge, as this could form the basis of tailored interventions to increase food hygiene practices.

In the current study, females tended to have greater food knowledge than males. Such differences are consistent with previous findings in the USA (e.g. Byrd-Bredbenner *et al.*, 2007a) and in Europe (Sanlier and Konaklioglu, 2012), and are also found for food hygiene behaviours such as hand-washing (Anderson *et al.*, 2008). Males may therefore be at greater risk of foodborne illness than females, and future interventions should be designed accordingly to target male populations.

Those who lived at home with their parents had lower levels of food knowledge than those who lived in rental properties or in their own home. It is likely that age is a confounder, such that those who were renting and living in their own home were older than those who lived at home. However, it is also possible that those who live at home have less responsibility for food preparation, and therefore had not encountered as many opportunities to learn about food hygiene and practice safe food handling (Byrd-Bredbenner *et al.*, 2007a).

Australians had higher levels of food knowledge than those residing in the UK. However, country differences in food knowledge were no longer relevant when education group was added to the regression. As university students could only be recruited from Australia, the most likely explanation for this finding is that country and education group were confounded, and the differences between school students and university students were larger than the differences between the school students recruited from Australia and the UK. However, the initial country differences observed could also be partly explained by a range of social, economic, and cultural differences (Wilcock *et al.*, 2004). Although there is limited cross-country or cross-culture examination of food safety and food knowledge, Jussaume and Judson (1992) found that those living in Japan were significantly more concerned about food safety than those living in the USA. However, in their study as in the current study, this effect was mediated by circumstantial differences, such as number of children, age, income, and education; those of similar circumstances had similar food safety concerns, regardless of country. Further exploration of potential cultural and country differences in food knowledge is warranted.

That food hygiene knowledge scores varied across demographic factors such as gender and education group is promising, as it provides an avenue for more specified food-hygiene knowledge interventions that target those who need them most. In particular, school-age males may be more at risk of foodborne illnesses due to lower knowledge levels, and future interventions could target this population.

There has been research suggesting that knowledge may be necessary, but not sufficient, for behaviour change in food-related behaviours (Kothe and Mullan, 2011).



Even when levels of knowledge are high there is frequently a disconnect between knowledge and behaviour (Ansari-Lari *et al.*, 2010), and a recent intervention that included knowledge was unsuccessful in improving food hygiene in a sample of Australian university students, even though increases in knowledge were found (Mullan and Wong, 2010). It is possible that other factors are also important in motivating food hygiene, such as desire to change behaviour, impulsivity and self-control, attitudes, and social images; these factors should be investigated to determine whether they explain differences in food hygiene behaviour, and if so whether appropriate interventions can be designed to target these factors in addition to increasing knowledge.

A recent systematic review of food hygiene interventions suggested that food hygiene is modifiable, however, the quality of the studies was generally poor, and many relied on self-report changes (Milton and Mullan, 2010), despite previous research suggesting that self-reported food hygiene do not match actual practices (Maurer, 2006).

To further develop this field of research, theory-based interventions may offer more effective interventions. For example, the theory of planned behaviour has been effectively used to explain and change a range of food-related behaviours (Webb and Sheeran, 2006). In the area of food hygiene, Milton and Mullan (2012) recently conducted a theory of planned behaviour-based intervention designed to also improve knowledge, as well as attitudes, subjective norms, and perceived behavioural control. This intervention was effective in improving food hygiene behaviour in young adults, and therefore applying models such as the theory of planned behaviour to food hygiene may create more effective interventions. In working towards such food hygiene interventions, food knowledge could form a basis that is then built upon by theoretically driven interventions.

Limitations of the current study must be considered. Actual food hygiene behaviours were not measured, and therefore it cannot be assumed, even with low knowledge scores, that the current sample had poor food hygiene. However, previous research has suggested that knowledge may be necessary (albeit not sufficient) for behaviour (Kothe and Mullan, 2011); and the relationship between food knowledge and behaviour warrants further investigation. Second, identifying demographic differences in food knowledge does not offer ways to change knowledge; however identifying both baseline levels of food knowledge, and populations at risk for specified targeting of such interventions, are equally important for this field of research, and suggest that poor knowledge may be a limitation to behavioural implementation, particularly in young males.

Using the results of the current study, tailoring such interventions may help to improve their effectiveness. Empirically rigorous interventions using knowledge and theory-based intervention components, and that are designed for specific at-risk groups (such as young males who live at home) would be very beneficial to this field of research.

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Dr Barbara A. Mullan is a Chartered Health Psychologist with the British Psychological Society and is registered with the Health Professions Council. She has worked in health psychology for more than 15 years and is currently an Associate Professor at the Curtin University, with over 80 peer-reviewed publications. Her research interests include social cognition models in predicting and intervening to improve health, particularly food-related behaviours, physical health and addiction. Dr Barbara A. Mullan is the corresponding author and can be contacted at [barbara.mullan@curtin.edu.au](mailto:barbara.mullan@curtin.edu.au)

Dr Cara Wong is a Post-Doctoral Fellow and currently undertaking a Masters in Clinical Neuropsychology. Her primary research is using non-invasive brain stimulation to investigate and map out the functions of brain regions involved in visual cognition, semantic, and social processing. She previously worked as a Research Assistant with Dr Mullan, where her research linked her interests in neurocognition with health psychology. Her research examined the role of executive function and self-regulation as additional predictors of health behaviours.

Jemma Todd's primary research area is in the application of health models (e.g. Theory of Planned Behaviour, Prototype Willingness Model, Temporal Self-regulation Theory) to predict, explain and improve health behaviours. Her other research interest is the exploration of the psychological mechanisms of chronic pain management, with a particular focus on attentional biases.

Esther Davis is primarily interested in researching supportive care, and psychosocial and quality of life issues in cancer and palliative care. Within these areas she is particularly interested in clinical outcomes associated with existential distress in palliative care as well as patient decision making, doctor-patient communication, communication between the oncology or palliative care team.

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