Food safety makes me happy: Using emotion to improve food safety training

by

Tracee Watkins

B.S., Culinary Arts, 2001
M.B.A., Mississippi State University, 2005

AN ABSTRACT OF A DISSERTATION

submitted in partial fulfillment of the requirements for the degree

DOCTOR OF PHILOSOPHY

Department of Hospitality Management
College of Health and Human Sciences

KANSAS STATE UNIVERSITY
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Abstract

Food safety education continues to be an important tool in the fight against foodborne illness. Using narratives in instruction can be more persuasive compared to traditional analytical delivery methods used in education and training. This research examined the effectiveness of both traditional educational videos, and videos using emotion evoking narrative techniques on food safety behavior outcomes. The extended transportation imagery model was employed as the theoretical basis for investigating the emotional and cognitive antecedents and outcomes of food safety interventions. The theory of planned behavior (TPB) was used as the framework for determining the relationship between emotional and cognitive outcomes of viewing food safety interventions, and measures of attitude, subjective norms, perceived behavioral control, and behavioral intention.

The purpose of this research was to: (a) examine trainee (consumer) narrative involvement through their desire to experience emotion and likelihood to deeply interact with stories; (b) measure effectiveness of food safety videos and the level of emotional response they induce (c) compare emotional responses and training effectiveness of narrative, analytical, and combined interventions; and (d) determine how emotion impacts the TPB constructs. This study crowd sourced survey data from 502 participants. Mixed effect models and generalized estimating equations were used to explore the relationships between the antecedents and outcomes of narrative involvement for a group of 12 food safety videos, and then to investigate the relationship of emotional responses to TPB constructs after viewing narrative, analytical, and combined interventions about a single food safety topic.

For the 12-video set, results indicated transportability and narrative characteristics were positive predictors of narrative involvement. Transportation positively predicted happiness and

cognitive response. Narrative engagement positively predicted disgust, anxiety, fear, and sadness, and negatively predicted relaxation, and happiness. Training effectiveness was positively predicted by fear and happiness, while negatively predicted by disgust and sadness.

For the analytical, narrative, and combined interventions, narrative involvement and cognitive response was higher for the narrative and combined interventions. Discrete emotion responses were lowest in the analytical intervention, and highest in the narrative. Perceived training effectiveness was highest for the combined intervention. Within the TPB framework, the analytical intervention was associated with lower levels of perceived behavioral control and the narrative was associated with higher levels of normative beliefs compared to the combined intervention. Four discrete emotions were found to effect TPB constructs. Anxiety positively predicted normative beliefs. Desire negatively predicted normative beliefs, attitude, and behavioral intention. Anger positively predicted normative beliefs, subjective norms, and perceived behavioral control. Disgust negatively predicted normative beliefs and perceived behavioral control. This study provides evidence for the use of discrete emotions, particularly anger and anxiety, in food safety training.

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Dedication

Ericha, this is for you.

Chapter 1 - Introduction

It is estimated that 31 major foodborne pathogens account for over 9.4 million foodborne illnesses, over 55,000 hospitalizations, and an estimated 1,350 deaths annually in the United States (Scallan et al., 2011; Scallan, Hoekstra et al., 2011). Maintaining food safety in commercial kitchens is a complex task requiring both knowledge and motivation to perform safe food handling. Safety practices, such as cleaning and sanitizing food contact surfaces, handwashing, and thermometer usage are known to reduce foodborne outbreaks (Centers for Disease Control and Prevention [CDC], 2015; U.S. Food and Drug Administration [FDA], 2009).

With slightly over 50% of total food expenditures made away from home, effective food safety education and training for food handlers is vital to public health (U.S. Department of Agriculture [USDA] Economic Research Service, 2017). Increasing food safety knowledge through training and education was previously thought sufficient to alter on-the-job food safety practices. However, knowledge alone has not always improved the food safety practices of food professional handlers (Arendt & Sneed, 2008; Ashraf et al., 2008; Averett et al., 2011; Henroid & Sneed, 2004; Jenkins-McLean et al., 2004; Pilling et al., 2008; Soares, et al., 2013; Viator et al., 2015).

Because improvement in on-the-job food safety behavior is the ultimate measure of food safety education success, improved approaches to translate knowledge into action are warranted. When specifically considering handwashing, the combination of training and social cognitive interventions, such as the health belief model or the theory of planned behavior (TPB), have produced changes in food safety behavior (Soon & Baines, 2012).

The TPB has been applied widely to health behavior, including food safety. The TPB explains the intent to perform a behavior can predict actual behavior. I intent is influenced by a person's attitude, subjective norms, and perceived behavioral control (Ajzen, 1985, 1991, 2002). Therefore, salient beliefs about the target behavior can be used in interventions to increase the intent to perform a desired behavior. Though theoretically successful, TPB-based interventions must be delivered in a way that is sufficiently persuasive to motivate behavior change.

Storytelling is a traditional, multifunctional form of human communication that has been used to share knowledge and experience throughout history (Allan et al., 2002). Stories, also referred to as narratives, describe events to convey messages and generate emotions in the listener (Denning, 2006). While hearing a story, images, sounds, and emotions are evoked, which encourages memory formation (McGaugh, 2013; Parkin, 2010). Storytelling has been found to positively influence classroom learning in higher education (Lordly, 2007) and reduce patient mortality rates in a healthcare setting (Quaid et al., 2010). Recently, storytelling has been used as a novel pedagogy in food safety education, utilizing videos describing a food safety crisis as experienced through the viewpoints of foodservice personnel (Roberts et al., 2018).

Narratives, even if fictional, evoke emotions and have wide ranging cognitive effects, such as impacting memory, decision making, perception, and other processes (Ledoux, 2002; Zadra & Clore, 2011). Emotion benefits decision making by providing a framework for experiences, creating the ability to assign value to these experiences (Levine, 2017; Peters, 2006; Walsh et al., 2017). Emotion is thought to be a vital and necessary part of sound decision making; despite two popular misconceptions that the rational and emotional minds exist in constant conflict, and that emotional responses are always inferior to rational assessment (Levine, 2017).

Levine (2013) summarizes the interaction between emotion and reason rather simply, emotion allows the establishment of objectives and ambition, and reason illuminates how to proceed from ambition to attainment. Thus, knowledge-only food safety training provides partial motivation to change behavior. Knowledge training instructs how to change but does not assign value to why the change is needed. Evoking emotion during knowledge-based training could result in increased adoption of food safety behaviors (Levine, 2013).

As suggested by the extended transportation imagery model, characteristics of both the narrative and the consumer affect narrative interaction. Story consumers that express emotions more strongly, and exhibit the stable trait of transportability, are more likely to be transported into and persuaded by stories. Research comparing the effectiveness of written narratives and rhetorical arguments in cervical cancer health appeals supports the positive relationship between affect, transportability, and transportation (Thompson & Haddock, 2012). Characteristics of stories are also known to influence persuasion. In advertising research, stories possessing more narrative characteristics have been shown to be more successful at producing upbeat emotional responses (Escalas et al., 2004). Stories that are found to be more transporting generate greater emotional responses in consumers, and narrative storytelling techniques generate more emotions than analytical techniques (Chang, 2009; Escalas et al., 2004; Van Laer et al., 2013).

Research supports combining different methods of persuasion to enhance message effectiveness. And that in some cases, overall persuasiveness is the cumulative result of the message components (Kim et al., 2012). For example, in research on persuasive messages involving fear, inclusion of more individual persuasive elements increased the effectiveness of the fear message incrementally (Witte & Allen, 2000). If similar findings hold for food safety

education applications, combining analytical and narrative videos should be more effective than either analytical or narrative alone.

Emotion is believed to influence the TPB in multiple ways; food safety education that combines analytical and narrative videos could produce different measures of behavioral beliefs, attitudes, or behavioral intent than programs employing analytical or narrative videos alone. Emotion enters the TPB directly as a behavioral belief affecting attitude, or as a background factor influencing behavioral, normative and control beliefs, and potentially subjective norms and perceived behavioral control, through positive and negative moods (Ajzen, 2011a, 2011b). Moods, which are dependent on emotions, change the salient behavioral, normative and control beliefs most easily recalled from memory. For example, people in negative moods have been shown to produce more unfavorable beliefs about smoking than people in positive moods (McKee et al., 2003). Positive moods have been shown to produce more positive evaluations of behaviors and outcomes than negative moods, which then indirectly influences intention and behavior (Ajzen, 2011b).

Statement of Problem

Despite current training efforts, failure to perform food safety behaviors remains a concern for food handlers. Though traditional analytical training has been shown to increase food safety knowledge, it is not as effective in fostering changes in behavior known to reduce foodborne illness. Using narratives that evoke emotion in combination with more traditional forms of training may be an effective method to encourage food safety behavior change. Consequently, accurately measuring emotions during training becomes important. Affect analysis has been used in many fields, including food science, to evaluate food safety and food quality concerns (Walsh et al., 2017). However, it has not been used to evaluate food safety

educational materials, or the relationship of emotional response to social cognitive models, such as the TPB, that form the theoretical basis for many behavior change interventions. This study will use self-report measures of discrete emotions to quantify food handler emotional responses to food safety educational materials, and how emotion evoking videos employing storytelling or narrative characteristics may change intent to perform safe food handling behaviors.

Purpose & Objectives

The purpose of this study was to determine how emotional responses to videos used during food safety education influence the intent to change food safety behavior. Specific objectives of this study included:

1. Determine how need for affect and transportability effect narrative involvement by measuring consumer transportation and narrative engagement.

2. Determine how narrative characteristics effect narrative involvement by measuring consumer transportation and narrative engagement.

3. Determine how emotional outcomes vary with transportation and narrative engagement by measuring the discrete emotions experienced.

4. Determine how cognitive outcomes vary with transportation and narrative engagement by measuring cognitive response.

5. Determine how perceived effectiveness varies with cognitive and emotional responses by measuring perceived training effectiveness.

6. Examine how narrative modality, e.g., narrative, analytical, or a combination of narrative and analytical, influences narrative involvement, emotional, cognitive, and perceived effectiveness outcomes.

7. Determine if combining narrative and analytical modalities increases beliefs associated with intention to perform food safety behaviors within the TPB framework over analytical or narrative modalities alone.

8. Determine if relationships exist between emotional response outcomes and TPB constructs.

Hypotheses

This study proposed several hypotheses, seven surrounding the relationship of narrative involvement antecedents and outcomes: four regarding the effectiveness of combining analytical training videos with persuasive narratives on narrative involvement and its outcomes, and ten surrounding the effects of combining analytical training videos with persuasive narratives on measures of emotion and constructs in the TPB. The following hypothesized relationships were used to address the proposed research objectives.

Transportability, need for affect, and narrative characteristics affect narrative involvement. The emotional and cognitive outcomes of narrative involvement affect the perceived effectiveness of the videos. Therefore, the following hypothesis will be tested (Figure 1.1):

H_1: Consumer need for affect has a positive effect on narrative involvement.

H_2: Transportability has a positive effect on narrative involvement.

H_3: Story narrative characteristics has a positive effect on narrative involvement.

H_4: Narrative involvement has a positive effect on self-reported discrete emotions.

H_5: Narrative involvement has a positive effect on cognitive response.

H_6: As emotional response increases, perceived training effectiveness increases.

H_7: As cognitive response increases, perceived training effectiveness increases.
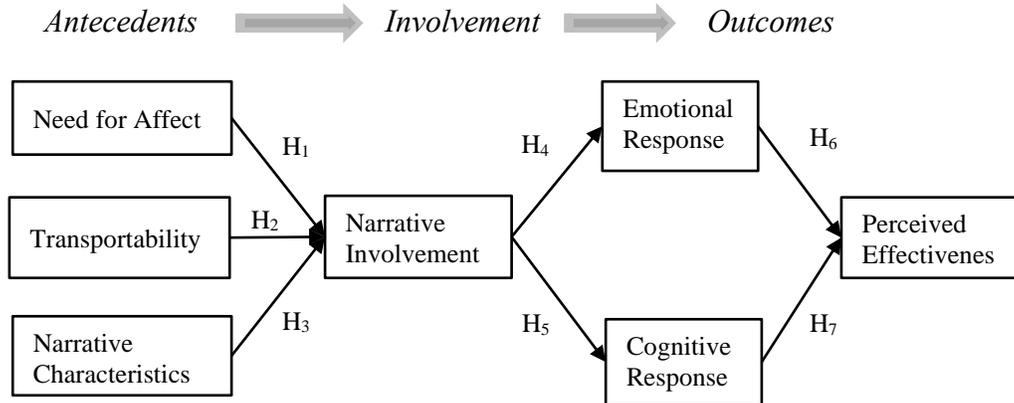
Figure 1.1 Hypotheses One Through Seven

Combining narrative modalities (e.g., narrative and analytical), may affect narrative involvement, emotional responses, cognitive responses, and perceived effectiveness. When narrative and analytical videos are used together, they alter levels of narrative involvement and its outcomes over analytical or narrative video modalities. Therefore, the following hypothesis will be tested (Figure 1.2):

H_8: The levels of narrative involvement of combined modalities increases over single modalities.

H_9: Emotional response of combined modality increases over single modalities.

H_{10}: Cognitive response of combined modalities increases over single modalities.

H_{11}: The perceived training effectiveness of combined modalities increases over single
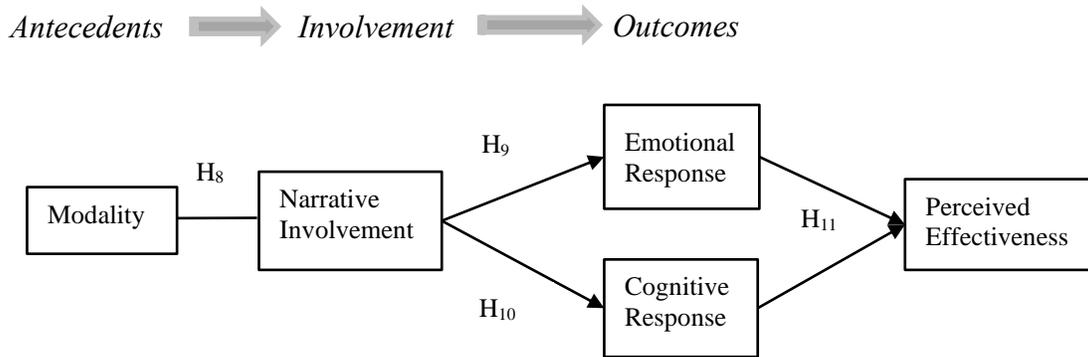
modalities.

Figure 1.2 Hypothesis Eight Through Eleven

When combined narrative and analytical video modalities are compared to single

modalities, combined modalities may affect TPB constructs differently. Similarly, increased

emotion may result in differences in TPB constructs. Therefore, the following hypothesis are

proposed (Figure 1.3):

H_{12}: Combined modality increases behavioral beliefs over single modalities.

H_{13}: Combined modality increases attitudes over single modalities.

H_{14}: Combined modality increases behavioral intention over single modalities.

H_{15}: Combined modality has no effect on normative or control beliefs.

H_{16}: Combined modality has no effect on subjective norms or perceived behavioral control.

H_{17}: Emotional response has a positive effect on behavioral beliefs.

H_{18}: Emotional response has a positive effect on attitudes.

H_{19}: Emotional response has a positive effect on behavioral intention.

H_{20}: Emotional response has no affect on normative or control beliefs.

H_{21}: Emotional response has no affect on subjective norms or perceived behavioral control.
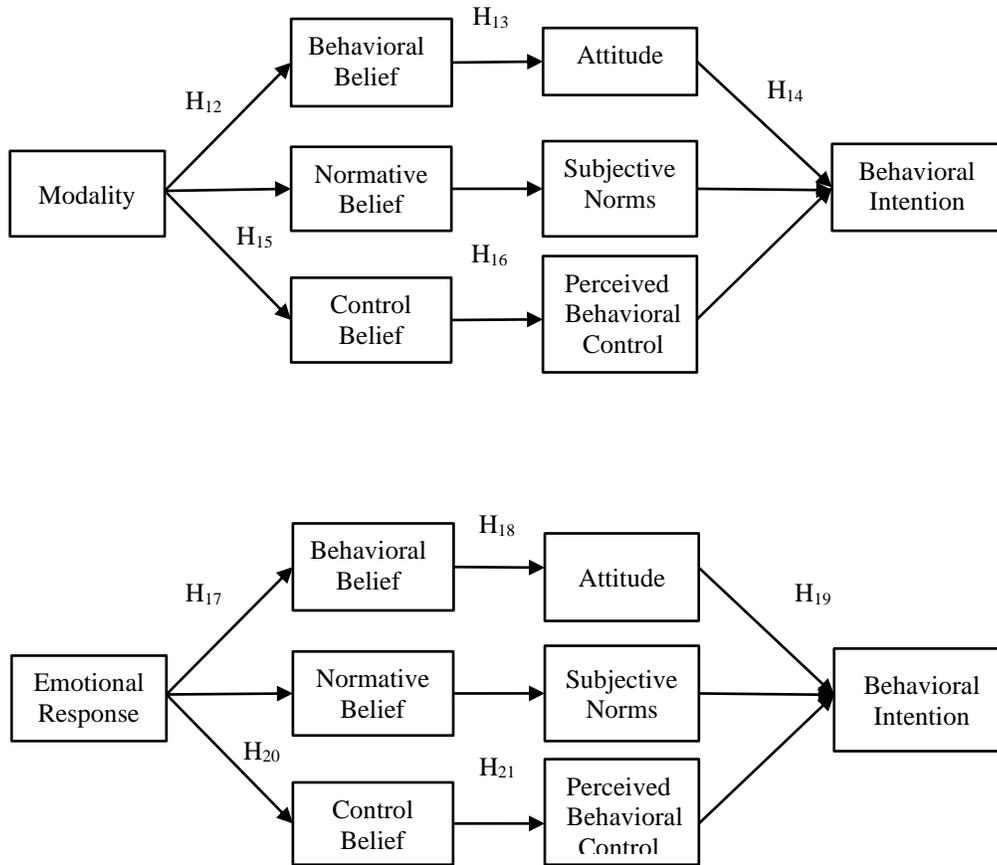
Figure 1.3 Hypotheses Twelve Through Twenty-One

Justification

The importance of storytelling in education, training, and marketing is becoming increasingly realized, and studying emotion directly will expand knowledge of what makes a successful food safety training story. Affect analysis has not been widely used in food safety intervention studies, and it is expected this research will support the utility of using emotion in designing educational interventions in the future. Studies could target specific emotions (anger,

disgust, etc.) in training to determine the effectiveness of the intervention in both inducing the emotions and determining their effectiveness in encouraging behavior change.

This study provided information about how emotions relate to the TPB. Emotions are implied in the theory and showing how emotional responses relate to behavioral beliefs and attitudes could improve interventions based on these beliefs. Once the emotional responses to a training intervention are known, and how they relate to TPB constructs, it is possible that emotional responses could be used to predict constructs such as behavioral intent. If emotional responses known to be associated with specific TPB characteristics could be identified they could be used to provide insight into how effective the training may be for the individual. For example, if fear is determined to be an emotional response to a training narrative that is associated with high behavioral intention, it may be possible to use a self-report of the emotion as a proxy for behavioral intention levels. Further, it is possible individuals who are very unlikely to intend to adopt a behavioral change could be identified by their emotional response. If identified, these individuals could be provided additional education, or be eliminated from the food production environment.

Definition of Key Terms

Affect: The experience of feelings and emotions in response to stimuli (Diener, 1999).

Affect analysis: Detailed examination of the elements of emotion or desire, especially as influencing behavior or action (Pantic, 2009).

Approach motivation: Actions, emotions, and cognitions created by the desire to achieve a favorable result (Wimmer et al., 2018).

Attitude: The combination of strength of each belief and the evaluation of the outcome of the behavior (Ajzen, 1985). Attitude, whether positive or negative, is a learned, somewhat stable, response tendency that is a powerful influencer of behavior (Dainton & Zelley, 2017).

Avoidance motivation: Actions, emotions, and cognitions created by the desire to avoid an unfavorable result (Wimmer et al., 2018).

Behavioral beliefs: Beliefs that a behavior generates a certain consequence; behavioral beliefs determine attitude toward the behavior (Ajzen, 1985).

Contributing factors: Risk factors that either enable an outbreak to occur or amplify an outbreak caused by other means. Contributing factors are classified into three categories: contamination factors proliferation/amplification factors and survival factors (CDC, 2017).

Control beliefs: Beliefs of the existence of barriers and facilitators that impact the performance of a behavior. These beliefs are linked to one's perceived behavioral control (Ajzen, 1985).

Direct measures of beliefs: Antecedents of behavioral intention including attitude, subjective norm, and perceived behavioral control (Ajzen, 1985).

Elicitation study: Qualitative study conducted among a subset of a population to explore salient behavioral, normative, and control beliefs about a behavior (Ajzen, 2011a).

Emotion: Complex, conscious, biologically driven process characterized by mental activity combined with pleasure or displeasure. Basic human emotions as classified by Ekman are anger, disgust, fear, happiness, sadness, contempt, and surprise (Ekman & Cordaro, 2011).

Feeling: A conscious, subjective experience of emotion ("Feeling," n.d.).

Intention: A likelihood to perform a behavior. The immediate antecedent to actual behavior (Ajzen, 1985).

Narrative: A story consumer's consumption of a story (Van Laer et al., 2013).

Narrative engagement: The ongoing mental process of experiencing a persuasive narrative. Narrative engagement consists of four dimensions: narrative presence, narrative understanding, attentional focus, and emotional engagement. Narrative engagement results in intense cognitive focus that is theorized to be experienced as transportation (Busselle & Bilandzic, 2008).

Narrative involvement: Processes occurring when one's cognition is focused on constructing the necessary metal models to make sense of a narrative. Due to their differential effects on affective and cognitive outcomes in narrative persuasion, narrative involvement is operationalized as both the process of narrative engagement and the phenomenological state of transportation (Johnson & Sangalang, 2017).

Narrative persuasion: The use of stories as a persuasion tool (Van Laer et al., 2013)

Need for affect: A person's willingness to interact with emotion inducing situations (Maio & Esses, 2001).

Normative beliefs: A belief that important individuals or groups have expectations for the performance of a behavior. An indirect measure of subjective norms (Ajzen, 1985).

Perceived behavioral controls: A perceived ability to perform a behavior (Ajzen, 1985).

Perceived effectiveness: Assessment of the degree to which the persuasive potential of a message will be favorably evaluated by recipients of that message (Dillard et al., 2007).

Proper cleaning and sanitizing of food contact surfaces: Not allowing raw food to come into contact with ready-to-eat foods, cleaning and/or sanitizing all food contact surfaces between each use, and cleaning and sanitizing all food contact surfaces when switching from one food preparation task to another (FDA, 2017) .

Proper handwashing: Washing hands with soap and hot water for 20 seconds; drying with an air dryer or single-use paper towel, washing hands before work, washing hands before putting on

gloves, washing hands when food preparation tasks are interrupted or changed, and washing hands whenever they come in contact with something that might have germs (FDA, 2017)

Salient beliefs: Behavioral, normative, and control beliefs determining attitudes toward a behavior, subjective norm, and perceived behavioral control, respectively (Ajzen, 1985) .

Story: A storyteller's account of an event or a sequence of events leading to a transition from an initial state to a later state or outcome (Van Laer et al., 2013) **.**

SEEKING system: Control system located in the brain that is activated as the basic biological drive to seek resources (Wright & Panksepp, 2012). The term SEEKING, along with the designations of six other emotional control systems, is capitalized by convention of the affective neuroscientist Jaak Panksepp to differentiate these brain systems from common emotion labels. For example, activity of the SEEKING brain system may be described by the emotional terms desire or expectancy.

Theory of Planned Behavior (TPB): A human behavioral theory linking beliefs and behavior, stating attitudes, subjective norms, and perceived behavioral control determine behavioral intent and behavior (Ajzen, 1985).

Transportation: The story consumer's experience of being carried away by the story (Green & Brock, 2000).

Using a thermometer to check the temperature of food: using a thermometer to check the temperature of food at the completion of cooking, at the completion of reheating, to ensure that food stored on the hot line was at least 135°F, and to ensure that food stored on the cold line was at 41°F or less (FDA, 2017).

Chapter 2 - Review of Literature

Burden of Foodborne Illness

Foodborne illness has a substantial public health, economic, and quality of life burden. Scallan, Hoekstra et al. (2011) estimated 31 major foodborne pathogens account for over 9.4 million foodborne illnesses, 55,000 hospitalizations, and an estimated 1,300 deaths annually in the United States. Fourteen of these 31 foodborne pathogens (Table 2.1) cause an annual loss of over $14 billion and 61,000 quality-adjusted life years. Most (90%) of the financial and quality-adjusted life year losses are caused by five pathogens: nontyphoidal *Salmonella*, *Toxoplasma gondii, Listeria monocytogenes,* norovirus, and *Campylobacter* spp. (Hoffmann et al., 2012). Though these numbers are substantial, they do not represent the entire burden of foodborne illness. In addition to the major foodborne pathogens, unspecified agents are estimated to cause an additional 38 million illnesses, 79,000 hospitalizations, and 1,700 deaths, for a total of 48 million illnesses and 3,000 foodborne deaths annually (Scallan, Hoekstra et al., 2011; Scallan, Griffin et al., 2011).

Attribution of Foodborne Illness to Foods

Because effective interventions require an understanding of the pathogen-food relationship at all points on the farm-to-fork continuum, foodborne illness prevention can be complicated and expensive (Batz et al., 2005). Attributing illness to a specific food is vital to this task and may be problematic if illness is not associated with an outbreak. For example, though estimated to cause over 25% of foodborne illness related deaths annually, astrovirus, *Mycobacterium bovis*, *Toxoplasma gondii*, and *Vibrio vulnificus* have been difficult to associate

Table 2.1 Burden of Foodborne Illness

	Illnesses	Hospitalizations	Pathogen Rank Deaths	Cost of Illness[1]	QALY[2] Loss
1	Norovirus (5,461,731)	*Salmonella* nontyphoidal (19,336)	*Salmonella* nontyphoidal (378)	*Salmonella* nontyphoidal (3,309.3)	*Salmonella* nontyphoidal (16,782)
2	*Salmonella* nontyphoidal (1,027,561)	Norovirus (14,663)	*Toxoplasma gondii* (327)	*Toxoplasma gondii* (2,973.3)	*Campylobacter* spp. (13,256)
3	*Clostridium perfringens* (965,958)	*Campylobacter* spp. (8,463)	*Listeria monocytogenes* (255)	*Listeria monocytogenes* (2,577)	*Toxoplasma gondii* (10,964)
4	*Campylobacter* spp. (845,024)	*Toxoplasma gondii* (4,428)	Norovirus (149)	Norovirus (2,002.1)	*Listeria monocytogenes* (9,375)
5	*Staphylococcus aureus* (241,148)	STEC O157 (2,138)	*Campylobacter* spp. (76)	*Campylobacter* spp. (1,747)	Norovirus (5,027)
6	*Shigella* spp. (131,254)	*Shigella* spp. (1,456)	*Vibrio vulnificus* (36)	*Clostridium perfringens* (309.4)	STEC O157 (1,660)
7	STEC non-O157 (112,752)	*Listeria monocytogenes* (1,455)	*Yersinia enterocolitica* (29)	*Vibrio vulnificus* (291)	*Yersinia enterocolitica* (1,415)
8	*Yersinia enterocolitica* (97,656)	*Staphylococcus aureus* (1,064)	*Clostridium perfringens* (26)	STEC O157 (254.8)	*Clostridium perfringens* (875)
9	*Toxoplasma gondii* (86,686)	*Yersinia enterocolitica* (533)	STEC O157 (20)	*Yersinia enterocolitica* (252)	*Vibrio vulnificus* (557)
10	*Giardia intestinalis* (76,840)	*Clostridium perfringens* (438)	*Shigella* spp. (10)	*Shigella* spp. (120.9)	*Shigella* spp. (545)
11	*Bacillus cereus* (63,400)	Rotavirus (348)	*Clostridium botulinum* (9)	*Vibrio* spp., other (107)	*Cryptosporidium* spp. (341)
12	STEC O157 (63,153)	STEC non-O157 (271)	*Vibrio* spp., other (8)	*Cryptosporidium* spp. (46.6)	*Vibrio* spp., other (210)
13	*Cryptosporidium spp.* *(57,616)*	*Giardia intestinalis* (225)	Hepatitis A virus (7)	STEC non-O157 (23.9)	STEC non-O157 (153)
14	*Vibrio parahaemolyticus* (34,664)	*Cryptosporidium* spp. (210)	*Staphylococcus aureus* (6)	*Cyclospora cayetanensis* (2)	*Cyclospora cayetanensis* (10)

Notes. Adapted from Hoffman et al, (2012)
[1]Cost of illness in millions $2009 U.S.
[2]Quality Adjusted Life Years

with specific foods because they tend to cause sporadic illness (Painter et al., 2013; Scallan, Griffin et al., 2011). From 1998 through 2008 produce (22.9%) and poultry (19.1%) resulted in the highest percentages of outbreak-related deaths. Similarly, from 1998 through 2008, approximately 46% of illnesses were attributed to produce (Painter et al., 2013). When considering foods, these estimates suggest risk-based food safety interventions should focus on produce and poultry (Table 2.2).

Table 2.2 Outbreak Associated Foodborne Illness by Food Category 1998-2008

Food Category	Illness	(%)	Hospitalizations	(%)	Deaths	(%)
Land Animals	4,021,839	(41.7)	26,118	(45.5)	629	(43.3)
Dairy, Eggs	1,904,396	(19.8)	13,346	(23.3)	211	(14.6)
Poultry	943,185	(9.8)	6,634	(11.5)	278	(19.1)
Meat	1,174,257	(12.2)	6,138	(10.7)	140	(9.7)
Plants	4,924877	(51.1)	23,506	(40.9)	363	(25)
Produce	4,423,310	(45.9)	21,885	(38.1)	333	(22.9)
Other Plant	501,567	(5.2)	1,621	(2.8)	30	(2.1)
Aquatic Animals	589,310	(6.1)	3,199	(5.6)	94	(6.4)
Fish	258,314	(2.7)	1,661	(2.9)	71	(4.9)
Shellfish	330,997	(3.4)	1,538	(2.7)	23	(1.6)
Undetermined	102,275	(1.1)	4,639	(8.1)	366	(25.2)
Total	9,638,301	(100)	57,462	(100)	1451	(100)

Note: Adapted from Painter et al. (2013)

Contributing Factors to Foodborne Illness and Outbreaks

Information on additional factors contributing to outbreaks is critical to understanding and preventing foodborne illness (Brown et al, 2017). The CDC has identified 32 contributing factors and grouped them according to how they influence a foodborne illness outbreak (Bryan et al., 1997; CDC, 2014). There are three categories of factors that permit and augment an outbreak: conditions that contribute to pathogen contamination of food, conditions that contribute to pathogen and toxin proliferation in food, and conditions that allow pathogen

survival after a reduction or elimination procedure. Contributing factors are only reported for about 65% of outbreaks (Brown et al., 2017).

Based originally on the 1997 Food Code, the FDA distinguishes 42 food safety practices in five risk factor categories as important measures of retail food protection system effectiveness (FDA, 2009, 2010, 2017, 2018). Risk categories include food from unsafe sources, inadequate cooking, improper holding temperatures, contaminated equipment, and poor personal hygiene. Within these risk categories, improper holding temperatures, poor personal hygiene, and contaminated equipment consistently contribute to foodborne illnesses, and are considered problem areas that remain in need of priority attention. Within these priority areas, the food safety practices most often out of compliance with the food code are proper and adequate handwashing, cleaning and sanitizing of food contact surfaces, and cold holding of time temperature control for safety foods. In the 2018 Food and Drug Administration report on risk factor occurrence in restaurants, cold holding of refrigerated foods and employee handwashing were the two primary practices most commonly out of compliance with food safety standards (FDA, 2018).

Food safety professionals can use contributing factor and risk factor data to recognize illness-increasing practices and develop interventions to reduce or eliminate them. For example an analysis of norovirus outbreaks conducted by the CDC identified bare-hand contact with ready-to-eat foods by infected food handlers as a major contamination contributing factor, and has led to the recognition that behavioral interventions focused on food handlers are the primary means to prevent foodborne norovirus illness (Brown et al., 2017; Hall et al., 2014).

Food Safety Training and Education

With 50% of food expenditures made outside of the home, food safety education and training for food-handlers is vital to public health (USDA Economic Research Service, 2017). The study of food safety education interventions is varied, with goals ranging from changing personal hygiene behaviors, altering the built environment, changing management behaviors, pathogen reduction, to increasing knowledge (Viator et al., 2015).

Though food safety education programs are available and supported by regulation, the overall incidence of foodborne disease has not significantly decreased. (Gould et al., 2013). Critics of food safety education have suggested there is not adequate evidence to support the efficacy of education in improving food safety practices. Egan et al. (2007) reviewed 46 studies, and found that overall, comparison between studies was difficult due to reported differences in methods and measures. However, nine of 29 studies reported significant improvement in knowledge after a food safety intervention. In studies of attitude, behavior and work practices, expressions of positive attitude about food safety, did not agree with self-reported practices. Additionally, studies found that self-reported behavior did not match observed behavior. The authors concluded that evidence for the effectiveness of food safety education was limited by study quality, the usefulness of direct observations of safety behaviors, and the effects of organizational and individual factors on food safety education. However, training of managers in food safety was identified to be effective (Egan et al., 2007).

To guide the development of a stronger evidence-base for food safety education interventions, Viator et al. (2015) sought to evaluate the quality of published studies in a systematic review of 23 behavioral and environmental food safety intervention studies. Study quality was measured by scoring of 0 or 1 on nine quality criteria. Values ranged from 0 to 6.0,

M = 4.23, *SD* = 1.86. Only three of the studies were found to be grounded in a behavioral theory. Twenty of the studies reported some level of improvement in either food safety knowledge, attitudes, or behaviors. Similar to Egan et al, Viator et al. concluded that more rigorous studies were needed to provide evidence-based guidance to determine which educational programs were most effective (Viator et al., 2015). Additional studies have investigated the usefulness of posters, food safety info sheets, videos, interactive media, and hands-on activities as adjuncts to knowledge-based training. Positive changes in knowledge, attitude, and behavior are reported, but fewer studies examine the comparative effectiveness of educational methodologies (Medeiros et al., 2011).

In a systematic review of food safety training methods, Medeiros et al. (2011) studied the food safety training practices in published papers retrieved in digital databases between January 2004 and April 2009. Articles were selected for inclusion based on whether they were performed in a foodservice environment, provided a training course, and were full text article written in English, Portuguese, Spanish, or Italian. Fourteen out of 559 articles were included. All studies included in the review used more than one method for training. Audiovisual resources were used in 10 studies, the most common of which were videos (n = 5), and posters (n = 4). Half of the training programs presented lectures, and of these, four also used reading materials, booklets, and leaflets. Topics most frequently presented in training were personal hygiene, food safety, best practices, hazard analysis and critical control points, workplace hygiene, handwashing, and basic microbiology. Knowledge acquired was assessed through pre- and post-training questionnaires. Attitudes, behaviors, and practices were assessed in 11 studies using questionnaires and checklists. The most successful studies combined multiple methods

such as lectures, videos, posters, reading, writing and hands on-training. Few studies (n = 4)

employed a theoretical model to guide the training program (Medeiros et al., 2011).

Soon and Bains (2012) performed a meta-analysis on the effects of hand hygiene training

on food handler knowledge and attitudes. Fourteen studies were included in the analysis based

on definitions of training interventions, and the application of evaluations of hand hygiene

knowledge, attitudes, or behavioral changes. The effect of training intervention on hand hygiene

knowledge was examined in nine studies, and the intervention effect was strongly higher than

control, g = 1.284, 95% CI [0.830, 1.738]. The effect of training interventions on hand hygiene

attitudes and practices also favored interventions, g = 0.683, 95% CI [0.523, 0.843]. Further, the

effects of combining social-behavioral interventions with standard training on hand hygiene

attitudes was investigated in two study indexes of three publications. In the first study index, the

effects of standard training, managerial support, and financial incentives on attitudes all favored

interventions over control. The combination of all three interventions provided the largest effect

size, g = 1.064, 95% CI [0.779, 1.350]. The second study, which investigated standard training

and social cognitive model-based intervention on attitudes, yielded similar results. Standard

training and social cognitive based interventions were favored over control, with, the

combination of both interventions providing the largest effect size, g = 0.825, 95% CI [0.496,

1.155].

Despite lingering questions about the benefits of food safety education, it is known that

when performed correctly, employee food safety behaviors such as handwashing, thermometer

usage, and cleaning and sanitizing of food contact surfaces, reduce foodborne illness outbreaks

(CDC, 2014, 2015, 2017; FDA, 2009). Different interventions have been investigated to

improve these practices, and successful long-term behavior change is thought to depend on

multiple motivational prompts appropriate for the demographics, turnover rate, and cost constraints of the foodservice industry (Pellegrino et al., 2015; World Health Organization, 2000).

The Theory of Planned Behavior

The TPB has been applied widely to health behavior problems, including food safety. The TPB was proposed as an improvement on the theory of reasoned action, in that it included volitional control as a way to address circumstances that may limit the performance of a behavior. The TPB states that behavioral intention is the best predictor of actual behavior and person's behavioral intention is influenced by three antecedents: attitude, subjective norms, and perceived behavioral control (Ajzen, 1985, 1991, 2002). These antecedents are measured both indirectly and directly, with behavioral belief and outcome intention, normative belief and motivation to comply, control belief and perceived power as indirect measures of attitude, subjective norms, and perceived behavioral control, respectively (Ajzen, 1985, 1991, 2002). Behaviors, behavioral intention, attitude, subjective norms, and perceived behavioral control are also measured directly. The components of the TPB and their relationships may be seen in Figure2.1, and a more in-depth discussion of their meanings follows.
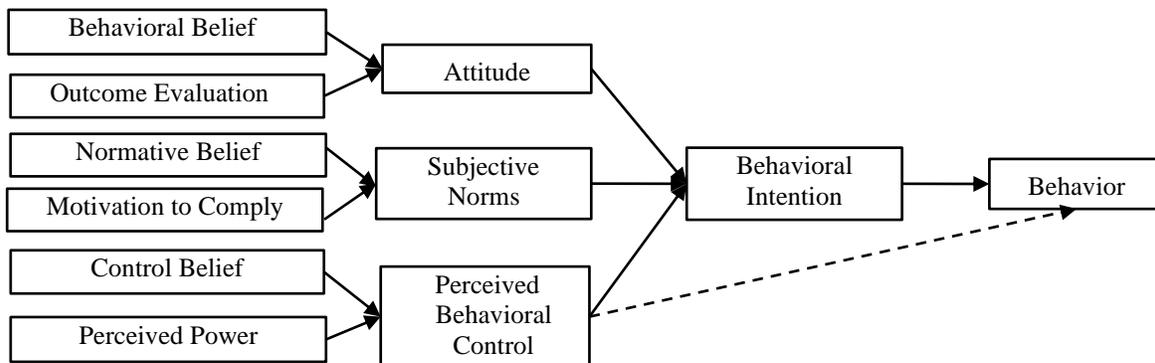
Figure 2.1 The Theory of Planned Behavior
Note: Adapted from Ajzen (1991)

Behavioral Belief and Attitude

Attitude is the degree to which a person has a positive or negative opinion of the behavior. Attitude is measured in the TPB by assessing a person's view that a behavior leads to an expected outcome. If a person has a positive attitude about a behavior, they will be more likely to partake in the behavior compared to one who has a negative attitude about the behavior. A person's attitude forms as a result of considering both the likelihood and consequences of a given behavior in combination. In the TPB model, each indirect behavioral belief is weighted by its corresponding outcome evaluation, and the resulting sum quantifies attitude. Salient beliefs may vary from person to person, and by the behavior itself, and only the beliefs that are salient to a person contribute to their attitude. Therefore, if the weight of the assessment differs for the same belief, two different people could hold different attitudes (Ajzen, 1985). Attitude can be represented by the following equation:

$$\textit{Attitude (A)} = \sum_i bb_i be_i$$
$$\textit{Behavioral belief} = (bb_i)$$
$$\textit{Outcome evaluation} = (be_i)$$

Normative Beliefs and Subjective Norm

The subjective norm is an individual's estimate of the total pressure and motivation to perform a behavior. Subjective norm is based on consideration of other important people's beliefs about participating in the behavior, in combination with the value of complying with the opinions of these important others. Each normative belief is weighted by its corresponding motivation to comply. The resulting sum of these products quantifies the person's subjective norm related to the behavior (Ajzen, 1985). Subjective norms can be represented by the following equation:

$$Subjective\ norms\ (SN) = \textstyle\sum_i nb_i mc_i$$
$$Normative\ beliefs = (nb_i)$$
$$Motivation\ to\ comply\ with\ beliefs = (mc_i)$$

Control Beliefs and Perceived Behavioral Control

Perceived behavioral control is a person's view of perceived and actual ability to perform a behavior. Perceived behavioral control affects both behavioral intention and behavior directly, because participation in a behavior depends on the belief that one has the control and power to do so.

If control and power are thought to be lacking, the behavior will not be performed, no matter the level of behavioral intent. Like attitude and subjective norm, perceived behavioral control indirect measures are a function of beliefs and their respective weights. Perceived behavioral control forms when a person considers conditions that make the behavior more or less difficult, in combination with perceived ability to perform the behavior (Ajzen, 1985). Perceived behavioral control may be represented by the following equation:

$$Perceived\ behavioral\ control\ (PCB) = \textstyle\sum_i cb_i pp_i$$
$$Control\ beliefs = (cb_i)$$
$$Perceived\ power = (pp_i).$$

Behavioral Intention and Behavior

Attitude, subjective norms, and perceived behavioral control all influence behavioral intent. The TPB represents behavior as the weighted sums of the salient beliefs about the behavior, and these beliefs influence behavior through behavioral intent. The control component of the TPB influences behavioral intentions as well as behavior directly because a person may or may not actually have control over performing a specific behavior (Ajzen, 1985). Behavioral intention may be represented by the following relationship:

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Behavioral Intention (BI) = Attitude (A) + Subjective Norms (SN) + Perceived Behavioral Control (PBC)

Application of TPB to Food Safety

Once relevant behavioral, normative, and control beliefs about the target behavior have been determined, the TPB can increase the intent to perform a desired behavior by designing interventions addressing attitudes, subjective norms, or perceived behavioral controls. TPB-based interventions, when combined with formal education, have been shown to significantly improve food safety behavior over education alone (York et al., 2009). The TPB has been used to investigate food safety behaviors of different food handlers, with studies on consumers, farm workers, foodservice managers, and professional food handlers found in the literature.

Mullan and Wong (2009) examined the utility of the TPB to predict consumer hygienic food handling behaviors. In a study of first year psychology students (n=109), two questionnaires spaced four weeks apart were completed to examine past and current food safety behavior. Two hierarchical regression analysis were conducted. The first analysis determined if attitude, subjective norms, perceived behavioral control, and past behavior were predictive of intention. The TPB found to predict 64% of the variance in intention to prepare food hygienically, $R^2 = .64$, $F_{(3,105)} = 69.03$, $p < 0.05$. Subjective norm, $\beta = 0.22$, $p < 0.05$; and perceived behavioral control, $\beta = 0.59$, $p < 0.01$ significantly predicted intention. Adding past behavior to the TPB predicted 69% of the variance in intention to prepare food hygienically, $R^2 = 0.69$, $F_{(4,104)} = 58.64$, $p < 0.01$. Subjective norm, $\beta = 0.22$, $p < 0.05$; perceived behavioral control, $\beta = 0.51$, $p < 0.01$; and past behavior, $\beta = 0.20$, $p < 0.01$, were significant predictors of intention (Mullan & Wong, 2009).

The second analysis determined if intention, perceived behavioral control, and past behavior predicted behavior at four weeks post-intervention. Intention and perceived behavioral control accounted for 21% of variation, $R^2 = .21$, $F_{(2,106)} = 14.22$, $p < 0.01$; with intention, $\beta = 0.42$, $p < 0.01$, found to be the only significant predictor of behavior. When past behavior was added to the analysis, 39% of variation was accounted for, $R^2 = 0.39$, $F_{(3,105)} = 24.17$, $p < 0.01$. Past behavior accounted for an additional 19% of the variance. However, if past behavior, $\beta = 0.53$, $p < 0.01$, was included in the model, intention lost significance (Mullan & Wong, 2009).

Further, in a randomized controlled pilot study of consumer participants (n = 45), Milton and Mullan (2012) studied the utility of the TPB to predict consumer hygienic food handling behavioral intention and behaviors pre- and post-participation in a food safety intervention. Participants baseline food safety behaviors were observed during a cooking task, and participants were randomly assigned to mere measurement, control, and intervention groups. Control and intervention groups then completed a demographics and TPB measure, and the mere measurement group completed only the demographic measure. Next, participants in the intervention group completed a TPB based food safety intervention, while the control and mere measurement groups completed a distractor task. Four weeks later, all participants were observed in the same cooking task and completed a TPB post-test. Two hierarchical regression analysis were used to examine the predictive capacity of attitude, subjective norms, perceived behavioral control on intent to perform hygienic food handling behaviors. Paired sample t-tests were performed to determine the effect of the intervention on each component of the TPB. In the first regression analysis, attitude, subjective norm, and perceived behavioral control predicted 26% of the variance in intentions, $R^2 = 0.26$, $F_{(3, 41)} = 3.09$, $p < 0.05$; with perceived behavioral control emerging as a significant predictor, $\beta = 0.49$, $p < 0.01$. The intervention led to an

increase in perceived behavioral control, observed safety behaviors, and reported safety behaviors (Milton & Mullan, 2012).

Soon and Bains (2012) used the TPB as a model to develop food safety training for 62 produce workers on six farms, and to investigate their handwashing intentions pre-and post-participation in a food safety intervention combining lecture with slides, educational booklets, a video, and hand hygiene demonstrations. The training produced significant increases in food safety knowledge. A t-test of knowledge gained after intervention was significant, $t(41) = -6.95$, $p < 0.001$ with a large effect size, $d =1.07$. Additionally, the TPB explained 57% of variance in handwashing intentions, $R^2=0.57$, $F_{(3, 58)}= 27.72$, $p < 0.001$. Only behavioral control was found to be a significant predictor of intention, $\beta = 0.77$, $p < 0.001$ (Soon & Baines, 2012).

Roberts and Barrett (2011) investigated the conditions leading to managerial support of food safety training for food handlers. In their study of 266 restaurant managers, it was determined the TPB was useful in predicting restaurant managers' intentions to offer food safety training to their employees, $R^2 = 0.64$, $F_{(3, 262)} = 139.9$, $p < 0.001$. Intent to offer food safety training was associated with manager's attitudes, $\beta = 0.11$, $p < 0.05$ and subjective norms, $\beta = 0.73$, $p < 0.001$, with subjective norms having the greatest positive effect on intention (Roberts & Barrett, 2011).

Pilling et al. (2008) used the TPB to determine if foodservice employee's performance of food safety practices could be improved by identifying their important beliefs about food safety. Employees (n =190) completed a TPB and knowledge questionnaire about cleaning food contact surfaces, using thermometers, and handwashing. Pilling et al. found that attitude was the only significant predictor for all three behaviors, $\beta = 0.32$, $p < 0.05$, $\beta = 0.53$, $p < 0.001$, and $\beta = 0.50$, $p < 0.001$, respectively. In addition to attitude, hand washing intention was predicted by

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perceived behavioral control, $\beta = 0.37$, $p < 0.01$, cleaning was predicted by subjective norms, $\beta = 0.48$, $p < 0.001$, and thermometer use predicted by subjective norms, $\beta = 0.34$, $p < .001$, and perceived control, $\beta = 0.26$, $p < .01$ (Pilling et al., 2008).

York et al. (2009), conducted a longitudinal study investigating the effectiveness of a traditional ServSafe® (National Restaurant Association Educational Foundation, Chicago, IL) food safety training, and a TPB-based intervention targeting food handler perceived barriers and attitudes toward performing food safety behaviors. Employee safety behaviors were observed at baseline, after ServSafe® training, and again after exposure to the TPB-based intervention which included an incentive program, signs with persuasive messages and reminders to perform the behaviors, and thermometers. It was determined that ServSafe® was effective at improving knowledge in handwashing, $F_{(3, 36)} = 5.06$, $p < 0.05$, but the addition of the TPB based intervention was required to improve handwashing, $F_{(2, 44)} = 6.41$, $p < 0.01$, and overall food safety behavior compliance, $F_{(2, 44)} = 8.42$, $p < 0.001$ (York et al., 2009).

While literature supports attitudes, subjective norms, and perceived behavioral controls as effective targets for TPB-based adjuncts to formal food safety training and education, the interventions must still be delivered in a way that is sufficiently persuasive to motivate behavior change. The acceptance of multimedia demonstrated in the previously discussed food safety training literature suggests the use of stories and other narrative techniques would be useful. Further, Fishbein's integrated model (2008) also referred to as the reasoned action approach to behavior change (Fishbein & Ajzen, 2011) is an extension of the theories of reasoned action and planned behavior, which suggest emotions and exposure to media are environmental factors influencing behavioral constructs. This theoretical framework, along with the knowledge that emotional activation is a frequent outcome of narrative involvement, suggests that emotion-

inducing videos could serve as effective adjuncts to traditional food safety training. The following sections review definitions of emotion and the major theories of emotion genesis and function. Persuasion research acknowledges the importance of affect in cognition, and that emotions may be an important part of belief change. Further explanation of emotion theory, and the multiple functions of emotion is necessary.

Emotion Definitions and Theory

Emotion is a universal but difficult to define concept, and numerous models to describe it have been proposed. There are four features that are useful in relating what is meant by emotion (Frijda, 2016). First, emotions occur after something happens that is relevant to an organism's needs or goals. A series of automatic and largely unconscious appraisal processes determines relevance. Next, emotions are strong motivational forces, producing a state of action readiness that enables an organism to cope with crucial life events. Third, emotions involve the entire organism in a synchronized, somato-visceral way. Last, emotions control behavior, by attempting to prioritize action readiness (Frijda et al., 2014).

Currently, three different, but often overlapping, types of emotion models exist. First, the cognitive-appraisal models include appraisal theories of emotion which require judgement of a stimulus before emotion occurs. Second are the continuous directional models, which are bi-dimensional, constructivist emotion theories that categorize emotion into two bipolar dimensions, most commonly valence and intensity. Last are discrete categorical models referred to as the basic emotion theories which consider emotions to be biologically driven, physiologically distinct states that are universally recognized across cultures (Coppin & Sander, 2013; McDuff et al., 2014; Scherer, 2009a). The next sections provide further detail about the three categories of emotion models.

Cognitive Appraisal Theory

Cognitive appraisal theories of emotion are prominent in the study of emotion generation and differentiation, and in artificial neural network research (Coppin & Sander, 2013; Sander, Grandjean, & Scherer, 2005). The appraisal theory of emotions developed along two paths. First, emotion functions as an information processing and signaling system that alerts organisms to goal-oriented events, and initiates actions toward goal achievement. Thus, emotions are important in motivation (Oatley & Johnson-Laird, 1987).

The second, and more frequently encountered path assumes that a cognitive evaluation or *appraisal* of a stimulus is the essence of emotion (Coppin & Sander, 2013; Sander et al., 2005; Siemer et al., 2007). It is useful to consider two additional models when discussing cognitive-appraisal theory, the core appraisal hypothesis, and Scherer's component process model (Scherer, 2001, 2009b/1984).

Core appraisal hypothesis. Different emotions may be generated by a common stimulus based on how it is appraised. Therefore, it is the appraisal and not the stimulus that determines emotion. The core appraisal hypothesis lies at the heart of all cognitive appraisal models and can be viewed through the nonexclusive lenses of sufficiency and necessity (Siemer et al., 2007). Different appraisals of the same stimulus can result in varying quality and intensity in responses, meaning different appraisals are sufficient to evoke different emotional reactions to the same stimulus. Necessity hypotheses claims appraisals are the necessary cause of all emotion, and if the same stimulus results in a different emotional response, it must have been appraised differently. Additionally, necessity hypothesis states only appraisals, not other factors, cause emotion. Research has shown that specific patterns of appraisal do correlate with intensity of

emotions across individuals, and that groups with similar emotional responses make similar appraisals (Siemer et al., 2007).

The component process model. The component process model is a complex system that considers emotion to be a time-bound incidence of interconnected state changes in an organism's information processing, regulation, executive function, action, and monitoring subsystems produced in response to stimuli as it relates to the organism's important goals (Sander et al., 2005). These interconnected subsystems correspond to the cognitive, motivational, subjective feelings, motor expression, and peripheral efference components of emotion. The cognitive component functions in information processing and is important in object and event evaluation. Motivation serves an executive purpose important in preparing for and directing action. Subjective feelings monitor internal state, organism-environment interaction, and communication. Motor expression serves an action function governing reactions and communication of behavioral intention. Peripheral efference is a support component involved in system regulation (Sander et al., 2005).

Stimulus evaluation checks. The component process model specifies that a standard set of criteria, or stimulus evaluation checks, are used in the stimulus appraisal process (Sander et al., 2005). Stimulus evaluation checks encompass three levels of information, based on four appraisal objectives that an organism needs to react to an event. The four appraisal objectives determine: (1) if the stimulus is relevant, (2) the implications of the stimulus for individual or social well-being, (3) the potential to cope with the outcome of the stimulus, and (4) the normative significance of the stimulus. These four objectives are evaluated at multiple levels, including the sensory-motor level, schematic, or automatic social learning process level, and conceptual or cultural meaning systems level. Stimulus evaluation checks are appraised

sequentially, and the earliest appraisal objectives function as filters for subsequent ones (Sander et al., 2005; Scherer, 2001). This appraisal process is also automatic, largely unconscious, and the root of emotion genesis (Coppin & Sander, 2013).

Subjective feelings. The feelings component of the component process model is important due to its monitoring and communication functions. Feelings are the representation of physiological changes, cognitive processing, and thought changes that occur while experiencing body states such as drives or emotions, and are personal to the individual experiencing them (Damasio, 2004; Damasio & Carvalho, 2013). Feeling, as a monitoring representation of emotional processing, is both conscious and unconscious, with the conscious portion developing from both unconscious appraisal as well as social values, ideas, and beliefs (Kaiser & Scherer, 1998). The conscious experience of feelings is influenced by the physical experience of emotion, how emotion is characterized, and how emotion is expressed.

If feelings are represented as a three circle Venn diagram (Figure 2.2), where the left circle represents unconscious feelings, the right circle represents consciously represented feelings, and the top circle represents verbalized feelings, seven useful areas can be seen that correspond to how we interpret and express feelings. They are: (1) conscious and unconscious feelings that can be verbalized; (2) unconscious feelings that are consciously represented but cannot be verbalized. This could occur due to limitations in language; (3) unconscious feelings that are verbally expressed without having to be consciously represented first; (4) verbalized, conscious representation not based on any unconscious appraisal. Kaiser and Scherer suggest this is the classic case of stereotyping; (5) unconscious appraisal that remains unconscious; (6) conscious appraisal that remains unverbalized; and, (7) verbalizations not based on conscious or unconscious representations (Kaiser & Scherer, 1998).
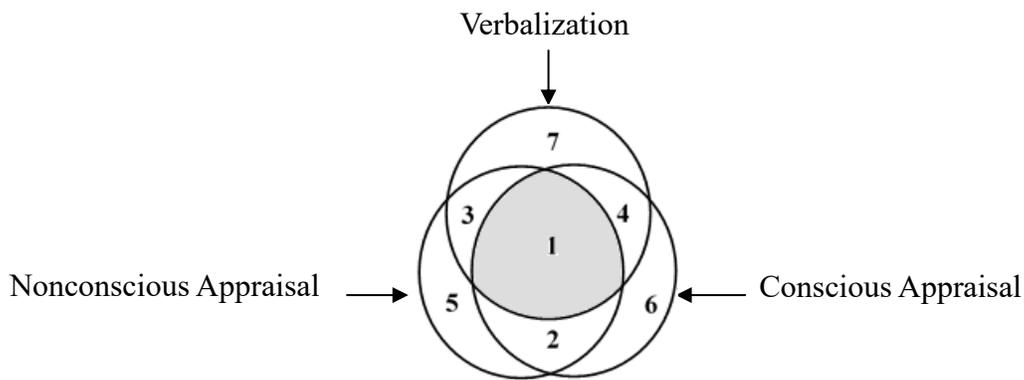
Figure 2.2 Feelings and Zone of Valid Self-Report
Note: Adapted from Kaiser and Scherer (1998)

The shaded area (1) represents a conundrum for researchers. Currently, verbal self-reports of feelings are the gold standard for measuring emotional response, and the only area in the diagram where valid self-reports of emotional experiences can be expected. Sander, et al. (2005) refer to it as the zone of valid self-report measurement. Self-reported measures of emotions will never capture all conscious feelings due to limitations in language. Self-reported measures of feelings capture even less of the overall emotional experience because much of it remains nonconscious (Sander et al., 2005).

Continuous/Directional Models

Directional models question the utility of grouping emotion into discrete categories such as anger or joy. Based on research and clinical observations, Russell (1980) claims that dimensional models of emotion more effectively describe our experience. Emotions are ambiguous, overlapping incidents lacking discrete borders, more similar to a spectrum of colors than discrete bins of feeling (Fehr & Russell, 1984; Plutchik, 1980; Russell, 1980). Directional models identify dimensions, usually two, which describe emotional feelings (Russell, 1980). In

the commonly cited circumplex model (Figure 2.3), emotional states are arranged in a circle on two axes, similar to a compass. Valence, or emotional quality lies on the x-axis as unpleasant/pleasant, and arousal lies on the y-axis as activation/deactivation (Posner et al., 2005; Russell, 1980).

```
                        ACTIVATION
              tense            alert
           nervous           excited
         stressed              elated
        upset                  happy
  UNPLEASANT                 PLEASANT  ←  Valence
                                            (Emotional Quality)
          sad                contented
          depressed            serene
                  bored     relaxed
                            calm
                      DEACTIVATION
                            ↑
                        Arousal
                  (Emotional Intensity)
```
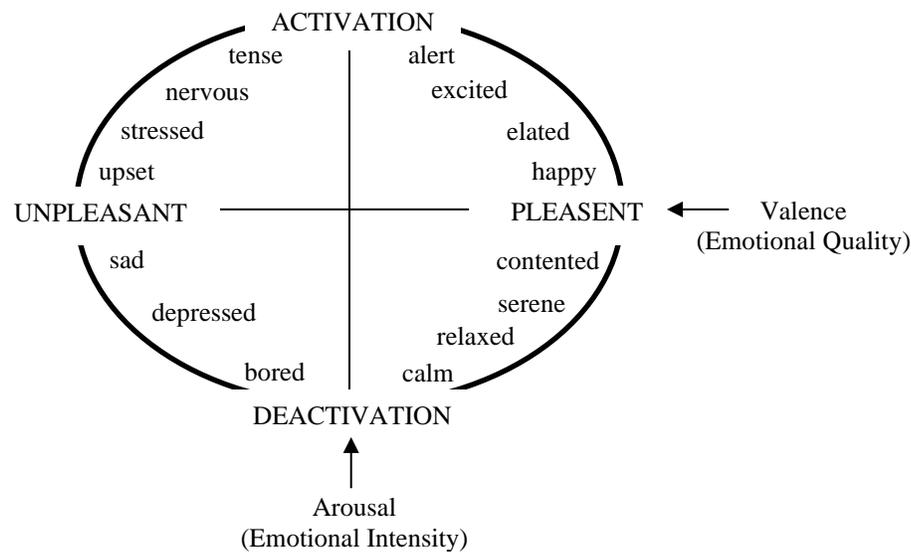
Figure 2.3 The Circumplex Model of Emotion
Note: Adapted from Russell (1980)

Discrete/Categorical Models

Discrete emotional models are often associated with the evolutionary approach to psychology. These models assume emotions are an adaptive process with distinct survival benefits. The human mind is considered a collection of specific strategies for solving ancient adaptive problems, such as predator avoidance, mate selection, telling relatives from non-relatives, or recognizing emotional expression (Coppin & Sander, 2013; Cosmides & Tooby, 2000; Walter, 2017). Emotions have developed to become an integrated organizational process

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governing an organism's physiology, motor system, and cognitive systems such as learning, attention, motivation, and memory (Cosmides & Tooby, 2000; Izard, 2009). In short, these models propose a group of distinct basic emotions that developed independent from social learning, with a specific evolutionary function (Ekman, 1992; Izard & Buechler 1980). The emotions comprising the group are not universally accepted, however anger, fear, joy, sadness, disgust, and occasionally surprise and contempt, are generally considered basic emotions. Different, or more complex, emotions exist as a combination of these basic emotions (Ortony & Turner, 1990). According to Scherer (2009a), discrete models assume specific events trigger affect programs corresponding to one of the basic emotions, and that the basic emotions yield identifiable expressions and distinctive physiological responses. Evolutionary psychologists are quick to point out that these expressions and responses are not an end in themselves, but that emotions are complex, superordinate biological programs that function as control and coordination mechanisms (Cosmides & Tooby, 2000; Scherer, 2009a).

Narrative Persuasion and Storytelling

Persuasion is a form of communication designed to influence the attitude, beliefs, and values of other people, and the focus of many persuasive attempts is to change attitude (Dainton & Zelley, 2017; Simons, 1976). To be considered persuasive, communication has three requirements: the message contains a sender's intent to achieve a goal, communication is the mechanism to achieve the goal, and the consumer may not be forced, intimidated or coerced into goal acceptance (Gass & Seiter, 2015; O'Keefe, 2015). From the perspective of persuasion, it is important to note that attitude, whether positive or negative, is a learned, somewhat stable, response tendency that is a powerful influencer of behavior. We are not born with attitudes; we

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develop them over our lifetime. As such, they are potentially mutable, making attitude change the target of much persuasive communication.

From Stories to Narratives

Storytelling has been a part of human existence since the beginning of time, serving as a source of entertainment, social interaction, as well as a means to transmit cultural values and traditions (Boyd, 2009). Story types may vary based on historical, cultural, and geographical influences, but they all share a common organization that differentiates them from mere groupings of statements (Fee & Webb, 2016; Van Laer et al., 2013). Storytellers layer action, dialog, and objective in ways that make story interpretation both memorable and affecting. Stories also induce cognitive, emotional, and belief changes in story consumers that may alter their attitudes, intentions, and behaviors (Van Laer et al., 2013).

A story is intuitively defined as a storyteller's product, an account of a succession of events describing the change from a beginning to an end (Bielenberg & Carpenter-Smith, 1997). There are common features included in a story: stories have a plot which orders events temporally, use characters, have a turning point or climax, and a resolution or outcome. The temporal nature of events in stories is most important, as the combination of symbolic framing and narrative movement through time create a story's plot (Green & Brock, 2000; Van Laer et al., 2013). Storytelling clearly can be entertaining and instructive for the consumer, but it provides benefits for the storyteller as well. For example, stories are a powerful device to organize and communicate a storyteller's experience, which increases the likelihood of retelling (Shankar et al., 2001).

Though the definitions of story and narrative vary some by discipline, this dissertation adopts Van Lear's (2013) approach to defining story and narrative. In contrast to a story as a

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storyteller's product, narratives reflect the story consumer's agency in receiving and interpreting the story (Van Laer et al., 2013). As such, narrative is the interpretation of a story based on the consumer's demographics, culture, personality, perceived risk, mood, emotion, and exposure to other similar stories (Fishbein & Yzer, 2003). The consumer's act of interpretation may produce an experience that is memorable, transformative, or both (Deighton et al., 1989).

Narrative and Rational Persuasion Paradigms

While traditional persuasion models emphasize arguments based on a rational, logical world view, Fisher's (1984) narrative paradigm focuses on the importance of persuasion through storytelling. Important assumptions differentiate Fisher's narrative paradigm from rational ones. First, humans are unique in their drive and ability to create meaning using symbolic words and actions in narratives. Individual experience and values color our symbolic communication, so all messages, even the most rational ones, are subjective on some level. Second, because understanding is based on subjective narratives, rational decisions are based on a concept of good reasons rather than sound argument. Third, based on the distinct cultures, values, and experiences, good reason will vary from one individual consumer to another. Fourth, good reason is determined by the perception of a story's truthfulness and consistency considering its coherence and congruence with consumer personal experiences. Last, understanding of the world is based on a catalog of stories to which consumers have applied the logic of good reason to select the narratives useful in creating and refining their social reality.

Though rational paradigms hold pride of place in Western thought, Fisher points out that few things in our life can be understood as absolute fact. Rationality exists in concert with our human need for narratives and emotion. Pitting rational against narrative is less effective than integrating the paradigms (Fisher, 1984).

Analytical and Narrative Persuasion

The processing patterns of narrative are markedly different from analytical (also referred to as rhetorical or rational) models of persuasion commonly used in textbooks, lectures, or news reports. Analytical persuasion is an overt process that attempts to persuade by presenting logical arguments (Mazzocco & Green, 2011). Dual process analytical models such as the elaboration likelihood model (Petty & Cacioppo, 1986) or the heuristic-systematic model (Chaiken, 1987) explain that people evaluate a persuasive message by logical arguments through one of two pathways. The first pathway is through central or systematic processing, which requires careful analysis of the argument, deliberately and analytically. The second pathway employs peripheral, or heuristic processing, through decision rules and heuristic cues that evaluate message adequacy in simplified, reflexive, or automatic ways (Chaiken, 1987; Petty & Cacioppo, 1986). For the first pathway to be used in either model, consumers must have the ability and motivation to analytically process the persuasive message. In the elaboration likelihood model, the second pathway relies on decision rules for simplification, such as trusting expert testimony. In the heuristic-systematic model, heuristic cues in the second pathway minimize cognitive resources needed to process the message. To accomplish this, heuristic cues must be applicable to the consumer's goals, stored in memory, and easily activated for quick use (Chaiken, 1987; Deighton et al., 1989; Petty & Cacioppo, 1986; Van Laer et al., 2013).

Deighton et al. (1989) believed evidence of different persuasive paths could be detected by measuring the degree to which persuasive commercials produced counterarguments, expressions of beliefs, expressions of feelings, and verisimilitude. Based on the presence of narration, characters, and plot, Deighton et al. classified 40 commercials into four basic types: arguments, demonstrations, stories, and dramas, on a continuum from highly analytical to highly

dramatic. The authors defined arguments as narrated, characterless, and plotless; demonstrations as narrated, characterless, with a plot; stories as narrated, and include characters and a plot; and dramas as unnarrated, include characters, and a plot. In a study of 1,215 participants who viewed the commercials, and scored persuasiveness, counterarguments, expressions of beliefs, expressions of feelings, and verisimilitude on a scale from 1 to 6, the authors found commercials were processed differently based on whether they were characterized as arguments or dramas. Dramatic commercials, n = 615, produced higher expressions of feelings, $M = 4.35$, versus $M = 4.18$, $p < 0.05$, and verisimilitude, $M = 3.94$, versus $M = 3.68$, $p < 0.05$, than analytical commercials. Argumentative commercials, n= 605, yielded a trend for producing more counterarguments than dramas, $M = 2.51$, versus $M = 2.35$, $p < 0.07$. Though the persuasive paths differed, drama and arguments did not produce significant differences in beliefs (Deighton et al., 1989).

Because narrative persuasion uses vehicles such as stories, television shows, novels, or videos, that are more closely associated with entertainment than persuasion, it can alter attitudes and intentions by processing covertly persuasive messages (Green & Brock, 2002; Van Laer et al., 2013). Consumers are expecting to be entertained rather than persuaded; they tend to be less critical of the story and are less likely to analyze its content (Green & Brock, 2002). Narrative persuasion produces changes without the active evaluation of arguments, thus is more cognitively efficient than the dual process models (Dainton & Zelley, 2017). As consumers become deeply involved with the plot and characters of the story, the careful analysis associated with analytical persuasion is suspended. The degree to which a consumer becomes immersed in a story is directly associated with story-related attitude and belief changes (Busselle & Bilandzic,

2009; Green & Brock, 2000). A discussion of the mechanism involved in narrative persuasion

follows.

Mechanisms of Narrative Persuasion

The extended transportation imagery model was developed by Van Lear (2013) resulting

from a quantitative meta-analysis of over two decades of narrative transportation research.

Consistent with Green and Brock's (2002) transportation-imagery model on which it is based,

the extended transportation imagery model states that both story and consumer antecedents

determine narrative persuasiveness through the mechanism of transportation, which is the story

consumer's experience of being completely immersed the story. The outcomes of transportation

can be both affective and cognitive, and transportation results in narrative consistent changes in

attitude, beliefs, and intentions (Green & Brock, 2002; Hood, 1975; Van Laer et al., 2013).

To develop the extended transportation imagery model, Van Laer conducted a meta-

analysis encompassing 79 Dutch, English, French, German, and Italian language articles.

Sources measured transportation through one of three scales, Green and Brock's (2000)

transportation, Escalas' (2004) being hooked, or Hood's (1975) mysticism scales (Escalas et al.,

2004; Green & Brock, 2000). Two coders classified nine antecedent variables identifiable

character, imaginable plot, verisimilitude, familiarity, attention, transportability, age, education,

and sex: as well as six consequence variables, affective response, critical thoughts, narrative

thoughts, belief, attitude, and intention, achieving moderate agreement, Cohen's $\kappa = 0.75$, $p <$

0.001. Reliability adjusted, inverse variance-weighted correlations and 95% confidence intervals

were calculated for 15 variables associated with transportation. Results of the analysis are

summarized in Table 2.5. From these results, the model of the extended transportation imagery

model was proposed and is shown in Figure 2.6.

Story
Identifiable characters
Plot
Verisimilitude

Story Consumer
Narrative
Transportation

Consequences
Affective Responses
Critical thoughts
Narrative thoughts
Belief
Attitude

Story Consumer
Familiarity
Attention
Transportability
Education
Sex

Measurement
Scale
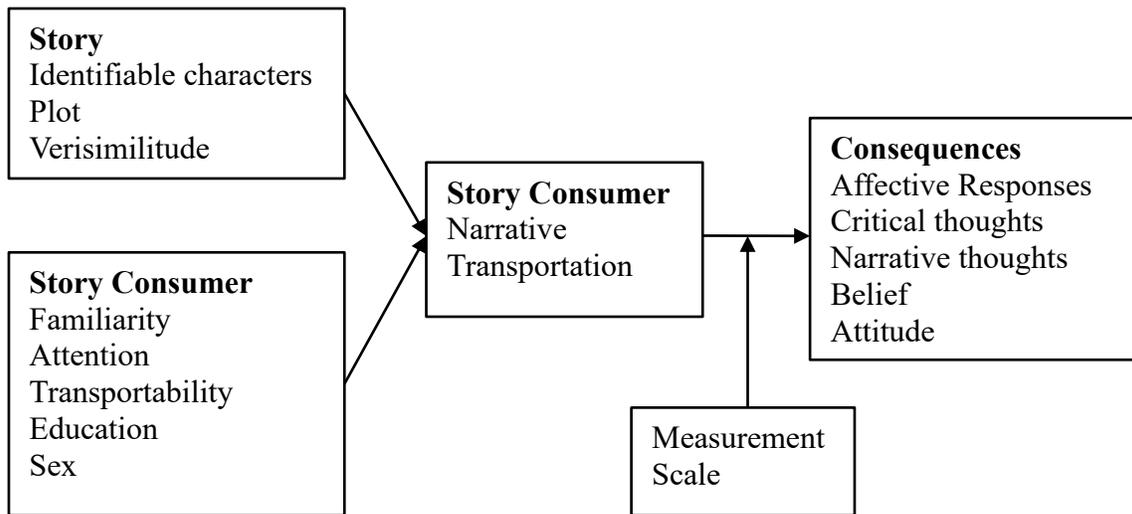
Figure 2.4 Extended Transportation Imagery Model
Note: Adapted from Van Lear (2013)

Variables, with the exception of age, were significantly related to transportation. Effect size for affective response was large, ρ greater than 0.50. Effect sizes for transportability, attitude, and intention were medium, between $0.30 < \rho < 0.50$. With the exception of age, which did not reach significance, effect sizes for all other variables were small, $\rho < 0.30$.

Though not mentioned in the extended transportation imagery model, other factors important in narrative persuasion exist. Need for affect, narrative engagement, and perceived message effectiveness have been shown to have roles in persuasion (Aziz, 2015; Busselle & Bilandzic, 2009; Maio & Esses, 2001). Their specific functions on persuasion and motivation within a food safety training context should explored, and their utility in designing food safety training materials investigated. The next sections review these factors, as well as provides more detail on selected components of the extended transportation imagery model.

Table 2.3 Antecedents and Consequences of Narrative Transportation

Variable	k	ρ	95% CI	z	Sig
Identifiable character	16	0.20	0.10 – 0.28	4.15	*p* < 0.001
Imaginable plot	28	0.29	0.21 –0 .36	7.39	*p* < 0.001
Verisimilitude	8	0.27	0.15 – 0.39	4.34	*p* < 0.001
Familiarity	30	0.21	0.15 – 0.30	5.65	*p* < 0.001
Attention	22	0.29	0.20 – 0.39	5.73	*p* < 0.001
Transportability	17	0.30	0.23 – 0.36	8.15	*p* < 0.001
Age	34	0.00	0.00 – 0.00	0.01	
Education	45	0.10	0.09 – 0.11	15.67	*p* < 0.001
Sex	45	0.15	0.14 – 0.16	26.44	*p* < 0.001
Affective response	13	0.57	0.47 – 0.65	9.33	*p* < 0.001
Critical thoughts	7	-0.20	-0.34 – -0.05	2.60	*p* < 0.01
Narrative thoughts	8	0.20	0.10 – 0.29	4.06	*p* < 0.001
Beliefs	13	0.26	0.21 – 0.30	10.82	*p* < 0.001
Attitude	31	0.44	0.38 – 0.50	12.16	*p* < 0.001
Intention	9	0.31	0.21 –0. 41	5.62	*p* < 0.001

Note. k = number effect sizes, ρ = reliability-adjusted, inverse variance-weighted mean correlation; 95% CI = lower and upper limit of the 95% confidence interval around the correlation; z = test of null (two-tailed). *Note*: Adapted from Van Laer et al. (2013)

Story

Most important story characteristics include identifiable characters, plot, and verisimilitude. Characters in a story must be both easy to identify and empathize with for consumers to become engrossed in the story and interpret events from the character's perspective (Green & Brock, 2000). Story plot can trigger intense mental imagery and emotion, which makes the story resembles the real world (Van Laer et al., 2013). Last, a story does not have to be true, but it does have to be plausible, or possess verisimilitude (Van Laer et al., 2013). Together these models state that the most effective stories present action sequences, the consciousness of those participating in the action, and the emplotment of actions consists of an event plus reaction episode. In short, the most basic narrative contains chronology and causality affecting a character (Bruner, 1986; Feldman, 1990). If a story has compelling characters, an entrancing plot, and seems like it could happen, a consumer is likely to be transported. Research

suggests that when stories contain these characteristics, they are more carefully evaluated by consumers (Pennington & Hastie, 1986; Rumelhart, 1975).

Narrative characteristic measures. Escalas (1996) devised the narrative structure coding scale to analyze the quality of narrative advertisements by quantifying characteristics known in effective narratives. Items included in the scale are drawn from the dual landscapes model and the episode schema model. In a study of 10 television ads scored on their level of narrative characteristics, participants were asked to report the upbeat, warm, and disinterested feelings they experienced while viewing. Narrative structure was found to be positively related to upbeat and warm feelings, $F_{(1,729)} = 12.88$, $\beta = .07$, $p < 0.001$, and $F_{(1,729)} = 281.08$, $\beta = 0.33$, $p < 0.001$, respectively. Narrative structure was negatively related disinterested feelings, $F_{(1,729)} = 15.73$, $\beta = -0.07$, $p < 0.001$ (Escalas, 1996).

Story Consumer

Consumers are also very important in story interpretation, as their personal attributes determine the strength and outcome of transportation (Green, 2008). Transportation increases when consumers are motivated to pay attention and are not distracted from doing so. Though consumers have many different characteristics, familiarity with the story, attention, transportability, education, and gender are directly related to transportation (Van Laer et al., 2013). Consumers are more likely to be transported by a narrative if they have some level of familiarity with the story, either because they are more interested in the subject matter, or because their level of knowledge allows them to think less and imagine more about the story (Slater & Rouner, 2002).

Demographic characteristics. Gender and education also appear to have some effect on transportation. Females and those with higher educational attainment tend to be more easily

transported by stories. Females are believed to respond more empathetically than males (Argo, 2007). Education is thought to be important when the story is written, however audio and videos are more transporting overall, so the importance of education is unclear (Shen, 2015; Van Laer et al., 2013). Last, consumers may differ in their chronic predisposition to being transported, independent of the story (Van Laer et al., 2013). Of these characteristics, transportability should be described in more detail.

Transportability. Consumers differ in their ability to be transported into narrative worlds. This trait difference, referred to as transportability, results in varying emotional, empathetic connections with the narrative on which transportation depends (Dal Cin, 2002; Knowles & Linn, 2004). Numerous studies have shown that individuals who are more transported by a story also show more uptake of story beliefs (Escalas, 1996; Green & Brock, 2000, 2002). Research also supports a correlation between an individual's trait of transportability and their transportation into stories (Bilandzic & Busselle, 2008). Determining how transportability characteristic relates to transportation is important to persuasion research in order to be able to separate individual traits from the persuasive effects of a narrative.

Transportability measure. In their studies on transportation, Dal Cin et al. (2004) observed that some people were more likely to be transported by a narrative than others. They termed this individual difference transportability and developed the scale from Green and Brock's (2000) transportation scale (Dal Cin et al., 2004).

The transportability scale is a 19-item measure of the individual propensity to be transported by narratives. It suffers from the same lack of economy common to many other questionnaires, and no validated transportability scale short form appears in literature. However, a reduced set of four items from the full transportability scale developed by Dal Cin et al. (2004)

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captures 85% of variance of the full measure, and has been suggested as an approximation of the full scale (Mazzocco & Green, 2011).

Need for affect. According to Maio and Esses (2001), need for affect is the motivation to approach or avoid situations that may induce emotions in oneself or others, and can be considered a metaemotional trait (Bartsch et al., 2008; Norman & Furnes, 2016). High levels of need for affect result in individuals that are more likely to both approach and enjoy emotional experience, while individuals low in need for affect eschew emotional experiences. The need for affect contains both approach and avoidance facets, and approach has been found to correlate with emotional outcomes (Maio & Esses, 2001). Maio and Esses (2011) investigated the association of need for affect to several conditions related to the desire to experience emotions: selection of emotional movies over non-emotional ones (n=116), extremeness of attitudes (n=69), and the intensity of emotional responses to the death of Princess Dianna (n=88). Need for affect positively correlated with extremeness of attitudes $r = 0.38$, $p < 0.05$, selection of emotional movies $r = 0.19$, $p < 0.05$, and emotions regarding Princess Diana's death $r = .42$, $p < 0.05$.

Because strong emotional response to a narrative is a characteristic of transportation, individuals demonstrating high need for affect should also experience high levels of transportation, resulting in greater persuasion. In a two-experiment study, Appel and Richter (2010) investigated the role of need for affect on transportation and narrative persuasion in fictional narratives. Experiment one examined whether the persuasive effects of a fictional narrative depend on need for affect. Participants (n=181) read either a narrative describing the murder of a child by a psychiatric patient, or a control narrative of similar length describing a dinner party at a restaurant. The dependent variable measured, on a scale of one to seven, the

belief that psychiatric patients were dangerous. Individual measures of need for affect and transportation were assessed as moderators of the persuasive effects of the narratives. The experiment showed participants who read the narrative were more likely to have stronger beliefs that psychiatric patients were dangerous, than participants who read control narratives, $M = 5.03$ versus $M = 4.31$, $p < 0.001$, and that the beliefs were strongest with participants in the experimental group that experienced higher transportation, $\Delta R^2 = .010$, $\beta = 0.61$, $p < 0.001$. The magnitude of the persuasive effect at low (one standard deviation below the mean) and high, (one standard deviation above the mean) level of transportation was estimated. Persuasive effect was found at high transportation, $\Delta R^2 = 0.13$, $\beta = 0.59$, $p < 0.001$, but not low, $\Delta R^2 = 0.00$, $\beta = -0.10$, $p = 0.45$. Need for affect also showed positive effects on beliefs that psychiatric patients were dangerous, $\Delta R^2 = 0.02$, $\beta = 0.23$, $p < 0.05$. The magnitude of the persuasive effect at low (one standard deviation below the mean) and high, (one standard deviation above the mean) need for affect was estimated. Persuasive effect was found at high need for affect, $\Delta R^2 = 0.13$, $\beta = 0.60$, $p < 0.001$, but not low, $\Delta R^2 = 0.01$, $\beta = 0.16$, $p = 0.17$. (Appel & Richter, 2010).

Appel and Richter's (2010) second experiment (n = 133) further examined the relationship of need for affect and transportation by modifying the level of emotion in two narratives about organ transplantation. It is important to note that narratives must have enough emotional content for individuals high in need for affect to respond to it in an emotional way. The narratives provided the same message and described young female protagonists who were members of organizations that supported organ donation. In the high emotional version, the protagonist who was an organ donor, was killed in a car accident, and in the low emotion version the protagonist thought about being killed in a car accident, and then decided to become an organ donor. Information about the benefits of organ donation was included in both narratives. The

dependent variable assessed beliefs about the benefits of organ donation. Overall, no significant

difference in organ donation belief was found between the high and low emotion narratives,

however transportation was shown to have a positive effect on beliefs in participants who had

read the high emotion story, $\Delta R^2 = 0.14$, $\beta = 0.32$, $p < 0.001$, but not the low emotion story, ΔR^2

$= 0.00$, $\beta = 0.01$, $p = 0.86$. Need for affect was also shown to have a positive effect on beliefs in

participants who had read the high emotion story, $\Delta R^2 = .09$, $\beta = 0.29$, $p < 0.001$, but not the low

emotion story, $\Delta R^2 = 0.00$, $\beta = 0.02$, $p = 0.80$. Last, the moderator effect of need for affect was

determined to be mediated by the moderator effects of transportation. Similar to the results

found in experiment one, need for affect was determined to influence the level of transportation,

which then influences the persuasive effects of the narrative (Appel & Richter, 2010).

Need for affect measure. In response to a growing body of research supporting the

interaction of emotion and cognition, such as the affect infusion model, researchers recognized

the need to evaluate the relationship between an individual's motivation to approach both

cognitive and emotional tasks (Forgas, 1995; Maio & Esses, 2001). The need for affect

questionnaire was created to test individual differences in the drive to avoid or approach

conditions likely to produce emotions (Maio & Esses, 2001). Though designed to measure both

avoidance and approach factors, the scale has been used primarily as an aggregate gauge of need

for affect and has enjoyed wide support for its utility (Van Laer et al., 2013). However, at 26

questions in length, the need for affect questionnaire is long, and potentially uneconomical when

used in studies incorporating multiple measures. A 10-question need for affect questionnaire

short-form has been developed that demonstrates reliability comparable to the need for affect

questionnaire, and similar correlations to other studied personality constructs (Appel et al.,2012).

Using the need for affect questionnaire short form is an acceptable alternative to the full measure when reduced item number is desired (Appel et al., 2012).

Story Consumer Transportation

Transportation is described as a mental process where attention, emotion, and imagery fuse in response to exposure to a narrative (Green & Brock, 2000). Narrative transportation requires that consumers receive and process the story, allowing a consumer to become so focused on the narrative that, mentally, attachment with reality is temporarily suspended to make room for the narrative. Mental imagery (Green & Brock, 2002) and empathy (Slater & Rouner, 2002) are thought to be responsible for the transportation process. Because of empathy, story consumers will try to understand the experience of a story character by feeling the same way. Additionally, consumers generate mental images of the story plot that are so intense they feel as though they are experiencing the events themselves. This empathy and imagery result in consumers experiencing strong emotions or motivations related to the narrative (Green & Brock, 2000). Narrative transportation theory posits that when consumers lose themselves in a story in this way, their attitudes and intentions can be altered (Green, 2008). Given the implications of narrative transportation on consumers, stories are a powerful tool for motivation, belief, and behavior change (Van Laer et al., 2013). In fact, transportation has been shown to cause increases in story-consistent beliefs, positive persuasive outcomes (Green & Brock, 2000), emotions, self-referencing, narrative consistent cognitions (Dunlop et al., 2010), and reduced negative thinking (Escalas et al., 2004).

In a series of three experiments, Green and Brock (2000) examined the role of transportation in public narratives. In experiment one, 97 participants were presented with one of two versions of an experimental narrative that were offered, and clearly marked, as fiction or

nonfiction. The narratives described a situation where a young girl was brutally murdered in a mall buy a psychiatric patient. After reading, participants answered questions about story-related beliefs and transportation. Belief measures included questions about freedoms for psychiatric patients, world is less just, crime does not pay, and levels of violence in the U.S. Both fiction and non -fiction versions of the reading were equally transporting, $F_{(1, 94)} < 1$, $p > 0.80$, and produced no differences in story specific beliefs, $Fs_{(1, 94)} < 2.5$, all $ps > 0.20$. After conducting a median split separating participant into high and low transportation groups, Green and Brock determined that highly transported participants were more likely to report more story consistent beliefs, with significant differences found in beliefs about levels of violence, $F_{(1, 84)} = 3.85$, $p = 0.05$, and a trend towards difference in psychiatric patient freedom beliefs, $F_{(1, 84)} = 3.38$, $p = 0.07$.

In Green and Brock's (2000) second experiment, the effect of story framing and instructions on transportation and story specific beliefs was examined, along with a measure of false noting, which is analogous to counterarguing. Participants (n=67) were presented with the same reading in the first experiment, but with one of three instructions designed to increase transportation, decrease transportation, and cause normal levels of transportation. Participants then answered questions about story consistent beliefs, transportation, and were asked to complete a false noting exercise where participants were asked to circle parts of the story that did not seem true or did not make sense. The authors found that story instructions and frame had no effect on transportation, and similar to experiment one, highly transported individuals demonstrated more story consistent beliefs, such as the world is less just $F_{(1, 53)} = 8.16$; $p < 0.01$. Highly transported individuals also found fewer lines of false noting than lower transported individuals, $M = 6.71$ and $M = 17.21$ respectively, $F_{(1, 53)} = 4.92$, $p < 0.05$.

In experiment three, Green and Brock (2000) repeated the instruction and source manipulation used in study two but with a larger sample size (n=274), and the results were similar, with source and instructions having no effect on transportation, and highly transported individuals demonstrated more story consistent beliefs, such as likelihood of violence, $F_{(1, 243)} = 6.14$, $p < 0.01$, and that the world was less just, $F_{(1, 228)} = 5.32$, $p < 0.05$.

Transportation measure. The original transportation scale was developed as a three-factor scale, containing 15 questions about affect, imagery, and attentional focus. However, the transportation scale is usually treated as a one-dimensional measure of general transportation (Green & Brock, 2000). Though widely used in narrative persuasion research (Van Laer et al., 2013), the transportation scale was often considered too long, because it measured only a single construct. As a result, many different shortened versions are found in the literature, making it difficult to compare results between studies, reducing the interpretability of the scale (Appel et al., 2015).

The transportation scale short form was designed as a sensitive, reliable, shorter version of Green and Brock's (2000) original transportation scale. The short form consists of six questions measuring the one-dimensional construct of transportation (Appel et al., 2015). Correlations between the two versions of the measure ranged from .89 to .94, $p < .05$. The transportation scale short form is a practical alternative to the original transportation scale when measuring transportation in longer questionnaires.

Narrative Engagement

Though transportation is known to affect narrative persuasion, Busselle and Bilandzic's (2009) model of narrative engagement and comprehension posits that involvement is a process rather than a state where cognition is focused on understanding the narrative. The focus is so

intense, that one loses self-awareness. This loss of self-awareness is the phenomenological state of transportation (Bilandzic & Busselle, 2008; Busselle & Bilandzic, 2008; Busselle & Bilandzic, 2009). The authors believe transportation is a part of a larger experience, which they called narrative engagement. Four factors were determined to be important in narrative engagement; narrative presence, which is the sensation of being lost in a narrative; narrative understanding, described as the ability to make sense of the narrative; attentional focus which is the extent to which a consumer is not distracted by thoughts unrelated to the narrative; and emotional engagement which is defined as consumer experience of empathy or sympathy for the characters.

Johnson and Sangalang (2017) sought to determine which measure, transportation or narrative engagement, was more influential on cognitive and affective processes that mediated changes in story consistent beliefs, attitudes, and behavioral intentions. Participants (n=362) were randomly assigned to view one of four primetime television episodes specifically designed for sexual and reproductive health education. Using a pre- and post-test design, the authors measured sexual health beliefs, attitudes, behavioral intentions, transportation, and narrative engagement, along with measures of several other processes thought to be important in narrative persuasion. Cognitive elaboration, perceived relevance and enjoyment were examined as positive mediators of narrative involvement on attitudes, beliefs, and behavioral intentions. Counterarguing and reactance were investigated as negative mediators of narrative involvement on attitudes, beliefs, and behavioral intentions.

Results indicated transportation and narrative engagement influence narrative persuasion in different ways. Using a maximum likelihood estimation procedure, transportation was found to positively influence relevance, $\beta = 0.19$, $p < 0.001$, beliefs, $\beta = 0.13$, $p < 0.05$ and enjoyment,

β = 0.42, p <0.001. Enjoyment positively influenced behavioral intention, β = 0.15, $p < 0.001$,

and negatively influenced beliefs, β = -0.12, $p < 0.05$. Beliefs positively influenced attitudes β =

0.19, $p < 0.001$; χ^2 = 16.76, p = 0.27, CFI = 0.97, RMSEA = 0.02. Transportation had no effect

on attitude, behavioral beliefs, counterarguing, cognitive elaboration or reactance. Narrative

engagement positively influenced enjoyment, β = 0.60, p <0.001, and negatively influenced

reactance, β = -.14, p <.001. Enjoyment positively influenced behavioral intention, β = 0.15, $p <$

0.001. Reactance positively influenced attitudes, β = .13, $p <0 .001$. Beliefs positively

influenced attitudes β = 0.19, $p < 0.001$; χ^2 = 5.34, p = 0.87, CFI = 1.0, RMSEA = 0.001.

Narrative engagement had no effects on elaboration, counterarguing, relevance. Transportation

and narrative engagement revealed different responses to narratives, and therefore could be used

together to give a more nuanced view of narrative involvement (Johnson, & Sangalang, 2017).

 Narrative engagement measure. Busselle and Bilandzic (2009) created the narrative

engagement scale to describe the factors associated with narrative involvement, beyond the

phenomenological state of transportation. By examining experiential, cognitive, and affective

dimensions, narrative engagement includes a more comprehensive assessment of narrative

involvement than transportation (Johnson, & Sangalang, 2017). Though narrative presence and

emotional engagement seem like transportation, they are thought to explain different facets of

narrative involvement and have different impacts on narrative persuasion (Johnson, &

Sangalang, 2017). The greatest benefit of the narrative engagement scale is its versatility. It may

be used as an overall measure or divided into its subscales to distinguish between multiple

aspects of narrative involvement (Busselle & Bilandzic, 2009). Therefore, the following

hypotheses will be tested:

 H₁: Story narrative characteristics have a positive effect on narrative involvement.

H₂: Consumer transportability has a positive effect on narrative involvement.

H₃: Consumer need for affect has a positive effect on narrative involvement.

Outcomes of Narrative Involvement

Transportation has cognitive and affective outcomes, as well as effects on attitudes, beliefs, and intentions. Exposure to a story produces two kinds of cognitive responses, narrative thoughts and critical thoughts. Narrative thoughts represent the beliefs presented in story content, whereas critical thoughts are produced when the consumer encounters a belief that is inconsistent with their own. The degree of transportation has a positive effect on narrative thoughts, and a negative effect on critical thoughts (Chang, 2009; Green & Brock, 2000). Two pathways of influence have been proposed to explain the outcomes of transportation, one cognitive and the other affective or experiential, and that affective response and narrative consistent cognitive responses mediate the effect of transportation on persuasive outcomes (Banerjee & Greene, 2012; Dunlop et al., 2010). Transportation has also been shown to positively influence story consistent attitudes and beliefs. Advertising research shows that consumers that are more highly transported demonstrate more advertisement specific purchasing intent (Escalas, 1996; Van Laer et al., 2013).

Discrete emotional response. Research on the effects of emotion on narrative processing, as well as judgement and decision making, traditionally considered only positive versus negative valence, or bipolar unidimensional emotions (e.g., sad or happy). Generally, positive emotional valence yields positive judgement and decision-making outcomes, but the effects of negative valence are more varied (Angie et al., 2011). Investigating discrete emotions, particularly negative emotions, provides an opportunity to determine if specific emotions produce differential effects on the outcomes of narrative involvement.

Murphy et al. (2013) contrasted the role of identification, transportation, and discrete emotions between narrative and non-narrative films about cervical cancer related risks and prevention. Participants (n = 758) viewed one of two 11-minute videos, one narrative, one non-narrative, with the same information about cervical cancer causes, prevention and detection. Dependent variables, knowledge, attitudes, behavioral intentions were measured before and after the video intervention. Transportation, identification with characters, and discrete basic emotional response, e.g., anger, sadness, disgust, happiness, surprise, and fear, were measured after watching the videos. Viewers of narratives demonstrated small but significantly higher scores on knowledge, $F_{(1, 752)} = 5.79$, $p < 0.05$, $\eta^2 = 0.01$, and a small but significant increase in supportive attitudes, $F_{(1, 750)} = 11.0$, $p < 0.01$, $\eta^2 = 0.01$, than participants who viewed non-narratives. Regression analysis explained 25% of the variance in knowledge at post-test, $F_{(9, 364)} = 14.5$, $p < 0.001$. Participants who were more highly transported had greater levels of knowledge, $\beta = 0.14$, $p < 0.03$. Happiness was found to be negatively associated with knowledge, $\beta = -0.13$, $p < 0.02$. Regression analysis also explained 56% of the variance in post-test attitudes, $F_{(9, 363)} = 54.3$, $p < 0.00$. Both positive, ($\beta = -0.09$, $p < 0.03$), and negative, ($\beta = -0.10$, $p < 0.02$), emotions were negatively associated with attitudes toward Pap tests as a prevention measure (Murphy et al., 2013).

Self-reported discrete emotional response measure. Emotion theory research contains both discrete and dimensional approaches and describing and measuring affect encompasses both. Discrete emotions can be described dimensionally (low/high arousal, positive/negative valence, or avoid/approach motivational directions), but possess other characteristics that are not dimensional (Harmon-Jones et al., 2016a). Despite research in several disciplines widely supporting the importance of discrete emotions, it is common for self-reported emotion to be

described using dimensional scales such as the positive and negative affect schedule which is designed to measure wide groupings of positive or negative affect rather than a discrete emotional state (Harmon-Jones et al., 2016a; Watson et al., 1988).

The discrete emotions questionnaire was developed to measure several self-reported discrete emotions with terms used by average English speakers. The questionnaire measures eight factors based on four common words or phrases describing anger, disgust, fear, anxiety, sadness, desire, relaxation as a measure of satisfaction, desire, and happiness as a measure of joy (Harmon-Jones et al., 2016a).

Harmon-Jones et al. (2016b) demonstrated the sensitivity of the questionnaire by detecting disgust and emotions related to social exclusion. It should be noted that in previous research, emotions in response to social exclusion scenarios could not be detected by the positive and negative affect schedule (Twenge et al., 2003). In a part one of two-part investigation of transient emotions, participants (n = 101) viewed two sets of photos, one neutral of rocks, and the other validated to induce disgust, which included dirty toilets, spoiled food, and dead animals. Participants were then asked to describe their emotions on the discrete emotions questionnaire or the positive and negative affect schedule. Half of the participants were asked to describe their emotions right then, and the other half were asked to describe emotions while they were viewing the images. Disgust, as measured by the discrete emotions questionnaire, was significantly higher in the while viewing group than the right now group, $M = 4.78$, $SD = 0.26$; and $M = 3.76$, $SD = 0.25$, $p < 0.005$, respectively. Additionally, the questionnaire demonstrated more sensitivity than the positive and negative affect schedule in measures of emotional change after viewing the images in both the right now and while viewing groups, $M = 2.52$, $SD = 0.25$, and $M = 3.61$, $SD = 0.26$; $M = 0.91$, $SD = 0.17$, and $M = 1.41$, $SD = 0.17$, $p < .001$, respectively.

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In experiment two, Harmon-Jones et al. (2016b) considered if anger and sadness, as measured by the discrete emotions questionnaire, would be more sensitive than the positive and negative affect schedule to emotions related to social exclusion. In a 2 x 2 x 2 design, (inclusion vs. exclusion, right now vs. while writing, positive and negative affect schedule vs. discrete emotions questionnaire measures of anger and sadness) participants (n = 102) were asked to write about a situation where they either felt either included or socially isolated. After the writing task, participants were then asked to describe their emotions for either the right now or while writing conditions by answering the discrete emotions questionnaire or positive and negative affect schedule. In pairwise comparisons, anger, $M = 3.52$, $SD = 0.25$, and sadness, $M = 3.04$, $SD = 0.25$, were greater than negative affect, $M = 2.48$, $SD = 0.23$, in the while writing condition, $p < .001$ (Harmon-Jones et al., 2016b). Therefore, the following hypotheses will be tested:

H_4: *Narrative involvement has a positive effect on self-reported discrete emotions.*

Cognitive response. Two kinds of cognitive responses are believed to result from transportation: (a) thoughts that are consistent with the narrative message (narrative thoughts); and (b) critical thoughts that are generated when the narrative presents information that differs from the consumer's beliefs. (Escalas et al., 2004; Van Laer et al., 2013). Persuasion research has focused on the formation of rebuttals, or counterarguments to the persuasive message, which are thought to be reduced by the use of narratives. The results of research between these two similar ideas have not always been consistent. While studying education-entertainment persuasion, Moyer-Guse and Nabi (2010) investigated the effects of transportation and identification with characters on counterarguing and intention to practice safe sex. Participants (n=367) took a pre-test measuring safe sex intentions and safe sex behaviors. Participants then

viewed either a narrative or non-narrative video about the consequences of teen pregnancy, followed by a post-test measuring transportation, identification with characters, counterarguing, and safe sex intentions. Two weeks later, participants completed a follow-up survey of safe sex behavior and behavioral intention. Using a maximum likelihood estimation procedure, transportation was found to positively influence counterarguing, $\beta = 0.20$, $p = 0.03$ and have no significant effect on safe sex intention at post-test, $\chi^2 = 8.13$, $p = 0.52$, CFI = 1.00, RMSEA = 0.00; $\beta = -0.07$, $p = 0.35$, or follow-up, $\chi^2 = 9.40$, $p = 0.40$, CFI = 1.00, RMSEA = 0.02; $\beta = -0.07$, $p = 0.36$. The effect of transportation on counterarguing was unexpected, opposite to the hypothesized relationship and to results that would have been expected based on the research already described by Dunlop et al. (Dunlop et al., 2010; Moyer-Gusé & Nabi, 2010). The following hypothesis will be tested:

H_5: *Narrative involvement has a positive effect on cognitive response.*

Perceived Message Effectiveness

Determining the effectiveness of interventions is important, especially in the case of limited resources for implementation. Perceived effectiveness is an often used but not clearly stated measure predicting the success of a message. Due to the intuitive meaning of perceived effectiveness, standardized definitions and scales of the construct are neither used nor agreed upon (Yzer et al., 2015). According to Yzer et al. (2015), perceived effectiveness should, at a minimum, be a measure of the successful outcome of the intervention.

Even though perceived effectiveness may be under conceptualized, there is research supporting its relationship with changes in attitude, beliefs, and behavior. In a study of 17 health behavior interventions, Dillard et al. (2007) used structural equation modeling to determine if perceived message effectiveness predicted actual message effectiveness. Only two selected

studies of the 17 interventions will be discussed here, however across all interventions, perceived

effectiveness was found to be a significant predictor of actual effectiveness. No bidirectionality

between perceived effectiveness and actual effectiveness was found. The reverse model, where

actual effectiveness predicted perceived effectiveness was not preferred in any of the cases

(Dillard et al., 2007). Antecedents to perceived effectiveness such as cognitive outcomes and

discrete emotion (e.g., surprise, anger, fear, sad, guilt, happiness), were measured, and actual

effectiveness was defined as attitude and behavioral intention changes after message exposure.

Model parameters were estimated using maximum likelihood procedures. Model fit was

determined by root mean square error of approximation, comparative fit index, goodness of fit

index, and Bayesian information criterion. Interventions covered a wide range of health topics

e.g., alcohol consumption, flossing, AIDS prevention, exercise, and others, promoting either an

action or an avoidance. In an intervention about flossing, cognitive response and fear were

found to positively influence perceived effectiveness, $\beta = 0.59$, $p < 0.05$, and $\beta = 0.06$, $p < 0.05$,

respectively. Anger had a negative effect on perceived effectiveness, $\beta = -0.30$, $p < 0.05$.

Perceived effectiveness positively influenced attitude, $\beta = 0.56$, $p < 0.05$, $\chi^2 = 1.99$, CFI = 1.00,

GFI = 1.00, BIC= -13.93, RMSEA = 0.00. Similarly, in an intervention about alcohol cessation,

cognitive response and guilt were found to positively influence perceived effectiveness, $\beta = 0.64$,

$p < 0.05$, and $\beta = 0.11$, $p < 0.05$, respectively. Anger had a negative effect on perceived

effectiveness, $\beta = -0.20$, $p < 0.05$. Perceived effectiveness positively influenced attitude, $\beta = 0.22$,

$p < 0.05$, $\chi^2 = 8.39$, CFI = 0.96, GFI = 98, BIC= -7.56, RMSEA = 0.08.

Training effectiveness measures. Aziz (2015) developed the general training

effectiveness scale as an instrument to gauge training success, designed to assist in making

timely decisions about formal employee training quality. Similar to earlier training models, the

general training effectiveness scale assesses three levels of effectiveness, learning performance, individual performance, and organizational performance (Aziz, 2015; Cannon-Bowers et al., 1995). Learning performance is the change in metacognition, declarative and procedural knowledge resulting from training, and is commonly measured with academic tests. Individual performance is the change in work effectiveness, efficiency, and competency, and is usually measured by trainee or supervisor self-report. Organizational performance is the improvement in metrics such as customer satisfaction, teamwork, or organizational goal attainment resulting from training (Aziz, 2015).

The scale employs 10 questions covering all three of the training levels to provide an economical overview of training effectiveness. If the relationships are the same in food safety education applications, cognitive and emotional responses should influence perceived training effectiveness. Therefore, the following hypotheses will be tested:

H6: Emotional response has a positive effect on perceived training effectiveness.

H7: Cognitive response has a positive effect on perceived training effectiveness.

Additive Model of Persuasive Components

Research supports combining different methods of persuasion to enhance message effectiveness, and that in some cases, overall persuasiveness is the cumulative result of the message components (Kim et al., 2012; Witte & Allen, 2000). In a meta-analysis of persuasive messages involving fear, Witte and Allen (2000) found that inclusion of more individual message elements increased the effectiveness of the fear message incrementally. Similarly, in a 2 x 2 x 2 design Kim et al. (2012) examined the effectiveness of evidence source qualifications, statistical or narrative evidence, and testimonial assertive evidence on the belief that climate change was overstated. Participants (n=1140) read the persuasive messages, and attitudes

towards climate change were then measured. The additive model of persuasive message components was supported by t-test, $t_{(1133)} = 3.99$, $p < .05$, and ANOVA for the main effects of each message component. Arguments presented by cited sources, $M = 8.84$, $SD = 3.08$, $n = 567$, were rated as more persuasive than arguments by sources with no affiliations, $M = 8.43$, $SD = 2.87$, $n = 574$, $F_{(1, 1133)} = 6.10$, $p < 0.05$. The main effect for statistical versus narrative evidence was also significant, with messages including statistical evidence, $M = 8.95$, $SD = 2.91$, $n = 564$, more persuasive than narrative evidence, $M = 8.32$, $SD = 3.01$, $n = 577$, $F_{(1, 1133)} = 13.10$, $p < 0.01$. Last, messages containing assertive evidence, $M = 8.85$, $SD = 2.97$, $n = 572$, were more persuasive than messages without assertion, $M = 8.42$, $SD = 2.98$, $n = 569$, $F_{(1, 1133)} = 5.81$, $p < 0.05$. The additive effect of statistical and narrative components was not investigated (Kim et al., 2012).

If similar findings hold for food safety education applications, combining analytical and narrative video modalities should be more effective than either analytical or narrative alone. Therefore, the following hypothesis will be tested:

H8: Narrative involvement of combined modalities increases over single modalities.

H9: Emotional response of combined modality increases over single modalities.

H10: Cognitive response of combined modalities increases over single modalities.

H11: Perceived training effectiveness of combined modalities increases over single modalities.

Theory of Planned Behavior and Message Modality

If the additive model of persuasion holds for food safety applications (Kim et al., 2012; Witte & Allen, 2000), combining narrative and analytical video modalities may affect TPB

constructs differently than when modalities are used alone. Therefore, the following hypothesis are proposed:

H₁₂: Combined modality increases behavioral beliefs over single modalities.

H₁₃: Combined modality increases attitudes over single modalities.

H₁₄: Combined modality increases behavioral intention over single modalities.

H₁₅: Combined modality has no effect on normative or control beliefs.

H₁₆: Combined modality has no effect on subjective norms or perceived behavioral control.

Theory of Planned Behavior and Emotions

Affect can have indirect effects on intentions and behavior by influencing the kinds, strength, and importance of salient beliefs (Ajzen, 2011b; Fishbein & Yzer, 2003). Though emotions, affect, and mood states are theoretically different, they are interrelated and mutually influential; emotion is partially responsible for determining mood (Ekman & Davidson, 1993; Hume, 2012). Emotions may enter the TPB in multiple ways. Because belief strength and evaluation vary with mood state, it can serve as a background factor that influences the TPB constructs. On a gross level, people in a positive mood tend to evaluate behavioral consequences more favorably and perceive favorable events as more likely to occur than people in a negative mood (Ajzen, 2011b; Forgas et al., 1984; Johnson, & Tversky, 1983), though effects of mood on behavior can be more complex (Noval & Stahl, 2017). Additionally, emotions can act as filter for a person's salient beliefs in memory. For example, people in a negative mood state were more likely to identify unfavorable beliefs compared to participants in a positive mood state (Ajzen, 2011b; McKee et al., 2003). Therefore, the following hypotheses will be tested:

H₁₇: Emotional response has a positive effect on behavioral beliefs.

H₁₈: Emotional response has a positive effect on attitudes.

H_{19}: Emotional response has a positive effect on behavioral intention.

H_{20}: Emotional response has no effect on normative or control beliefs.

H_{21}: Emotional response has no effect on subjective norms or perceived behavioral control.

Chapter 3 - Methods

Introduction

This chapter outlines data collection and analysis for three phases of study:
(a) phase 1 gathered data about both participant and food safety video characteristics; (b) phase 2 investigated the cognitive, emotional, and training effectiveness outcomes of 12 food safety videos characterized in phase 1; and (c) phase 3 compared behavioral intention, behavioral beliefs, cognitive and emotional outcomes of three training interventions created from narrative and analytical food safety videos about a single food safety topic. These videos were selected as a result of the analysis in phase 2. A flow chart representing the research procedure is found in Figure 3.1. The first section describes the sample, followed by materials and methods, and last the statistical analysis description.

Research Approval

The Kansas State University Institutional Review Board approved the research protocol before data was collected (Appendix A). Informed consent was obtained for all phases of the study during participant qualification, and again for all questionnaires at each research phase. (Appendix B).

Sample

Collecting data from online survey panels is a practice, though controversial, that has increased rapidly in the last few years in behavioral science research (Walter et al., 2019). Amazon Mechanical Turk (MTurk), an online labor market offered by Amazon (Amazon, Seattle, WA), is considered to be the most commonly used online data collection tool (Porter et al., 2019). Because participant recruitment occurs electronically, proponents of conventionally sourced data have questioned the quality and validity of online survey panels, and MTurk in
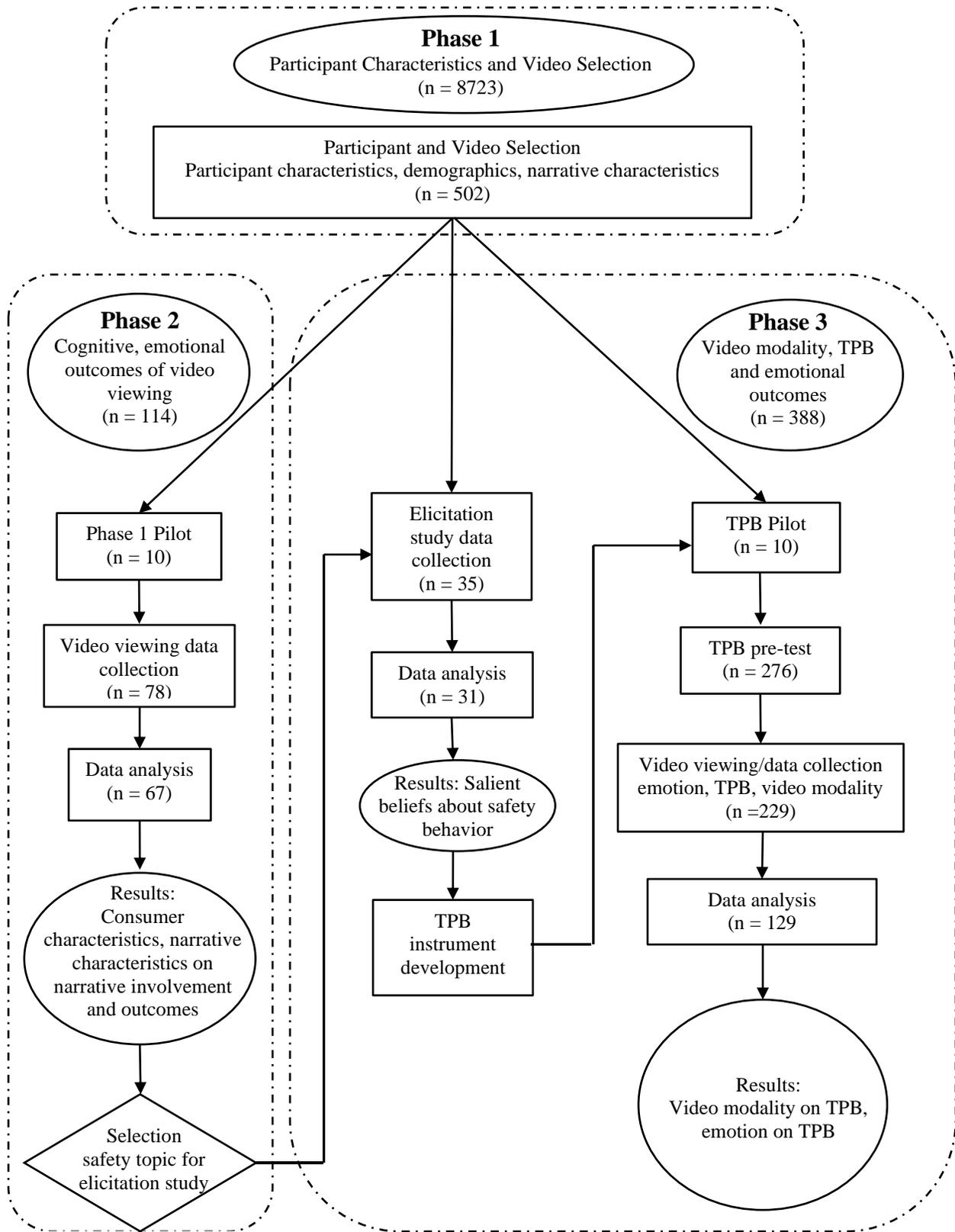
Figure 3.1 Research Flow Chart

particular. Best practices to ensure data quality such as careful participant screening, verifying internet protocol addresses, and use of attention checks, have been suggested in literature, and are discussed more fully in the next section (Aguinis et al., 2020).

The sample for this study included employees working at least part-time as food handlers. Participants meeting the following criteria were selected from the MTurk population between April 2019 and June 2020: residents of the US, English speaking, over the age of 18, and currently working at least part-time as a food handler. Of the 8723 MTurk workers screened, 502 met the inclusion qualifications for the study.

Phase 1: Participant and Video Characterization

The goal of phase 1 was to characterize both food safety training videos and participants for study in the project. Demographic data, need for affect, and transportability data and (e.g., antecedents of narrative involvement) were collected from participants. Descriptions and narrative characteristics of food safety training videos were also measured.

Materials

Video selection and characterization

Videos were selected by the researcher through a two-part process consisting of identification and narrative characteristics scoring. YouTube was searched for analytical and narrative videos about food safety topics. Criteria for inclusion in the study were: (a) less than nine minutes in duration; (b) in English; and (c) produced with clear audio and video elements. Videos meeting these criteria were primarily analytical training or educational interventions covering topics such as allergies, cross contamination, health and hygiene, cleaning and sanitizing, temperature control, handwashing, and norovirus control. Additional persuasive narrative videos were sourced from The Center for Food Safety in Child Nutrition Programs

(Kansas State University, Manhattan, KS) and covered food safety topics such as allergy communication, cleaning and sanitizing, handwashing, and thermometer usage. A total of 12 videos were selected for further evaluation.

A panel of three food safety experts independently scored the group of 12 food safety videos using the narrative structure scale (Escalas et al., 2004). Values were averaged to determine the mean narrative characteristic score, with higher scores associated with videos possessing stronger narrative characteristics. Descriptions of the videos are found in Table 3.1.

The six-item narrative structure scale was used to further support video characterization as narrative or analytical (Escalas et al., 2004). The narrative structure scale assessed features known to be present in narratives, such as chronology, causal relationships, character development, and focus on a specific event rather than abstractions or generalities (e.g., "To what extent does this video let you know what the actors are thinking and feeling?" and "To what extent does this video explain why things happen, that is, what causes things to happen?"). Wording was altered to reflect video, rather than written, narratives. Responses were scaled from 1 (*not at all*) to 7 (*very much so*). Possible summated raw scores ranged from 6 to 42.

Participant qualification

The phase 1 survey is shown in Appendix C. A two-part survey, distributed through MTurk, collected demographic, need for affect, and transportability data. Participant qualification procedures combined demographic filters available through MTurk and demographic questions composed in the Qualtrics (Qualtrics, Provo, UT) survey platform. The survey was open to MTurk workers who resided in the United States. No restrictions on number of human intelligence tasks (HITs) or approval rating percentage were utilized. In order to reduce fraudulent access to the survey and associated reduction in data quality, a combination of

Table 3.1 Food Safety Video Descriptions

ID	Topic	Description	Time (min)	Modality	Narrative Characteristics M	SD
1	Allergy	Narrated lecture explaining common allergens and how to discuss allergen safety with restaurant customers.	1:45	Analytical	3.56	1.38
2	Temperature	Animated cartoon outlining safe time and internal temperature combinations for foods.	2:40	Analytical	3.00	1.08
3	Temperature	News story describing a near fatal and permanently disabling illness from eating undercooked hamburger meat.	2:04	Narrative	6.89	0.32
4	Sanitation	Chef presented lecture covering sanitation steps to minimize cross contamination food items during receiving, storage and preparation.	1:40	Analytical	3.44	1.58
5	Norovirus	A foodservice manager and her administrator investigate a norovirus outbreak in a school.	3:47	Narrative	6.83	0.38
6	Temperature	Story set in an elementary school describing how poor cooking temperature management caused a foodborne illness outbreak leading to hospitalization and death of two students.	2:00	Narrative	6.39	0.92
7	Allergy	Story describing the death of a child with a dairy allergy after eating at a restaurant from the perspectives of parents, servers, kitchen workers and manager.	8:01	Narrative	6.50	0.71
8	Handwashing	Dramatized conversation between a safety inspector and kitchen workers about secret camera footage of handwashing practices.	2:58	Narrative	6.67	0.49
9	Norovirus	Dramatized presentation of the prevention of norovirus by outlining symptoms, spread, and associated foods. Material is presented in a dating profile format by a young woman dressed in a norovirus costume.	1:54	Analytical	5.33	1.61
10	Sanitation	Chef presented lecture covering sanitation steps to minimize cross contamination of equipment, surfaces, and foods.	1:46	Analytical	3.83	1.86
11	Sanitation	Actual footage of a professional kitchen following instances of poor sanitation resulting in surface cross-contamination. Set to dramatic music.	2:16	Narrative	5.83	1.62
12	Handwashing	Black and white animated cartoon providing step by step instruction on handwashing hygiene best practices.	1:28	Analytical	4.33	1.91

internet protocol address verification and virtual private network screening was employed (Dennis et al., 2020; Kennedy et al., 2020; Winter et al., 2019). As described by Winter et al. (2019), a filter was established in Qualtrics employing an external internet protocol address lookup service (IPHub, Lisbon, Portugal) that excluded those who resided outside the United States or used a virtual private server. An external web service (Unique Turker, New York, NY) was used in combination with the prevent ballot box stuffing feature in Qualtrics to reduce multiple survey submissions. Affirmative consent to participate in the survey was requested before proceeding to the qualification and demographic questions.

Participants next completed the four-item transportability reduced item set (Mazzocco & Green, 2011) and the 10-item need for affect questionnaire short form (Appel et al., 2012). The transportability reduced item set assessed the degree to which people become engrossed in stories (e.g., "I can become so absorbed in a video that I forget the world around me"). Wording was altered to reflect video, rather than written, stories. Responses were scaled from 1 (*not at all*) to 7 (*an extreme amount*), with possible summated raw scores ranging from 4 to 28.

The need for affect questionnaire short form measured participant individual need to feel emotions. Both the five-item approach subscale (e.g., "I feel that I need to experience strong emotions regularly") and the five-item avoidance subscale (e.g., "I would prefer not to experience either the lows or highs of emotion") were used. Responses were scaled from 1 (*strongly disagree*) to 7 (*strongly agree*), with possible summated raw scores for each factor ranging from 5 to 35. The survey was pilot tested by 10 participants, who were asked to complete the survey and make comments for improvement where needed. Adjustments to the survey wording were made based on pilot feedback.

Procedure

MTurk workers answered a screening question which determined if they were currently employed as a food handler. Workers who were not food handlers were thanked for their interest in the research and released from the HIT with compensation. Next, qualified participants answered a series of questions about their demographic characteristics. The last question in the demographics section verified participant eligibility for the study. Participants who provided answers that were inconsistent with the initial screening question were released from the HIT. Transportability and need for affect measures followed with questions presented randomly. One attention check question was included within the transportability and need for affect questions. Participants that failed the attention were released from the HIT. Average amount of time to complete the survey was three minutes. Participants who successfully completed phase 1 were awarded a bonus bringing total compensation equivalent to $10.00 per hour (Dynamo, 2018). Successful participants were assigned a qualification within MTurk designating them as eligible for the study.

Phase 2: Narrative Involvement and Outcomes

In phase 2, participants viewed up to 12 of the food safety videos characterized in phase 1 and completed a four- part survey after each measuring narrative involvement, cognitive response, emotional response, and perceived training effectiveness. From these measures, a set of two videos about a single food safety topic, one narrative and one analytical showing high scores on narrative involvement, cognitive response, emotional response, and perceived training effectiveness, were selected to construct three food safety interventions for further study in phase 3.

Materials

The phase 2 survey is shown in Appendix D. The four-part survey was constructed to evaluate the degree to which participants became involved with videos while watching them, levels of cognitive and emotional response to the videos, and participant's perception of the video's training quality. This survey included a total of 54 questions. The survey was pilot tested by 10 participants, who were asked to complete the survey and make comments for improvement where needed. Adjustments to the survey wording were made based on pilot feedback. Participants who completed the pilot test were ineligible to participate in the phase 2 data collection task.

Narrative involvement was evaluated by measuring two constructs, transportation, and narrative engagement. The six-item transportation scale-short form (Appel et al., 2015) measured participants' emotional and mental involvement with the videos and the degree to which participants are transported into a story (e.g., "I could picture myself in the scene of the events described in the video."). The original transportation scale-short form was altered, removing two questions about main characters because main characters were absent in the analytical videos. Wording was also adjusted to reflect videos, rather than written, stories. Responses were scaled from 1 (*not at all*) to 7 (*an extreme amount*), producing possible summated raw scores from 4 to 28.

In the 12-question narrative engagement scale, participants were presented with questions from factors associated with narrative involvement beyond the phenomenological state of transportation (e.g., "My understanding of the characters is unclear" and "While the video was on, I found myself thinking about other things"), but a single overall measure of narrative

engagement was generated. Responses were scaled from 1 (*strongly disagree*) to 7 (*strongly agree*), with possible summative raw scores ranging from 12 to 84.

Cognitive response was gauged by a six-item scale measuring the valence and amount of cognitive processing (Stephenson & Palmgreen, 2001). The cognitive response scale measures agreement with the information provided in the video (e.g., "In general, while watching the video, did you agree or disagree with how using a thermometer can help to cook safe food"), and how much the participant thought in general (e.g., "Overall how much did the video make you think rather than feel"). Wording was altered to reflect the specific food safety behavior presented in each video. Responses were scaled from 1 (*not at all*) to 7 (*very much so*). Possible raw scores ranged from 1 to 49. Composite scores combining valence and amount of cognitive processing were calculated by multiplying the average valence by average amount of cognitive processing.

Emotional response was measured using a discrete emotion framework. Eight individual discrete emotions (e.g., anger, disgust, fear, anxiety, sadness, desire, relaxation, happiness) were each measured by four items within the 32-item discrete emotions questionnaire (Harmon-Jones et al., 2016a). The discrete emotions questionnaire sought to determine the level of discrete emotions experienced in response to a stimulus. The questionnaire asked about experiencing the emotion (e.g., "While watching the video to what extent did you experience these emotions"), followed by four words which describe the emotion (e.g., anger, mad, rage, and pissed off). Responses were scaled from 1 (*not at all*) to 7 (*very much so*) for each emotion. Possible summated raw scores for each of the eight discrete emotion ranged from 4 to 28.

Perceived training effectiveness was measured by the 10-item general training effectiveness scale (Aziz, 2015). The general training effectiveness scale rated the success of

training interventions based on learning, individual performance, and organizational performance (e.g., "I can list all the important things emphasized in this video" and My job performance has improved because of applying the skills emphasized in this video"). Responses were scaled from 1 (*not at all*) to 7 (*an extreme amount*), with possible summated raw scores ranging from 10 to 70.

Procedure

The survey for phase 2 was distributed through the MTurk system to participants who qualified for the study in phase 1. All 12 of the food safety videos were made available at the same time. Participants could self-select which videos to view and in which order they wished to view them. Participants viewed from one to 12 videos. On average, participants viewed and completed questionnaires for four videos. Participants were only allowed to view an individual video once. Videos and surveys were available within MTurk for approximately 90 days.

Participants qualified during phase 1 were asked to provide affirmative consent to participate before proceeding to the survey. Participants were instructed that they were going to watch a video, and to give the video their undivided attention. Participants were asked not to advance to the questions until they viewed the complete video. Participants that advanced before finishing were released from survey without compensation. After the video, an attention check determined if the participant could identify the video topic. Those failing the attention check were released from the survey without compensation. Participants then answered questions from the transportation scale short-form, narrative engagement scale, cognitive response scale, the discrete emotions questionnaire, and the general training effectiveness scale. The measures were presented in random order, with scale items randomized within each measure. One attention check question was included within the discrete emotion questionnaire. Participants that failed

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the attention check were given the option to take the questions again. Participants who failed the

attention check a second time or indicated they did not wish to retake the questions; were

released from the survey. Average amount of time to complete the survey was 12 minutes.

Participants who successfully completed phase 2 were compensated at a rate equivalent to

$10.00 per hour (Dynamo, 2018). Phase 2 participants were designated as ineligible for

participation in phase 3.

A two-video set on safe cooking temperatures, one analytical and one narrative, were

selected for study in phase 3 based on narrative involvement, cognitive response, emotional

response, and perceived training effectiveness scores. These videos were used in the analytical,

narrative, and combined (analytical and narrative) intervention modality studies in phase 3.

Phase 3: Combined Modalities, Emotions, and the TPB

Phase 3 had three purposes: (1) to compare the antecedents and outcomes of narrative

involvement of combined video modalities (e.g., analytical and narrative together), to single

modalities; (2) to compare the effects of combined and single modalities on theory of planned

behavior (TPB) constructs; and (3) compare the effects of emotions evoked by combined and

single modalities on TPB constructs. To achieve this, participants viewed three food safety

video interventions; (a) narrative only; (b) analytical only; and (c) combined intervention

consisting of the narrative and analytical videos together. Participants then completed a survey

measuring narrative involvement, cognitive response, emotional response, training effectiveness,

direct and indirect measures of attitude, subjective norms, perceived behavioral control, and

behavioral intention.

Materials

Video Interventions

Three food safety intervention modalities were developed for study in phase three. One narrative and one analytical video about using safe cooking temperatures were selected as the narrative and analytical modalities. Descriptions of the videos may be found in Table 3.1. A combined intervention was created by editing the analytical and narrative videos together into a two-part intervention. Interventions showed a neutral gray introductory slide with the title "Cooking Temperature Training" at the beginning, followed by either the narrative or analytical video. In addition, the combined intervention had a neutral gray transition slide with the subtitle "Cooking Temperature Training Part 2" between the first and second video. To reduce the chance that analytical or narrative order within the combined intervention might affect study outcomes, two combined interventions were made which alternated the order of the narrative and analytical portions. The two video versions were randomly presented to participants.

TPB Measure Development: Salient Belief Elicitation

Phase 3 surveys are shown in Appendix E. As recommended by Ajzen (2011), an elicitation study was performed to determine the salient behavioral, normative, and control beliefs about the food safety behavior selected from Phase 2, (e.g., using a thermometer to check the temperature of food). A salient belief questionnaire was developed which included a definition of using cooking foods to specific internal temperatures, outlining specifically what was meant by the behavioral act as reflected in the topics of the training videos (Table 3.2).

Table 3.2 Definition Using a Thermometer to Check the Temperature of Food

Cooking foods to specific internal temperatures is defined as:
1. Cooking to specific internal temperatures AND holding at that temperature for the determined amount of time for different foods:

    Poultry, stuffed meats or pasta, mixed dishes to 165°F for 15 seconds

    Ground meats, beef, and ratites to 155°F for 15 seconds

    Seafood, whole meat chops, and shell eggs to 145°F for 15 seconds

    Meat roasts to 145°F for 4 minutes

    Plant foods to 135°F

2. Using a thermometer to verify that specific internal temperatures are reached.

Note: Definition of food safety behaviors used in TPB elicitation studies adapted from Roberts et al. (2008) and Roberts et al. (2018)

The definition was followed by seven open-ended questions that probed (a) the expected positive and negative outcomes of (e.g., "What are some advantages of cooking foods to specific internal temperatures"); (b) positive and negative feelings about the behavior (e.g., "What are some reasons why you or other employees might not cook foods to specific internal temperatures"); (c) conditions facilitating or barring the performance of the behavior (e.g., "What makes it easier for you, or other employees, to cook foods to specific internal temperatures"); and (d) normative beliefs about the behavior (e.g. "List all the people that you think care, either approve or disapprove, about whether or not you and other employees cook foods to specific internal temperatures"). These questions were adapted from Roberts et al. (2008), Roberts et al. (2018), and Ajzen (2011). These beliefs were used to construct the indirect measures of attitude, normative beliefs, and perceived behavioral control within the TPB measure. The salient belief questionnaire was pilot tested by 10 participants, who were asked to complete the survey and make comments for improvement where needed. Based on pilot feedback, adjustments to the salient belief questionnaire wording were made for clarity. Participants who completed the pilot survey were ineligible to participate in salient belief data collection. Results from the elicitation study questionnaire may be found in Appendix G.

TPB Measure

To achieve a fuller understanding of TPB constructs, the surveys contained both direct and indirect measures of attitudes, subjective norms, and perceived behavioral controls. A full example of the survey may be seen in Appendix E.

Indirect measures. Indirect measures of attitude, subjective norms, and perceived behavioral control (e.g., behavioral beliefs, normative beliefs, control beliefs) were determined by the combination of belief strengths and belief outcomes related to cooking foods to specific temperatures. Responses from the elicitation study guided the development of questions for the indirect measures.

Behavioral beliefs were measured by four items rating behavioral belief strength (e.g., "Cooking foods to specific internal temperatures will keep my customer satisfied") from 1 (strongly disagree) to 7 (strongly agree). Corresponding outcome evaluations of behavioral beliefs (e.g., "How important is keeping my customers satisfied to cooking foods to specific internal temperatures") were rated from 1 (extremely unimportant) and 7 (extremely important).

Normative beliefs were measured by seven items rating beliefs of important persons (e.g., "Customer think that I should cook foods to specific internal temperatures") from 1 (strongly disagree) to 7 (strongly agree). Motivation to comply with normative beliefs (e.g., "Generally speaking, how likely are you to care what customers think you should do") were measured by seven items from 1 (strongly don't care) and 7 (strongly care).

Control belief strengths were measured by five items rating factors affecting the ease (or difficulty) of cooking foods to specific internal temperatures (e.g., "Having to calibrate a thermometer makes it more difficult for me to cook foods to specific internal temperatures" from 1 (strongly disagree) to 7 (strongly agree). Perceived power of control beliefs (e.g., "Having to

calibrate the thermometer makes it more difficult for me to cook foods to specific internal temperatures") were rated from 1 (strongly disagree) and 7 (strongly agree).

Outcomes of behavioral beliefs, motivation to comply with normative beliefs, and perceived power of control beliefs were recoded to -3 to 3 values. Scores of indirect measures of attitude, subjective norms, and perceived behavioral control were calculated by multiplying the belief scores (behavioral, normative, control) by the corresponding evaluation scores (outcome, motivation to comply, perceived power). Products were summed to determine the overall score.

Direct measures. In the 17-item direct measure section of the questionnaire, participants were presented with four subscales measuring three types of beliefs that influence behavior: (a) attitudes about cooking foods to specific internal temperatures; (b) subjective norms surrounding people of importance who feel food should be cooked to specific internal temperatures; (c) perceived behavioral control over cooking foods to specific internal temperatures; and (d) intentions to cook foods to specific internal temperatures.

Five semantic differential items measured attitude about specific cooking temperatures (e.g., For me, cooking foods to specific internal temperatures is") with Responses were scaled from 1 (*extremely bad, worthless, useless, foolish, unpleasant*) to 7 (*extremely good, valuable, useful, wise, pleasant*). Potential summated raw scores ranged from 5 to 35.

Perceived behavioral control was measured by six items which rated if participants felt they could cook foods to specific temperatures (e.g., "I am confident I could cook foods to specific internal temperatures when preparing food for customers"). Responses were scaled from 1 (*strongly disagree*) to 7 (*strongly agree*). Potential summated raw scores ranged from 6 to 42.

Subjective norms were measured by three items which rated the beliefs of important people about cooking foods to specific temperatures (e.g., "The people in my life whose opinions I value would want me to cook foods to specific internal temperatures."). Responses were scaled from 1 (*strongly disagree*) to 7 (*strongly agree*). Potential summated raw scores ranged from 3 to 21.

Behavioral intention was measured by three items which rated participant intention to cook food to specific temperatures (e.g., "I intend to cook foods to specific internal temperatures when preparing food at work"). Responses were scaled from 1 (*strongly disagree*) to 7 (*strongly agree*). Potential summated raw scores ranged from 3 to 21. (Ajzen, 2011a; Roberts et al., 2008; Roberts et al., 2018).

Narrative involvement and outcomes

Measures developed in phase 2 gauging narrative involvement and its outcomes were used in phase 3. Narrative involvement was assessed by the transportation scale short form and the narrative engagement scale. Outcomes of narrative involvement were assessed by the cognitive response scale, discrete emotions questionnaire, and the general training effectiveness scale.

The TPB survey was pilot tested by 10 participants, who were asked to complete the survey and make comments for improvement where needed. Adjustments to the survey wording were made based on pilot feedback. Participants who completed the pilot survey were ineligible to participate in the full measure.

Procedure

Elicitation study

A sample of 35 participants qualified during phase 1, who did not participate in phase 2, were presented a survey through the MTurk system that elicited salient beliefs about cooking foods to specific internal temperatures. Participants were asked to provide affirmative consent to participate before proceeding to the survey. Participants were instructed that they would be asked open-ended questions about beliefs on using thermometers to cook foods to specific internal temperatures, and that the questions required short phrase, or sentence length answers. The average amount of time to complete the survey was 4:48 minutes. Participants who successfully completed the elicitation study were compensated at a rate equivalent to $10.00 per hour. Elicitation study participants were designated as ineligible for further participation in phase 3.

Surveys

TPB Pretest. Participants were administered a TPB pretest designed to determine baseline measures of direct (e.g., attitude, subjective norms, perceived behavioral control, intention) and indirect (e.g., behavioral beliefs, normative beliefs, control beliefs) about using a thermometer to check the temperature of food. Questions within the survey were presented randomly. One attention check question was included. Participants who failed the attention check were given the option to retake the questions. Participants who failed the attention check a second time or indicated they did not wish to retake the questions were released from the survey. The average amount of time to complete the survey was 6:42 minutes. Participants who successfully completed the pretest were compensated at a rate equivalent to $10.00 per hour and were designated as eligible for participation in the remainder of phase 3.

Narrative, analytical, and combined intervention modalities. A randomized Latin square design balanced for first order carryover effects was used (Williams, 1949). Participants were assigned to one of six groups to view three food safety intervention modalities (e.g., analytical, narrative, and combined analytical-narrative). After each intervention, participants completed a survey measuring narrative involvement (transportation and narrative engagement), cognitive responses, perceived training effectiveness, self-reported discrete emotional responses and a TPB posttest. Groups and intervention viewing order are shown in Table 3.3. Questions within the survey were presented randomly. Two attention check questions were included. Participants who failed the attention checks were given the option to retake the questions. Participants who failed the attention checks a second time or indicated they did not wish to retake the questions were released from the survey. The average amount of time to complete the survey was 11:08 minutes.

Table 3.3 Intervention Viewing Order Groups

	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Order	A B C	B C A	C A B	C B A	A C B	B A C

Note: A is analytical modality; B is narrative modality; and C is combined modality

Data Analysis

Data was imported into SPSS (version 27, 2019, SPSS Inc., Chicago, IL) for statistical analysis. Prior to the analysis, the data was checked for missing responses. Participants missing more than 10% of survey responses were excluded from the analysis. As the remaining missing data were not missing completely at random, modeling-based imputation (i.e., the expectation-maximization method in the SPSS missing value analysis command) was used to impute missing

responses to survey items. The Kansas State University Department of Statistics was consulted for analysis.

Scale reliability consistency analysis was conducted in JASP (version 0.11, 2019, JASP Team, Netherlands). Reliability analysis included both item level and scale level analysis. As is frequently noted in literature, social sciences survey data often violates assumptions for the use of Cronbach's α and additional measures should be considered as additions or alternatives (Dunn et al., 2014; Peters, 2014; Trizano-Hermosilla & Alvardo, 2016). Consistent with suggestions made by Peters (2014), multiple measures of consistency were calculated to give a more holistic view of the item and scale adequacy. Item analysis included measures of item rest-correlation, McDonald's ω if item eliminated and Cronbach's α if item eliminated. Scale level analysis included McDonald's ω, Cronbach's α, and 95% confidence interval of Cronbach's α.

Phase 1

Descriptive statistics were computed and reported for the demographic information provided by participants in phase 1, for participants in phase 2 and phase 3. Composite scores were computed according to the instructions for each instrument.

For the narrative characteristic score, an intraclass correlation coefficient estimate with 95% confidence interval was calculated based on a mean-rating ($k = 3$), absolute-agreement, 2-way mixed-effects model.

Phase 2

To address the hypotheses, a series of linear mixed models were computed. Linear mixed models are appropriate to for determining relationships between variables when the data have a non-independent structure (Bates et al., 2014). In instances where deviations from normality were extreme, heteroskedasticity was present, and linear mixed models failed to converge,

generalized estimating equations with robust variance estimators were used to generate

population averaged models (Astivia & Zumbo, 2019; Hubbard et al., 2010). In Phase 2, each

participant completed measures in response to multiple videos. In each model, random

intercepts for each participant were estimated. The repeated measurements across videos was

modeled assuming an unstructured covariance structure. Specific fixed effects and outcome

variables were included in the models to address the hypotheses:

H_1: *Consumer need for affect has a positive effect on narrative involvement.*

H_2: *Transportability has a positive effect on narrative involvement.*

To address H_1 and H_2, the independent variables included in the models were the need for

affect measures (approach and avoidance) and transportability. The dependent variables were

the measures of narrative involvement (transportation and engagement). A separate model was

conducted for each dependent variable.

H_3: *Narrative characteristics have a positive effect on narrative involvement.*

To address H_3, the independent variable included in the models were the narrative

structure scale. The dependent variables were the measures of narrative involvement

(transportation and engagement). A separate model was conducted for each dependent variable.

H_4: *Narrative involvement has a positive effect on self-reported discrete emotions.*

H_5: *Narrative involvement has a positive effect on cognitive response.*

To address H_4 and H_5, the independent variables included in the models were the

measures of narrative involvement (transportation and engagement). The dependent variables

were the measures of discrete emotions (anger, disgust, fear, anxiety, sadness, desire, relaxation,

and happiness) and cognitive response scale (cognitive processing score). A separate model was

conducted for each dependent variable.

H₆: As emotional response increases, perceived training effectiveness increases.

H₇: As cognitive response increases, perceived training effectiveness increases

To address H_6 and H_7, the independent variables included in the model were the measures of discrete emotions (anger, disgust, fear, anxiety, sadness, desire, relaxation, and happiness) and cognitive response (cognitive processing score). The dependent variable was the general training effectiveness scale.

The assumptions of normality, homoscedasticity, and multicollinearity were checked for each model. Normality was checked by examination of a Q-Q scatterplot of residuals. Homoscedasticity was checked by examination of a scatterplot of residuals versus predicted values. Multicollinearity was checked by calculating variance inflation factors.

Phase 3

Answers to the elicitation study questions were pooled and analyzed through manual, line-by-line coding for thematic analysis of the TPB constructs. Codes represented TPB constructs addressed by the salient belief elicitation questions. Secondary codes were established for behavioral beliefs, advantages and disadvantages, and for control beliefs, facilitators and barriers. Beliefs were rank ordered, and the most frequently mentioned beliefs selected as the salient set to further inform questionnaire development (Ajzen, 2002).

To address the hypotheses of Phase 3, another series of linear mixed models were computed. Population averaged models were used when assumption violations were extreme or mixed models did not converge. Each participant completed a pretest, and posttest measures in response to up to three videos. In each model, random intercepts for each participant were estimated. The repeated measurements across videos were modeled assuming an unstructured covariance structure. The experimental condition (design group) was included as a fixed effect

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in each model. Specific fixed effects and outcome variables were included in the models to address the hypotheses as follows:

H_8: The levels of narrative involvement with combined modalities increases over single modalities.

H_9: Emotional response to combined modality increases over single modalities.

H_{10}: Cognitive response to combined modality increases over single modalities.

H_{11}: The perceived training effectiveness of combined modality increases over single modalities.

H_{12}: Combined modality increases behavioral beliefs over single modalities.

H_{13}: Combined modality increases attitude over single modalities.

H_{14}: Combined modality increases behavioral intention over single modalities.

H_{15}: Combined modality has no effect on normative or control beliefs.

H_{16}: Combined modality has no effect on subjective norms or perceived behavioral control.

To address H_8 through H_{16}, the independent variable included in the models were the intervention modalities (pretest, analytical, narrative, or combined). The dependent variables were the measures of narrative involvement (transportation and engagement), the measures of discrete emotions (anger, disgust, fear, anxiety, sadness, desire, relaxation, and happiness), cognitive response (cognitive processing score), the general training effectiveness scale, behavioral beliefs, attitude, behavioral intention, normative beliefs, control beliefs, subjective norms, and perceived behavioral control. A separate model was tested for each dependent variable.

H_{17}: Emotional response has a positive effect on behavioral beliefs.

H_{18}: Emotional response has a positive effect on attitude.

H$_{19}$: Emotional response has a positive effect on behavioral intention.

H$_{20}$: Emotional response has no effect on normative or control beliefs.

H$_{21}$: Emotional response has no effect on subjective norms or perceived behavioral control.

To address H$_{17}$ through H$_{21}$, the independent variables included in the models were the measures of discrete emotions (anger, disgust, fear, anxiety, sadness, desire, relaxation, and happiness). The dependent variables were behavioral beliefs, attitude, behavioral intention, normative beliefs, control beliefs, subjective norms, and perceived behavioral control. A separate model was conducted for each dependent variable. The assumptions of normality, homoscedasticity, and multicollinearity were checked for each model. Normality was checked by examination of a Q-Q scatterplot of residuals. Homoscedasticity was checked by examination of a scatterplot of residuals versus predicted values. Multicollinearity was checked by calculating variance inflation factors.

Chapter 4 - Results

This chapter outlines results for the three phases of study. Phase 1 summarized both

participant and food safety video characteristics. Phase 2 investigated the cognitive, emotional,

and effectiveness outcomes of food safety videos. Phase 3 compared behavioral intention,

behavioral beliefs, and cognitive and emotional outcomes of viewing analytical, narrative, and

combined narrative-analytical video interventions.

Participant Flow

Over the course of the study, 502 eligible participants were qualified in phase 1 after

screening 8,723 MTurk workers (5.8%). Figure 4.1 summarizes the flow of participants through

the studies. During Phase 2, when exploring the impact of training videos on transportation,

narrative engagement, cognitive and emotional responses, and training effectiveness, 114 of

these 502 participants (22.7%) were included. Of these, 58.8% ($n = 67$) viewed at least one food

safety video. The remainder of the eligible participants were included in phase 3. Thirty-five

participants were allocated to the theory of planned behavior (TPB) elicitation study, with 31

completing the survey. The remaining 357 participants were included in the TPB intervention

study. Of these, 64.1% ($n = 229$) of the participants completed the pretest and 56.3% ($n = 129$)

who took the pretest completed viewing at least one of the three video modalities.

Scale Reliability Analysis

Scale reliability was investigated by using Cronbach's α, 95% confidence interval for

Cronbach's α, and McDonald's ω. Alpha levels of .70 were used as a cutoff value for acceptable

internal consistency of the scales (Nunnally, 1978). Participant characteristic scales reached

Cronbach's α values above .70 in both phase 2 and phase 3. Table 4.1 summarizes the scale
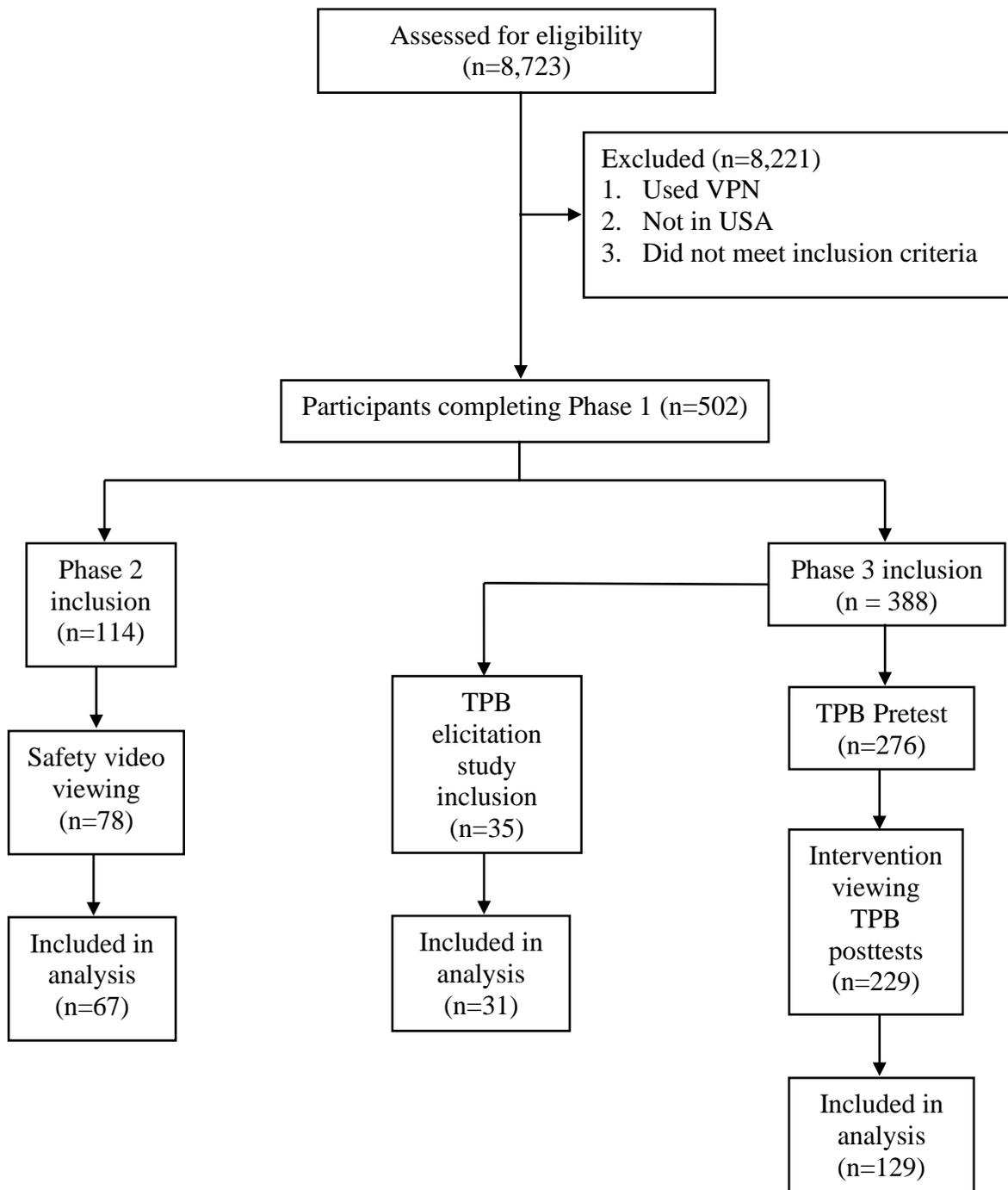
Figure 4.1 Participant Flow Diagram

Table 4.1 Scale Reliability Measures of Internal Consistency by Phase

Scale	Phase 2				95.0% CI α		Phase 3				95.0% CI α	
	M	*SD*	ω	α	*LL*	*UL*	*M*	*SD*	ω	α	*LL*	*UL*
Antecedents												
Need for affect: Approach	5.65[a]	0.13	.87	.85	.80	.89	5.23[c]	0.63	.82	.80	.76	.83
Need for affect: Avoidance	3.38[a]	0.37	.80	.79	.72	.84	3.81[c]	0.33	.83	.83	.80	.85
Transportability	5.03[a]	0.37	.81	.80	.74	.86	5.19[c]	0.24	.80	.80	.76	.83
Narrative Involvement												
Narrative Engagement	3.03[b]	0.93	.77	.83	.76	.88	3.20[d]	1.00	.85	.71	.65	.77
Transportation	5.36[b]	0.65	.80	.77	.66	.85	5.05[d]	0.67	.77	.76	.70	.81
Outcomes												
Cognitive response: Valence	6.23[b]	0.17	.63	.60	.34	.75	5.98[d]	0.14	.73	.73	.63	.79
Cognitive response: Amount	4.89[b]	1.30	.67	.54	.33	.70	5.05[d]	1.03	.74	.63	.53	.71
Discrete emotion: Anger	1.94[b]	0.08	.93	.92	.89	.95	2.63[d]	0.12	.95	.95	.94	.96
Discrete emotion: Disgust	2.18[b]	0.40	.83	.82	.73	.88	2.48[d]	0.32	.91	.91	.89	.93
Discrete emotion: Fear	2.21[b]	0.22	.92	.92	.88	.95	2.50[d]	0.13	.94	.94	.93	.96
Discrete emotion: Anxiety	2.63[b]	0.39	.89	.89	.84	.93	2.90[d]	0.31	.94	.94	.92	.95
Discrete emotion: Sadness	1.92[b]	0.46	.82	.80	.71	.87	2.37[d]	0.65	.84	.84	.79	.87
Discrete emotion: Desire	1.62[b]	0.16	.87	.86	.79	.91	1.98[d]	0.11	.89	.89	.86	.91
Discrete emotion: Relaxation	3.02[b]	0.33	.87	.87	.80	.91	2.97[d]	0.34	.91	.91	.88	.93
Discrete emotion: Happiness	2.52[b]	0.10	.90	.89	.84	.93	2.43[d]	0.10	.90	.90	.87	.92
Training Effectiveness	5.65[b]	0.08	.96	.96	.94	.97	5.79[d]	0.20	.94	.94	.92	.95

Table 4.1 Scale Reliability Measures of Internal Consistency by Phase

Scale	Phase 2				95.0% CI α		Phase 3				95.0% CI α	
	M	*SD*	ω	α	*LL*	*UL*	*M*	*SD*	ω	α	*LL*	*UL*
Theory of Planned Behavior												
Attitude	-	-	-	-	-	-	6.26[e]	0.39	.90	.90	.86	.91
Subjective norm	-	-	-	-	-	-	6.13[e]	0.24	.85	.84	.81	.87
Perceived behavioral control	-	-	-	-	-	-	5.49[e]	0.87	.74	.71	.65	.76
Intention	-	-	-	-	-	-	6.40[e]	1.05	.89	.89	.86	.91

Note. Scales that have no values in a cell are indicated by a dash. *LL* is the lower limit of the confidence interval; *UL* is the upper limit of the confidence interval. Abbreviation ω is McDonald's ω. Abbreviation α is Cronbach's α. Scales that have no values in a cell are indicated by a dash.

[a]114 observations used, 0 excluded

[b]67 observations used, 0 excluded.

[c]373 observations used, 0 excluded.

[d]192 observations used, 0 excluded

[e]276 observations used, 0 excluded.

reliability analysis by research phase. Appendix F summarizes the item analysis for the measures.

Consistency measures for the antecedent and outcome scales were acceptable. Cronbach's α values for the eight discrete emotions ranged from .80 to .95. The general training effectiveness scale also reached acceptable consistency. However, measures of cognitive response valence and cognitive response amount did not reach the .70 cutoff in some instances. The two-item cognitive response valence subscale yielded .60, in phase 2 and .54, in phase 3. The four-item cognitive response valence subscale yielded .73, in phase 2 and .63, in phase 3. The acceptance of .70 as a cutoff for scale consistency is not universal, and .60 is cited in literature as acceptable (Taber, 2016). Further, Cronbach's α values can be low in scales with few items, or when unidimensionality is not present (Peters, 2014). Therefore, no changes to cognitive response scale items were made.

Direct measures of the TPB constructs attitude, subjective norms, and behavioral intention reached Cronbach's α values above .70. Perceived behavioral control did not. Examination of individual item statistics revealed that elimination of one item, "It is difficult for me to use a thermometer to take the internal temperature of foods when rushing to prepare food for customers" (reverse scored) would increase Cronbach's α to an acceptable minimum. Thus, it was removed from further analysis. The final reliability for the resulting five-item scale was considered acceptable, with alpha equaling .71.

Phase 1 Findings: Participant and Video Characterization

Phase 1 served two district purposes. First, it sought to determine participants' need for affect approach and avoidance, transportability, and to collect their demographic data. Second,

narrative characteristics of available food safety training videos were measured in order to select videos for future phases of the study.

Participant Characteristics

Demographic data was available for 487 of the 504 participants and is presented in Table 4.2. The age range of the sample was 18 to 73 years ($M = 34.25$, $SD = 10.59$). Most participants were women ($n = 287$, 58.9%) and identified their race as White ($n = 352$, 72.3%). Most participants indicated English as their first language ($n = 464$, 95.3%). The largest proportions of participants had completed some college ($n = 176$, 36.1%) and were employed full time ($n = 263$, 54.0%). Most participants were in the leisure and hospitality industry ($n = 279$, 57.3%). Most participants had formal food safety training ($n = 367$, 75.4%), on-job food safety training ($n = 426$, 87.5%), and were certified in food safety ($n = 283$, 58.1%). The number of years of experience participants had in food production ranged from one to 35 ($M = 7.07$, $SD = 6.32$).

Need for affect approach score ranged from 3.00 to 7.00 ($M = 5.23$, $SD = 1.02$), while the need for affect avoidance score ranged from 1.00 to 7.00 ($M = 3.42$, $SD = 1.22$). The transportability scores ranged from 1.00 to 7.00 ($M = 5.10$, $SD = 1.12$).

Narrative Characteristics of Videos

Three food safety subject matter experts rated all 12 videos. A high degree of reliability was found between narrative characteristics measurements. The average measure intraclass correlation coefficient was .95, with a 95% confidence interval from .86 to .98 [$F (11,22) = 19.17$, $p < .001$]. The narrative characteristic scores ranged from 3.00 to 6.89 ($M = 5.79$, $SD = 1.49$). Narrative characteristics values may be found in Table 3.1.

Table 4.2 Participant Characteristics by Research Phase

Characteristic	Overall (*n* = 487)		Phase 2 (*n* = 114)		Phase 3 (*n* = 373)	
	n	%	*n*	%	*n*	%
Gender						
Female	287	58.9	76	66.7	211	56.6
Male	193	39.6	35	30.7	158	42.4
Undisclosed, nonbinary, other	7	1.4	3	2.6	4	1.1
Race						
White	352	72.3	83	72.8	269	72.1
Black or African American	53	10.9	10	8.8	43	11.5
Asian	31	6.4	4	3.5	27	7.2
Hispanic or Latinx	22	4.5	6	5.3	16	4.3
Two or more races or ethnicities	13	2.7	3	2.6	10	2.7
Other	5	1.0	1	0.9	4	1.1
American Indian or Alaska Native	4	0.8	1	0.9	3	0.8
Native Hawaiian or Pacific Islander	1	0.2	1	0.9	-	-
Missing	6	1.2	5	4.4	1	0.3
Language						
English	464	95.3	101	88.6	363	97.3
Spanish	10	2.1	7	6.1	3	0.8
Other	5	1.0	1	0.9	4	1.1
Chinese	2	0.4	-	-	2	0.5
Missing	6	1.2	5	4.4	1	0.3
Education						
Some college	176	36.1	37	32.5	139	37.3
Bachelor's degree	133	27.3	34	29.8	99	26.5
High school degree or equivalent	85	17.5	22	19.3	63	16.9
Associates degree	77	15.8	18	15.8	59	15.8
Graduate degree	16	3.3	3	2.6	13	3.5
Employment						
Full time	263	54.0	61	53.5	202	54.2
Part time	218	44.8	48	42.1	170	45.6
Missing	6	1.2	5	4.4	1	0.3
Industry						
Leisure and hospitality	279	57.3	67	58.8	212	56.8
Education, institutions, or health service	97	19.9	21	18.4	76	20.4
Other	76	15.6	17	14.9	59	15.8
Two or more	29	6.0	4	3.5	25	6.7
Missing	6	1.2	5	4.4	1	0.3

Table 4.2 Participant Characteristics by Research Phase

Characteristic	Overall (*n* = 487)		Phase 2 (*n* = 114)		Phase 3 (*n* = 373)	
	n	**%**	*n*	**%**	*n*	**%**
Formal Food Safety Training						
Yes	367	75.4	82	71.9	285	76.4
No	114	23.4	27	23.7	87	23.3
Missing	6	1.2	5	4.4	1	0.3
On-Job Food Safety Training						
Yes	426	87.5	96	84.2	330	88.5
No	55	11.3	13	11.4	42	11.3
Missing	6	1.2	5	4.4	1	0.3
Certification						
Yes	283	58.1	66	57.9	217	58.2
No	204	41.9	48	42.1	156	41.8

Note. Characteristics that have no responses in a cell are indicated by a dash.

Phase 2 Findings: Narrative Involvement and Outcomes

In phase 2, cognitive, emotional, and effectiveness outcomes of the videos were assessed to select two videos, one analytical and one narrative, for further investigation in phase 3. Additionally, the cognitive, emotional, and training effectiveness outcomes of the 12-video group was investigated. Findings for hypotheses one through seven are addressed. To address the hypotheses of phase 2, a series of linear mixed models were computed. In each model, random intercepts for each participant and each video were estimated.

A total of 114 participants were included in phase 2. Table 4.2 displays the descriptive statistics of the sample characteristics. The age range of the sample was 19 to 70 years ($M =$ 34.25, $SD =$ 10.59). more than half were certified in food safety ($n =$ 66, 57.9%). The number of years of experience participants had in food production ranged from one to 35 ($M =$ 7.09, $SD =$ 6.29).

Linear mixed models were conducted to compare the videos on the narrative involvement and outcome measures. Measured means and standard deviations for the survey items may be found in Appendix G. The independent variable included in the models was the video number. The dependent variables were the measures of narrative involvement (transportation and engagement), measures of discrete emotions (anger, disgust, fear, anxiety, sadness, desire, relaxation, and happiness), cognitive response scale (cognitive processing score), and the general training effectiveness scale. A post hoc analysis with Bonferroni adjustment for multiple comparisons, significance at $p = .05$, was used to determine the difference between means of narrative involvement and outcome measures by video.

Table 4.3 displays the estimated marginal means for the models. Measures of narrative involvement were similar, with videos 3, 5, 6, and 7 scoring highest on both transportation and narrative engagement. Videos 8 and 11 scored high on transportation, but not narrative engagement. Videos 3, 5, 6, 7 and 11 scored high on measures of anger, fear, anxiety, and sadness. Videos 3, 6, 7, 9, and 11 scored high on disgust. Videos 8 and 9 also scored high on fear. Videos 1, 2, 4, 9, 10 and 12 scored high on relaxation and happiness. Videos 1, 2, 4, 6, 7, 8, 9, 10, 11 and 12 scored high on training effectiveness. There were no differences by video for cognitive response or the discreet emotion desire.

Table 4.3 Narrative Involvement and Outcome Measures for Food Safety Videos

Parameter	Mean	*SE*	*df*	95% CI LL	95% CI UL
Dependent Variable: Transportation					
Video 7[a]	6.02	0.19	43.29	5.64	6.39
Video 3[a]	5.78	0.20	35.13	5.38	6.18
Video 5[a]	5.60	0.21	33.12	5.19	6.02
Video 6[a]	5.55	0.27	23.59	4.99	6.10
Video 11[a]	5.38	0.20	35.83	4.97	5.79
Video 8[a]	5.09	0.27	27.77	4.53	5.66
Video 9	4.89	0.20	38.61	4.49	5.28

Table 4.3 Narrative Involvement and Outcome Measures for Food Safety Videos

Parameter	Mean	SE	df	95% CI LL	95% CI UL
Video 1	4.84	0.24	36.17	4.34	5.33
Video 12	4.82	0.17	36.77	4.46	5.17
Video 2	4.74	0.23	30.20	4.27	5.21
Video 4	4.73	0.24	30.11	4.23	5.23
Video 10	4.72	0.25	32.00	4.21	5.23
Dependent Variable: Narrative Engagement					
Video 3[a]	5.53	0.14	48.61	5.24	5.81
Video 7[a]	5.47	0.12	62.40	5.23	5.71
Video 6[a]	5.34	0.25	24.61	4.84	5.85
Video 5[a]	5.33	0.16	32.53	5.00	5.65
Video 11	4.95	0.13	55.16	4.70	5.20
Video 9	4.79	0.12	61.62	4.55	5.03
Video 8	4.66	0.16	36.45	4.33	4.99
Video 12	4.60	0.16	33.25	4.28	4.92
Video 2	4.41	0.21	28.69	3.99	4.84
Video 1	4.38	0.21	36.89	3.96	4.80
Video 10	4.36	0.24	30.22	3.87	4.85
Video 4	4.12	0.23	29.14	3.65	4.58
Dependent Variable: Anger[b]					
Video 7[a]	3.22	0.34	27.00	2.53	3.91
Video 6[a]	3.07	0.42	20.00	2.19	3.95
Video 3[a]	2.91	0.33	22.00	2.23	3.59
Video 11[a]	2.07	0.23	25.00	1.59	2.55
Video 5[a]	1.81	0.24	21.00	1.32	2.30
Video 8	1.63	0.22	21.00	1.18	2.07
Video 1	1.38	0.21	28.00	0.94	1.82
Video 12	1.35	0.23	21.00	0.88	1.83
Video 2	1.33	0.23	21.00	0.86	1.80
Video 9	1.32	0.16	24.00	0.99	1.65
Video 10	1.29	0.16	24.00	0.97	1.61
Video 4	1.17	0.14	23.00	0.89	1.45
Dependent Variable: Disgust					
Video 11[a]	3.20	0.35	27.51	2.49	3.91
Video 3[a]	2.64	0.29	25.11	2.04	3.23
Video 6[a]	2.47	0.25	23.67	1.97	2.98
Video 9[a]	2.40	0.22	29.84	1.94	2.86
Video 7[a]	2.16	0.19	40.10	1.78	2.53
Video 8	1.83	0.16	42.17	1.51	2.15
Video 5	1.79	0.16	34.59	1.45	2.12

Table 4.3 Narrative Involvement and Outcome Measures for Food Safety Videos

Parameter	Mean	SE	df	95% CI LL	UL
Video 12	1.59	0.14	46.84	1.32	1.86
Video 10	1.44	0.12	59.69	1.21	1.68
Video 1	1.40	0.13	60.02	1.15	1.66
Video 4	1.29	0.12	41.03	1.05	1.52
Video 2	1.20	0.11	38.99	0.97	1.43
Dependent Variable: Fear					
Video 6[a]	3.30	0.48	21.29	2.31	4.30
Video 3[a]	3.28	0.33	26.80	2.61	3.95
Video 7[a]	3.03	0.29	32.94	2.43	3.62
Video 11[a]	2.38	0.29	31.89	1.79	2.96
Video 5[a]	1.97	0.23	25.08	1.50	2.44
Video 9[a]	1.57	0.19	40.96	1.19	1.95
Video 8[a]	1.54	0.15	57.08	1.23	1.84
Video 12[a]	1.48	0.14	64.73	1.20	1.76
Video 1	1.42	0.13	36.68	1.15	1.69
Video 4	1.36	0.11	67.23	1.14	1.57
Video 10	1.32	0.11	62.52	1.10	1.54
Video 2	1.27	0.13	39.07	1.00	1.53
Dependent Variable: Anxiety					
Video 7[a]	3.62	0.30	30.96	3.01	4.23
Video 3[a]	3.44	0.29	25.60	2.85	4.03
Video 6[a]	3.33	0.38	21.93	2.55	4.12
Video 11[a]	2.70	0.29	27.98	2.11	3.30
Video 5[a]	2.35	0.17	36.48	2.01	2.69
Video 9	2.06	0.21	32.73	1.63	2.49
Video 1	1.76	0.17	47.59	1.43	2.09
Video 8	1.67	0.12	59.60	1.42	1.92
Video 10	1.59	0.16	33.72	1.26	1.92
Video 12	1.50	0.15	44.11	1.20	1.80
Video 4	1.45	0.14	32.03	1.17	1.73
Video 2	1.44	0.12	67.90	1.21	1.67
Dependent Variable: Sadness					
Video 7[a]	3.05	0.21	38.00	2.62	3.47
Video 3[a]	2.81	0.20	31.70	2.39	3.22
Video 6[a]	2.63	0.29	21.88	2.02	3.24
Video 11[a]	1.63	0.14	52.67	1.36	1.91
Video 5[a]	1.63	0.14	44.52	1.35	1.91
Video 9	1.54	0.18	40.21	1.18	1.91
Video 8	1.49	0.13	65.53	1.23	1.74

Table 4.3 Narrative Involvement and Outcome Measures for Food Safety Videos

Parameter	Mean	SE	df	95% CI	
				LL	*UL*
Video 12	1.41	0.11	81.28	1.19	1.63
Video 1	1.34	0.14	48.19	1.06	1.62
Video 4	1.33	0.10	70.96	1.13	1.53
Video 10	1.32	0.10	72.13	1.12	1.51
Video 2	1.30	0.11	76.32	1.09	1.51
Dependent Variable: Desire					
Video 4	1.64	0.16	57.46	1.31	1.96
Video 7	1.61	0.13	81.01	1.36	1.86
Video 5	1.58	0.14	65.16	1.30	1.86
Video 10	1.58	0.18	44.85	1.22	1.94
Video 12	1.57	0.12	77.64	1.34	1.81
Video 6	1.57	0.12	77.49	1.34	1.81
Video 9	1.57	0.20	42.70	1.17	1.96
Video 1	1.55	0.17	47.37	1.21	1.90
Video 2	1.54	0.14	65.94	1.25	1.83
Video 3	1.48	0.14	64.06	1.20	1.77
Video 8	1.46	0.15	57.24	1.17	1.76
Video 11	1.42	0.11	67.17	1.19	1.64
Dependent Variable: Relaxation					
Video 12[a]	3.85	0.26	33.49	3.33	4.38
Video 10[a]	3.82	0.23	43.16	3.37	4.27
Video 4[a]	3.61	0.23	43.27	3.14	4.08
Video 2[a]	3.44	0.24	34.48	2.96	3.92
Video 1[a]	3.32	0.25	41.21	2.83	3.82
Video 9[a]	3.08	0.25	38.36	2.57	3.58
Video 5	2.58	0.26	32.39	2.06	3.10
Video 11	2.57	0.28	38.44	2.00	3.14
Video 8	2.57	0.26	37.08	2.05	3.08
Video 3	1.88	0.25	35.90	1.38	2.39
Video 7	1.74	0.28	35.29	1.18	2.31
Video 6	1.68	0.31	27.12	1.05	2.32
Dependent Variable: Happiness					
Video 10[a]	3.18	0.26	36.65	2.66	3.71
Video 12[a]	3.14	0.33	25.93	2.46	3.82
Video 2[a]	3.05	0.26	33.33	2.52	3.57
Video 4[a]	2.96	0.26	34.44	2.43	3.49
Video 9[a]	2.81	0.29	33.97	2.22	3.40
Video 1[a]	2.39	0.23	41.11	1.93	2.85
Video 8	2.22	0.30	28.80	1.61	2.83

Table 4.3 Narrative Involvement and Outcome Measures for Food Safety Videos

Parameter	Mean	SE	df	95% CI LL	95% CI UL
Video 11[a]	2.09	0.25	40.46	1.58	2.59
Video 5	1.95	0.19	30.45	1.55	2.35
Video 3	1.70	0.27	34.05	1.15	2.25
Video 6	1.49	0.29	26.50	0.90	2.09
Video 7	1.39	0.24	38.67	0.92	1.87
Dependent Variable: Cognitive Processing					
Video 7	32.05	1.16	44.79	29.72	34.39
Video 1	31.59	1.28	41.41	28.99	34.18
Video 5	31.48	1.09	49.57	29.28	33.67
Video 10	30.47	1.42	32.41	27.59	33.35
Video 6	30.26	2.10	24.28	25.94	34.59
Video 11	30.08	1.38	40.40	27.30	32.86
Video 12	29.99	1.80	26.21	26.29	33.69
Video 9	29.70	1.39	39.14	26.88	32.52
Video 2	28.70	1.59	30.87	25.45	31.95
Video 3	28.51	2.11	26.40	24.17	32.84
Video 4	28.04	1.34	36.24	25.32	30.76
Video 8	28.00	1.36	34.62	25.24	30.77
Dependent Variable: Training Effectiveness					
Video 12[a]	6.20	0.14	61.71	5.92	6.48
Video 2[a]	5.96	0.13	64.81	5.70	6.23
Video 7[a]	5.91	0.17	53.47	5.57	6.25
Video 4[a]	5.88	0.12	68.77	5.64	6.13
Video 11[a]	5.88	0.14	57.40	5.59	6.17
Video 1[a]	5.88	0.13	71.10	5.62	6.13
Video 9[a]	5.83	0.18	44.04	5.48	6.18
Video 10[a]	5.76	0.18	43.28	5.40	6.11
Video 5	5.72	0.12	74.49	5.48	5.96
Video 8[a]	5.70	0.20	32.10	5.29	6.10
Video 6[a]	5.32	0.29	24.53	4.73	5.91
Video 3	4.85	0.30	25.39	4.24	5.45

Note. Video 1 ($n = 29$); video 2 ($n = 22$), video 3 ($n = 23$), video 4 ($n = 24$), video 5 ($n = 22$), video 6 ($n = 21$), video 7 ($n = 28$), video 8 ($n = 22$), video 9 ($n = 25$), video 10 ($n = 25$), video 11 ($n = 26$), video 12 ($n = 22$)

[a]Means with the same superscript were not significantly different from the highest measure for the video in the model. For example, in the model for narrative engagement, video 3 has the highest narrative engagement score, and narrative engagement scores for videos 5, 6, and 7 do not differ significantly from video 3. Tests for significant differences between means were performed post hoc with a Bonferroni adjustment for multiple comparisons. Differences were significant at the $p = .05$ level.

[b]The mixed model did not converge for the discrete emotion anger. A population-averaged linear mixed model was substituted that removed the random intercept specification in the mixed model.

Video Selection for Phase 3

Narrative involvement, cognitive, emotional, and effectiveness outcomes of the videos were assessed to select two videos, one analytical and one narrative, for further investigation in phase 3. Table 4.4 summarizes videos that scored high on narrative involvement and outcome measures.

Narrative Video Selection

Three narrative videos scored high on eight of the narrative involvement and outcome measures. Video 6, a 2:00 minute long cooking temperature narrative, video 7, an 8:01 minute long allergy management narrative, and video 11, a 2:16 minute long sanitation narrative, were in high scoring groups. Though video 11 belonged to eight high scoring groups, it scored high on only one of the two measures of narrative involvement, so was eliminated from further consideration. Thus, videos 6 and 7 were selected as candidate narrative videos for consideration in phase 3.

Table 4.4 High Scoring Narrative Involvement and Outcome Characteristics

Video	High Scoring Characteristics
6	Transportation, Narrative Engagement, Anger, Disgust, Fear, Anxiety, Sadness, Training Effectiveness
7	Transportation, Narrative Engagement, Anger, Disgust, Fear, Anxiety, Sadness, Training Effectiveness
11	Transportation, Anger, Disgust, Fear, Anxiety, Sadness, Happiness, Training Effectiveness
3	Transportation, Narrative Engagement, Anger, Disgust, Fear, Anxiety, Sadness
5	Transportation, Narrative Engagement, Anger, Fear, Anxiety, Sadness
9	Disgust, Fear, Relaxation, Happiness, Training Effectiveness
8	Transportation, Fear, Happiness, Training Effectiveness
12	Fear, Relaxation, Happiness, Training Effectiveness
1	Relaxation, Happiness, Training Effectiveness
2	Relaxation, Happiness, Training Effectiveness
10	Relaxation, Happiness, Training Effectiveness
4	Relaxation, Happiness, Training Effectiveness

Analytical Video Selection

Analytical videos for cooking temperatures and allergy management were next examined as matches to the narrative videos. Video 1, an allergy management training (1:45 minutes), and video 2, a training about cooking temperatures (2:40 minutes), had similar patterns of high scores in relaxation, happiness, and perceived training effectiveness. The combination of videos 7 and 1 were eliminated from consideration for phase 3 study because of excessive combined length (9:46 minutes). Videos 6 and 2, narrative and analytical videos about cooking temperatures, were chosen as the videos for further study in phase 3 because of relatively short, combined length of 4:40 minutes.

Phase 2 Hypotheses Tests

The following section outlines the tests for hypotheses one through seven. Narrative persuasion mechanisms are considered through need for affect, transportability, narrative characteristics, transportation, narrative engagement, discrete emotions, cognitive response, and perceived training effectiveness.

Need for Affect, Transportability and Narrative Involvement

H_1: *Consumer need for affect has a positive effect on narrative involvement.*

H_2: *Transportability has a positive effect on narrative involvement.*

To address H_1 and H_2, the independent variables included in the models were the need for affect measures (approach and avoidance) and transportability. The dependent variables were the measures of narrative involvement (transportation and engagement).

An examination of normal P-P plots of the regression residuals revealed that the residuals were approximately normally distributed. An examination of scatterplots of residuals versus

predicted values revealed that the data were homoscedastic. Variance inflation factors were all

below 10 (Max = 2.32), indicating that there was no severe multicollinearity in the models.

Fixed effects regression coefficients for the models are summarized in Table 4.5.

Approach and avoidance scores were not significantly related to transportation or engagement

scores. Therefore, hypothesis 1 was not supported. Transportability scores were significantly

positively related to transportation ($B = 0.34$, $p = .002$) and engagement ($B = 0.24$, $p = .008$)

scores. Thus, hypothesis 2 was supported.

Table 4.5 Need for Affect and Transportability Predicting Narrative Involvement

Parameter	Estimate	Std. Error	df	t	Sig.
Dependent Variable: Transportation					
Need for affect: Approach	-0.06	0.16	58.61	-0.37	.713
Need for affect: Avoidance	-0.20	0.12	66.68	-1.66	.101
Transportability	0.34	0.11	52.87	3.20	.002
Dependent Variable: Engagement					
Need for affect: Approach	0.00	0.13	53.08	-0.03	.979
Need for affect: Avoidance	-0.16	0.10	56.85	-1.71	.092
Transportability	0.24	0.09	47.65	2.77	.008

Narrative Characteristics and Narrative Involvement

H$_3$: Narrative characteristics has a positive effect on narrative involvement.

To address H$_3$, the independent variable included in the models was the narrative

structure scale. The dependent variables were the measures of narrative involvement

(transportation and engagement).

An examination of normal P-P plots of the regression residuals revealed that the residuals

were approximately normally distributed. An examination of scatterplots of residuals versus

predicted values revealed that the data were homoscedastic.

Table 4.6 displays the fixed effects regression coefficients for the models. Narrative structure scores were significantly positively related to transportation ($B = 0.29$, $p < .001$) and engagement ($B = 0.32$, $p < .001$) scores. Therefore, hypothesis 3 was supported.

Table 4.6 Narrative Structure Predicting Narrative Involvement

Parameter	Estimate	SE	df	t	Sig.
Dependent Variable: Transportation					
Narrative structure	0.29	0.04	162.64	7.54	$< .001$
Dependent Variable: Narrative Engagement					
Narrative structure	0.32	0.03	158.37	10.07	$< .001$

Narrative Involvement, Discrete Emotions, and Cognitive Response

H4: Narrative involvement has a positive effect on self-reported discrete emotions.

H5: Narrative involvement has a positive effect on cognitive response.

To address H4 and H5, the independent variables included in the models were the measures of narrative involvement (transportation and engagement). The dependent variables were the measures of discrete emotions (anger, disgust, fear, anxiety, sadness, desire, relaxation, and happiness) and cognitive response (cognitive processing score).

An examination of normal P-P plots of the regression residuals revealed that there was some deviation from normality among the discrete emotion models. An examination of scatterplots of residuals versus predicted values revealed that there was some heteroscedasticity among the discrete emotion models. Because fixed effects within linear mixed models are robust to conditions of non-normality and heteroskedasticity, linear mixed models were used without data transformation (Kneif & Forstmeier, 2020; Schielzeth et al., 2020). Variance inflation factors were all below 10 (Max = 2.42), indicating that there was no severe multicollinearity in the models.

Table 4.7 displays the fixed effects regression coefficients for the models. Transportation scores were significantly positively related to happiness ($B = 0.29$, $p = .006$) scores. Engagement scores were significantly positively related to disgust ($B = 0.25$, $p = .001$), anxiety ($B = 0.31$, $p < .001$), fear ($B = 0.25$, $p = .002$) and sadness ($B = 0.11$, $p = .018$) scores. Engagement scores were significantly negatively related to relaxation ($B = -0.70$, $p < .001$) and happiness ($B = -0.65$, $p < .001$) scores. Hypothesis 4 was partially supported.

Table 4.7 Narrative Involvement Predicting Discrete Emotions and Cognitive Response

Parameter	Estimate	*SE*	*df*	*t*	Sig.
Dependent Variable: Anger					
Transportation	0.06	0.03	54.18	1.77	.082
Engagement	0.02	0.04	21.39	0.63	.533
Dependent Variable: Disgust					
Transportation	0.00	0.06	121.42	-0.02	.986
Engagement	0.25	0.07	153.93	3.45	.001
Dependent Variable: Anxiety					
Transportation	0.11	0.07	141.72	1.57	.119
Engagement	0.31	0.08	167.49	3.67	< .001
Dependent Variable: Fear[a]					
Transportation	0.02	0.06	50.12	0.25	.802
Engagement	0.25	0.08	69.01	3.18	.002
Dependent Variable: Sadness					
Transportation	-0.01	0.04	58.19	-0.22	.824
Engagement	0.11	0.04	72.61	2.42	.018
Dependent Variable: Desire					
Transportation	0.05	0.04	110.31	1.36	.176
Engagement	-0.07	0.04	103.28	-1.55	.125
Dependent Variable: Relaxation					
Transportation	0.08	0.11	258.50	0.76	.447
Engagement	-0.70	0.12	258.78	-5.61	< .001
Dependent Variable: Happiness					
Transportation	0.29	0.10	229.36	2.80	.006
Engagement	-0.65	0.12	238.56	-5.30	< .001
Dependent Variable: Cognitive processing					
Transportation	1.64	0.51	212.38	3.22	.001
Engagement	0.01	0.61	215.43	0.01	.990

Note. [a] The linear mixed model did not converge for the discrete emotion fear. A population-averaged linear mixed model was substituted that removed the random intercept specification in the mixed model.

Transportation scores were significantly positively related to cognitive processing scores ($B = 1.64$, $p = .001$). Thus, hypothesis 5 was partially supported.

Emotional Response, Cognitive Response, and Training Effectiveness

H_6: *As emotional response increases, perceived training effectiveness increases.*

H_7: *As cognitive response increases, perceived training effectiveness increases*

To address H_6 and H_7, the independent variables included in the model were the measures of discrete emotions (anger, disgust, fear, anxiety, sadness, desire, relaxation, and happiness) and cognitive response (cognitive processing score). The dependent variable was the general training effectiveness scale.

An examination of a normal P-P plot of the regression residuals revealed that the residuals were approximately normally distributed. An examination of a scatterplot of residuals versus predicted values revealed that the data were homoscedastic. Variance inflation factors were all below 10 (Max = 5.65), indicating that there was no severe multicollinearity in the models.

Table 4.8 displays the fixed effects regression coefficients for the model. Hypothesis 6 was partially supported; fear ($B = 0.20$, $p = .003$) and happiness ($B = 0.11$, $p = .004$) scores were significantly positively related to training effectiveness. Disgust ($B = -0.09$, $p = .033$) and sadness ($B = -0.19$, $p = .013$) scores were significantly negatively related to effectiveness. Hypothesis 7 was supported, the cognitive processing score was significantly positively related to training effectiveness ($B = 0.04$, $p < .001$).

Table 4.8 Emotions and Cognitive Processing Predicting Perceived Training Effectiveness

Parameter	Estimate	SE	df	t	Sig.
Dependent Variable: Perceived Training Effectiveness					
Anger	0.02	0.06	84.10	0.27	.790
Disgust	-0.09	0.04	46.33	-2.20	.033
Fear	0.20	0.07	84.47	3.05	.003
Anxiety	-0.02	0.06	156.01	-0.26	.799
Sadness	-0.19	0.08	121.75	-2.53	.013
Desire	-0.07	0.06	134.10	-1.21	.230
Relaxation	0.00	0.04	118.65	0.13	.899
Happiness	0.11	0.04	115.83	2.92	.004
Cognitive processing	0.04	0.01	155.90	7.72	$< .001$

Phase 3 Findings: Intervention Modality, Emotions, and TPB

In phase 3, participants completed pretest and posttest measures in response to up to three food safety video intervention modalities about cooking foods to specific internal temperatures. Modalities included narrative only, analytical only, and a combined intervention consisting of the narrative and analytical videos. Surveys measured narrative involvement, cognitive response, emotional response, training effectiveness, direct and indirect measures of attitude, subjective norms, perceived behavioral control, and behavioral intent. In each model, random intercepts for each participant and each video were estimated. The experimental condition (design group) was included as a fixed effect in each model. Though not of research interest, design group was included in the model to control any potential effects of viewing order, therefore design group was retained as a fixed effect.

Table 4.2 displays the descriptive statistics of the sample characteristics. A total of 373 participants were admitted to phase 2. The age range of the sample was 18 to 73 years ($M = 34.25$, $SD = 10.08$). More than half were certified in food safety ($n = 217$, 58.2%). The number

of years of experience participants had in food production ranged from one to 35 ($M = 6.94$, SD = 6.47).

Narrative Involvement and Intervention Modality

H_8: *The levels of narrative involvement with combined modalities increases over single modalities.*

To address H_8, the independent variable included in the models was the video type (analytical, narrative, or combined) with the combined intervention serving as the reference group. The dependent variables were the measures of narrative involvement (transportation and engagement).

An examination of normal P-P plots of the regression residuals revealed that the residuals were approximately normally distributed. An examination of scatterplots of residuals versus predicted values revealed that the data were homoscedastic. Variance inflation factors were all below 10 (Max = 1.00), indicating that there was no severe multicollinearity in the models.

Table 4.9 displays the fixed effects regression coefficients for the models. Hypothesis 8 was partially supported because the analytical intervention was associated with lower levels of transportation ($B = -0.77$, $p < .001$) and engagement ($B = -0.70$, $p < .001$) compared to the combined intervention.

Table 4.9 Intervention Modality Predicting Narrative Involvement

Parameter	Estimate	*SE*	*df*	*t*	Sig.
Dependent Variable: Transportation					
Intervention: Analytical	-0.77	0.11	187.20	-7.29	< .001
Intervention: Narrative	0.12	0.09	138.34	1.27	.206
Dependent Variable: Narrative Engagement					
Intervention: Analytical	-0.70	0.07	198.53	-10.13	< .001
Intervention: Narrative	0.09	0.05	73.24	1.66	.102

Note. Combined modality is established as the reference group for comparison purposes. Coefficients for design group not displayed for concision.

There was no association between the narrative and combined intervention and narrative involvement. In other words, the combined intervention did not show higher levels of narrative involvement than the narrative.

Emotional Response, Cognitive Response, and Intervention Modality

H_9: *Emotional response to combined modality increases over single modalities.*

H_{10}: *Cognitive response to combined modality increases over single modalities.*

To address H_9 and H_{10}, the independent variable included in the models was the video type (analytical, narrative, or combined), with the combined intervention serving as the reference group. The dependent variables were the measures of discrete emotions (anger, disgust, fear, anxiety, sadness, desire, relaxation, and happiness) and the cognitive response scale (cognitive processing score).

An examination of normal P-P plots of the regression residuals revealed that the residuals were approximately normally distributed. An examination of scatterplots of residuals versus predicted values revealed that the data were homoscedastic. Variance inflation factors were all below 10 (Max = 1.00), indicating that there was no severe multicollinearity in the models.

Table 4.10 displays the fixed effects regression coefficients for the models. The analytical intervention was associated with lower levels of anger (B = -1.01, $p < .001$), disgust (B = -0.85, $p < .001$), fear (B = -0.87, $p < .001$), anxiety (B = -1.18, $p < .001$), and sadness (B = -0.74, $p < .001$) and higher levels of relaxation (B = 1.29, $p < .001$) and happiness (B = 0.92, $p < .001$) compared to the combined intervention. The narrative intervention was associated with higher levels of anger (B = 0.38, $p < .001$), disgust (B = 0.33, $p = .001$), fear (B = 0.33, $p = .001$), anxiety (B = 0.29, $p = .003$), sadness (B = 0.22, $p = .009$) and lower levels of happiness (B = -0.32, $p < .001$) compared to combined intervention. Hypothesis 9 was partially supported.

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The analytical intervention was associated with lower levels of cognitive processing ($B =$ -3.49, $p < .001$) compared to the combined intervention. There was no difference in cognitive processing between the narrative intervention and combined intervention. Therefore, hypothesis 10 was partially supported.

Table 4.10 Intervention Modality Predicting Discrete Emotions and Cognitive Processing

Parameter	Estimate	Std. Error	df	t	Sig.
Dependent Variable: Anger					
Intervention: Analytical	-1.01	0.13	166.94	-7.76	< .001
Intervention: Narrative	0.38	0.10	101.97	3.79	< .001
Dependent Variable: Disgust					
Intervention: Analytical	-0.85	0.12	168.76	-7.35	< .001
Intervention: Narrative	0.33	0.09	116.07	3.55	.001
Dependent Variable: Fear					
Intervention: Analytical	-0.87	0.12	167.97	-7.19	< .001
Intervention: Narrative	0.33	0.10	107.44	3.28	.001
Dependent: Anxiety					
Intervention: Analytical	-1.18	0.13	167.68	-9.15	< .001
Intervention: Narrative	0.29	0.10	109.60	3.00	.003
Dependent Variable: Sadness					
Intervention: Analytical	-0.74	0.09	154.60	-7.81	< .001
Intervention: Narrative	0.22	0.08	138.77	2.66	.009
Dependent Variable: Desire					
Intervention: Analytical	0.09	0.08	166.36	1.13	.260
Intervention: Narrative	-0.10	0.07	154.77	-1.49	.138
Dependent Variable: Relaxation					
Intervention: Analytical	1.29	0.14	184.73	9.19	< .001
Intervention: Narrative	-0.19	0.11	124.46	-1.71	.090
Dependent Variable: Happiness					
Intervention: Analytical	0.92	0.12	174.17	7.43	< .001
Intervention: Narrative	-0.32	0.09	137.96	-3.67	< .001
Dependent Variable: Cognitive processing					
Intervention: Analytical	-3.49	0.78	162.53	-4.48	< .001
Intervention: Narrative	-1.03	0.75	157.08	-1.36	.176

Note: Combined modality is established as the reference group for comparison purposes. Coefficients for design group not displayed for concision.

Training Effectiveness and Intervention Modality

H_{11}: The perceived training effectiveness of combined modality increases over single modalities.

To address H_{11}, the independent variable included in the models was the intervention modality (analytical, narrative, or combined) with the combined intervention serving as the reference group. The dependent variable was the measure of perceived training effectiveness.

An examination of normal P-P plots of the regression residuals revealed that the residuals were approximately normally distributed. An examination of scatterplots of residuals versus predicted values revealed that the data were homoscedastic. Variance inflation factors were all below 10 (Max = 1.00), indicating that there was no severe multicollinearity in the models.

Table 4.11 displays the fixed effects regression coefficients for the models. The analytical ($B = -0.15$, $p = .020$) and narrative ($B = -0.42$, $p < .001$) interventions were associated with lower levels of perceived training effectiveness compared to the combined intervention; hypothesis 11 was supported.

Table 4.11 Intervention Modality Predicting Perceived Training Effectiveness

Parameter	Estimate	Std. Error	*df*	*t*	Sig.
Dependent Variable: Training Effectiveness					
Intervention: Analytical	-0.15	0.06	153.29	-2.35	.020
Intervention: Narrative	-0.42	0.08	164.93	-5.22	< .001

Note: Combined modality is established as the reference group for comparison purposes. Coefficients for design group not displayed for concision.

Cooking Temperature Salient Beliefs

In order to develop the quantitative survey used in phase 3, it was necessary to first elicit the salient beliefs of the target population. Therefore, 31 participants answered a survey with

open-ended question to determine their behavioral, normative, and control beliefs about cooking

foods to specific internal temperatures.

Table 4.12 summarizes the most often cited salient beliefs. The complete list of salient

beliefs may be found in Appendix H. Frequently mentioned positive beliefs included preventing

customer illness and ensuring food is safe. Negative beliefs mentioned most often included

being too busy or rushing, or not having a thermometer.

Table 4.12 Salient Beliefs About Using a Thermometer to Take the Temperature of Food

Belief	Frequency ($n = 31$)
Behavioral Beliefs- Positive	
Prevent customer illness	18
Ensure food is safe	10
Maintain food quality	6
Behavioral Beliefs- Negative	
In a hurry, rushing, or too busy	11
Do not have a thermometer or thermometer is broken	8
Employee is lazy	6
Customer requests undercooked food	5
Behavioral Beliefs- Advantages	
Cooking safe food; avoid making someone sick	22
Food is cooked properly or to the proper temperature	9
Increased food quality and consistency	8
Food is reheated properly	3
Behavioral Beliefs Disadvantages	
Takes too much time	16
Reduced food quality	4
Additional task to maintain thermometers	4
Control Beliefs- Facilitator	
Having, or having easy access to, a thermometer	11
Posting safe cooking temperatures	6
More staff working	4
Calibrated thermometers	3
Easy to read and easy to use thermometers	3
Digital thermometers	3
Control Beliefs- Barriers	
Not enough time or too busy	8
Not having or having access to a thermometer	7
Lack of training on temperatures and thermometer use	5
Rushed or pressured by others to get food out	4

Table 4.12 Salient Beliefs About Using a Thermometer to Take the Temperature of Food

Belief	Frequency ($n = 31$)
Normative Beliefs	
Customers	23
Managers	15
Health inspectors	12
Coworkers	11
Owners	6

Direct Measures of Cooking Temperature Beliefs

Salient behavioral, normative, and control beliefs about cooking foods to specific internal temperatures identified in the elicitation study were used to construct the quantitative measurement items to determine both direct and indirect measures of attitude, subjective norms, and perceived behavioral control.

Estimated marginal means and standard errors from linear mixed models of direct measure items for each intervention modality may be found in Table 4.13. Comparisons between pretest and intervention modalities were performed post hoc with a Bonferroni adjustment for multiple comparisons. Differences were significant at $p = .05$.

Attitude

Participants had positive attitudes toward cooking foods to specific internal temperatures. Grand mean scores for attitude items over all interventions ranged from 5.84 to 6.67. Participants indicated cooking food to specific internal temperatures was extremely wise ($M = 6.67$, $SE = 0.05$) and extremely valuable ($M = 6.55$, $SE = 0.05$). When compared to the pretest, participants reported cooking food to specific internal temperatures was more useful after viewing the analytical ($p = .006$), narrative ($p = .020$), or combined ($p < .001$) interventions. Participants indicated cooking food to specific internal temperatures was more pleasant after viewing the analytical ($p = .012$), narrative ($p < .001$), or combined ($p = .002$) intervention.

Table 4.13 TPB Direct Measures by Intervention Modality

Direct Measure	Pretest (*n* = 275)		Analytical (*n* = 151)		Narrative (*n* = 154)		Combined (*n* = 165)			
	Mean	*SE*	**Mean**	*SE*	**Mean**	*SE*	**Mean**	*SE*	**Mean**	*SE*
Attitude	31.27	0.39	32.23[a]	0.27	32.50[a]	0.39	32.32[a]	0.26	32.08	0.26
For me, cooking foods to specific internal temperatures is extremely bad/good	6.43	0.07	6.52	0.07	6.56	0.06	6.55	0.07	6.52	0.05
For me, cooking foods to specific internal temperatures is extremely worthless/valuable	6.41	0.07	6.56	0.06	6.64[a]	0.06	6.61[a]	0.06	6.55	0.05
For me, cooking foods to specific internal temperatures is extremely useless/useful	6.34	0.07	6.58[a]	0.06	6.56[a]	0.07	6.62[a]	0.06	6.52	0.05
For me, cooking foods to specific internal temperatures is extremely unpleasant/pleasant	5.56	0.09	5.86[a]	0.09	6.00[a]	0.09	5.91[a]	0.09	5.84	0.07
For me, cooking foods to specific internal temperatures is extremely foolish/wise	6.56	0.06	6.68	0.07	6.73	0.05	6.70	0.06	6.67	0.05
Subjective Norm	18.26	0.23	18.64	0.20	18.84[a]	0.19	18.83[a]	0.20	18.64	0.18
Most people who are important to me think that I should cook foods to specific internal temperatures when preparing food at work.	6.02	0.08	6.08	0.08	6.14	0.08	6.20	0.08	6.11	0.06
It is expected that I will cook foods to specific internal temperatures when preparing food for customers.	6.40	0.06	6.56[a]	0.06	6.51	0.06	6.47	0.08	6.49	0.05
The people in my life whose opinions I value would want me to cook foods to specific internal temperatures.	5.95	0.07	6.06	0.09	6.25[a]	0.08	6.23[a]	0.07	6.12	0.06
Perceived Behavioral Control	27.51	0.43	28.53[a]	0.37	28.67[a]	0.37	29.21[a]	0.53	28.48	0.33
I am confident I could cook foods to specific internal temperatures when preparing food for customers.	6.43	0.06	6.36	0.07	6.35	0.07	6.49	0.06	6.41	0.05
The decision to cook foods to specific internal temperatures is entirely up to me.	4.44	0.13	5.10[a]	0.15	5.14[a]	0.13	5.14[a]	0.13	4.96	0.10

Table 4.13 TPB Direct Measures by Intervention Modality

| Direct Measure | Pretest (n = 275) | | Intervention Modality | | | | | | | |
| | | | Analytical (n = 151) | | Narrative (n = 154) | | Combined (n = 165) | | | |
	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
It is mostly up to me whether I cook foods to specific internal temperatures.	4.73	0.12	5.19[a]	0.14	5.21[a]	0.13	5.39[a]	0.14	5.13	0.10
I have complete control over cooking foods to specific internal temperatures.	5.77	0.09	5.84	0.10	5.90	0.10	6.06[a]	0.08	5.89	0.07
It is easy for me to cook foods to specific internal temperatures when preparing food at work.	6.12	0.07	6.03	0.08	6.07	0.09	6.14	0.08	6.09	0.06
Behavioral Intention	19.12	0.21	19.36	0.17	19.39	0.17	19.38	0.17	19.31	0.16
I want to cook foods to specific internal temperatures when preparing food at work.	6.42	0.06	6.51	0.07	6.50	0.06	6.43	0.06	6.47	0.04
I expect to cook foods to specific internal temperatures when preparing food for customers.	6.42	0.06	6.44	0.07	6.50	0.06	6.46	0.07	6.45	0.05
I expect to cook foods to specific internal temperatures when preparing food for customers.	6.38	0.06	6.45	0.06	6.43	0.06	6.53	0.06	6.45	0.05

Note. [a]Significant difference exists between mean item or scale scores on the pretest and intervention modalities. Tests were performed post hoc with a Bonferroni adjustment for multiple comparisons. Mean differences were significant at the $p = .05$ level.

interventions. Participants also rated cooking food to specific internal temperatures as more valuable after viewing narrative ($p = .007$) and combined ($p = .024$) video modalities.

Subjective Norms

Values for the three subjective norm items were high, grand mean scores ranged from 6.11 to 6.49 across all interventions. Participants reported it is expected that they will cook food to specific internal temperatures ($M = 6.49$, $SE = 0.05$) as the highest scoring item. When compared to the pretest, participants reported stronger agreement that important people in their lives would want them to cook foods to specific internal temperatures after viewing the narrative ($p = .001$), and combined ($p = .001$) interventions. Participants also reported stronger agreement that it is expected they cook foods to specific internal temperatures when preparing food for customers after viewing the analytical ($p = .046$) intervention.

Perceived Behavioral Control

Grand mean scores for perceived behavioral control items ranged from 4.69 to 6.41 over all interventions. Participants reported that they were confident in cooking foods to specific internal temperatures for customers ($M = 6.41$, $SE = 0.05$) as the highest scoring item. When compared to the pretest, participants reported stronger agreement that the decision to cook foods to specific internal temperatures was entirely up to them after viewing the analytical ($p < .001$), narrative ($p < .001$), and combined ($p < .001$) interventions. Similarly, participants reported stronger agreement that the decision to cook foods to specific internal temperatures was mostly up to them after viewing the analytical ($p = .004$), narrative ($p = .001$), and combined ($p < .001$) interventions. Participants also reported stronger agreement that they had complete control over cooking foods to specific internal temperatures after viewing the combined ($p = .007$) intervention.

Behavioral Intention

Values for the three behavioral intention items were high, with grand mean scores ranging from 6.45 to 6.47. Participants reported wanting to cook food to specific internal temperatures ($M = 6.47$, $SE = 0.04$) as the highest scoring item. Item scores from analytical, narrative, and combined interventions did not differ significantly from the scores on the pretest.

Direct Measures as Predictors of Behavioral Intention

Additional linear models were conducted to determine the relationships between the measures of attitude, subjective norms, perceived behavioral control, and behavioral intention. Separate models were conducted for each intervention (pretest, analytical, narrative, or combined) with design group included as a control variable.

An examination of normal P-P plots of the regression residuals revealed that the residuals were approximately normally distributed. Variance inflation factors were all below 10 (Max = 2.38), indicating that there was no severe multicollinearity in the models. An examination of scatterplots of residuals versus predicted values revealed heteroscedasticity in the models predicting perceived behavioral control. To account for potential heteroscedasticity and to ensure convergence of the models, generalized estimating equations with robust estimators were conducted. Models employed full maximum likelihood estimation, normal distribution with identity link function and an independent correlation matrix structure.

Table 4.14 displays the fixed effects regression coefficients for the models with attitude, subjective norms, and perceived behavioral control predicting behavioral intention. Attitude was significantly positively related to behavioral intention for the analytical ($B = 0.22$, $p < .001$), narrative ($B = 0.26$, $p < .001$), and combined interventions ($B = 0.29$, $p < .001$). Subjective norms were significantly positively related to behavioral intention for the pretest ($B = 0.66$, $p <$

.001), analytical ($B = 0.46$, $p < .001$), narrative ($B = 0.38$, $p < .001$), and combined interventions ($B = 0.41$, p < .001). Perceived behavioral control was significantly positively related to behavioral intention only for the pretest ($B = 0.06$, p = .013).

Table 4.14 TPB Direct Measures Predicting Intention by Intervention Modality

Parameter	Estimate	SE	df	Wald	Sig.
Intervention: Pretest ($n = 178$)					
Attitude	0.04	0.04	1	0.73	.393
Subjective norms	0.66	0.07	1	82.88	< .001
Perceived behavioral control	0.06	0.03	1	6.12	.013
Intervention: Analytical ($n = 151$)					
Attitude	0.22	0.06	1	14.40	< .001
Subjective norms	0.46	0.09	1	28.05	< .001
Perceived behavioral control	0.03	0.03	1	1.66	.198
Intervention: Narrative ($n = 154$)					
Attitude	0.26	0.05	1	24.27	< .001
Subjective norms	0.38	0.09	1	19.81	< .001
Perceived behavioral control	0.03	0.03	1	1.18	.278
Intervention: Combined (n = 165)					
Attitude	0.29	0.06	1	22.34	< .001
Subjective norms	0.41	0.09	1	23.25	< .001
Perceived behavioral control	0.02	0.03	1	0.82	.365

Note. Coefficients for design group not displayed for concision.

Indirect Measures of Cooking Temperature Beliefs

Estimated marginal means and standard errors from linear mixed models of each behavioral belief item by intervention modality may be found in Table 4.15. Comparisons of mean item value differences between the pretest and intervention modalities were performed post hoc with a Bonferroni adjustment for multiple comparisons. Mean differences were significant at the *p* = .05 level.

Behavioral Beliefs

In most instances, participants had high behavioral beliefs supporting cooking foods to specific internal temperatures. Grand mean scores for behavioral belief items ranged from 2.29

to 18.28. Participants believed cooking foods to specific internal temperatures would decrease the likelihood of customers getting sick (M = 18.28, SE = 0.51) and ensure high quality food (M = 16.55, SE = 0.41). Participants were ambivalent about cooking foods to specific internal temperatures taking too much time (M = 2.29, SE = 0.52). Item scores from analytical, narrative, and combined interventions did not differ significantly from the scores on the pretest for any of the behavioral belief items.

Normative Beliefs

Overall, participants strongly believed normative referents thought they should cook foods to specific internal temperatures, grand mean scores ranged from 11.06 to 17.26. Participants thought inspectors/government regulators (M = 17.26, SE = 0.40) and immediate supervisors (M = 16.16, SE = 0.40) were most likely to care if they cooked foods to specific internal temperatures. When compared to the pretest, participants reported stronger normative beliefs about family members after viewing the narrative (p = .018) and combined (p = .037) interventions. Participants also reported stronger normative beliefs about customers after viewing the narrative (p < .001) and combined (p = .011) interventions. Participant's normative beliefs about immediate supervisors was higher after viewing the analytical (p = .027) and narrative (p = .016) interventions. Normative beliefs were significantly higher for general managers (p = .046) and coworkers (p = .013) after viewing the narrative intervention.

Table 4.15 Summary of Behavioral Beliefs, Normative Beliefs, and Control Belief Items by Intervention Modality

	Pretest (n = 275)		Intervention Modality Analytical (n = 151)		Narrative (n = 154)		Combined (n = 165)		Grand Mean	
Belief Item	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Behavioral Beliefs	51.62	1.76	53.98	1.41	53.17	1.44	52.94	1.40	52.93	1.19
Keeping customers satisfied	15.43	0.55	15.94	0.48	15.54	0.51	16.19	0.46	15.77	0.39
Decreasing the likelihood customers get sick	17.73	0.58	18.53	0.42	18.44	0.44	18.42	0.41	18.28	0.39
Ensuring high quality food	16.24	0.55	16.78	0.52	16.67	0.49	16.50	0.45	16.55	0.41
Not taking too much time	2.04	0.78	2.68	0.80	2.49	0.81	1.95	0.82	2.29	0.55
Normative Beliefs	95.95	3.06	104.18[a]	2.77	107.71[a]	2.71	103.04[a]	2.71	102.7	2.48
Inspectors / government regulators	16.66	0.54	17.34	0.48	17.73	0.46	17.31	0.46	17.26	0.40
Owners	15.04	0.53	15.92	0.54	16.16	0.53	15.25	0.53	15.59	0.42
My family	10.46	0.79	11.77	0.65	12.45[a]	0.64	12.25[a]	0.63	11.73	0.56
Customers	13.40	0.62	15.13	0.61	16.69[a]	0.50	15.32[a]	0.52	15.14	0.43
General manager	14.91	0.55	16.12	0.49	16.25[a]	0.45	15.94	0.47	15.80	0.40
Coworkers	10.05	0.67	11.00	0.68	11.83[a]	0.58	11.38	0.60	11.06	0.52
My immediate supervisor	15.32	0.50	16.69[a]	0.48	16.65[a]	0.44	15.95	0.47	16.16	0.40
Control Beliefs	16.84	2.76	16.11	2.76	22.00	2.39	18.21	2.39	18.29	2.05
Being rushed / not having enough time	3.93	0.81	3.70	0.75	4.24	0.72	3.78	0.72	3.91	0.59
Not having a thermometer	6.81	0.99	7.71	1.05	10.22[a]	0.78	8.97	0.88	8.43	0.71
Having to calibrate a thermometer	0.65	0.7	0.11	0.60	0.84	0.65	0.08	0.65	0.43	0.46
Cleaning and sanitizing thermometers between uses	-0.29	0.66	-1.21	0.55	-0.28	0.57	-1.21	0.56	-0.75	0.42
Not knowing proper temperatures	5.65	0.97	6.00	0.97	7.07	0.79	6.37	0.85	6.28	0.69

Note. Belief items are calculated by multiplying the belief strength by the outcome evaluation for each item. Belief item values range from -21 to 21, with zero values being roughly neutral.

[a]Significant difference exists between mean item or scale scores on the pretest and intervention modalities. Tests were performed post hoc with a Bonferroni adjustment for multiple comparisons. Mean differences were significant at the $p = .05$ level.

Control Beliefs

Overall, control beliefs were moderate, with item grand means ranging from -0.75 to 8.43. The three items found to be the greatest hindrance to cooking foods to specific internal temperatures were not knowing proper temperatures ($M = 6.28$, $SE = 0.69$), not having a thermometer ($M = 8.43$, $SE = 0.71$), and being rushed/not having enough time ($M = 3.91$, $SE = 0.59$). When compared to the pretest, not having a thermometer was rated as more of a hindrance after viewing the narrative intervention ($p = .001$).

Beliefs as Predictors of Direct Measures

Additional linear mixed models were conducted to determine the relationships between behavioral beliefs and the direct measures of the TPB. Separate models were conducted for each intervention and design group was included as a control variable.

An examination of normal P-P plots of the regression residuals revealed that the residuals were approximately normally distributed. An examination of scatterplots of residuals versus predicted values revealed heteroscedasticity in the models predicting perceived behavioral control. To account for potential heteroscedasticity and to ensure convergence of the models, generalized estimating equations with robust estimators were conducted. Models employed full maximum likelihood estimation, normal distribution with identity link function and an independent correlation matrix structure. Variance inflation factors were all below 10 (Max = 2.38), indicating that there was no severe multicollinearity in the models.

Table 4.16 displays the fixed effects regression coefficients for the models with behavioral beliefs predicting attitude. Behavioral beliefs were significantly positively related to attitude for the pretest ($B = 0.08$, $p = .014$), analytical ($B = 0.12$, $p < .001$), narrative ($B = 0.13$, $p < .001$), and combined interventions ($B = 0.13$, $p < .001$). Normative beliefs were significantly

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positively related to subjective norms for the pretest ($B = 0.05$, $p < .001$), analytical ($B = 0.05$, $p < .001$), narrative ($B = 0.05$, $p < .001$), and combined interventions ($B = 0.05$, $p < .001$). Control beliefs were not significantly related to perceived behavioral control for any intervention.

Table 4.16 Behavioral Beliefs Predicting Direct Measures by Intervention Modality

Parameter	Estimate	SE	df	Wald	Sig.
Intervention: Pretest ($n = 178$)					
Behavioral Beliefs and Attitude	0.08	0.03	1	6.08	.014
Normative Beliefs and Subjective Norms	0.05	0.01	1	52.35	< .001
Control Beliefs and Perceived Behavioral Control	0.00	0.01	1	0.06	.806
Intervention: Analytical ($n = 151$)					
Behavioral Beliefs and Attitude	0.12	0.02	1	62.71	< .001
Normative Beliefs and Subjective Norms	0.05	0.01	1	84.44	< .001
Control Beliefs and Perceived Behavioral Control	0.01	0.01	1	0.55	.457
Intervention: Narrative ($n = 154$)					
Behavioral Beliefs and Attitude	0.13	0.01	1	76.01	< .001
Normative Beliefs and Subjective Norms	0.05	0.00	1	261.64	< .001
Control Beliefs and Perceived Behavioral Control	0.02	0.01	1	1.55	.213
Intervention: Combined ($n = 165$)					
Behavioral Beliefs and Attitude	0.13	0.02	1	56.43	< .001
Normative Beliefs and Subjective Norms	0.05	0.01	1	64.69	< .001
Control Beliefs and Perceived Behavioral Control	0.00	0.01	1	0.16	.694

Note. Coefficients for design group not displayed for concision.

Intervention Modality and Behavioral Beliefs, Attitude, Behavioral Intention

H₁₂: Combined modality increases behavioral beliefs over single modalities.

H₁₃: Combined modality increases attitude over single modalities.

H₁₄: Combined modality increases behavioral intention over single modalities.

To address H_{12}, H_{13}, and H_{14}, the independent variable included in the models were the video type (pretest, analytical, narrative, or combined intervention) with the combined intervention serving as the reference group. The dependent variables were the measures of behavioral beliefs, attitude, and behavioral intention.

An examination of normal P-P plots of the regression residuals revealed that the residuals were approximately normally distributed. An examination of scatterplots of residuals versus predicted values revealed that the data were homoscedastic. Variance inflation factors were all below 10 (Max = 1.00), indicating that there was no severe multicollinearity in the models.

Table 4.17 displays the fixed effects regression coefficients for the models. There were no significant associations between the interventions and behavioral beliefs. Therefore, hypothesis 12 was not supported.

Table 4.17 Intervention Modality Predicting Behavioral Beliefs, Attitude, and Intention

Parameter	Estimate	Std. Error	df	t	Sig.
Dependent Variable: Behavioral beliefs					
Intervention: None/Pretest	-1.35	1.65	232.71	-0.82	.415
Intervention: Analytical	1.02	1.29	169.83	0.79	.428
Intervention: Narrative	0.16	1.34	195.12	0.12	.904
Dependent Variable: Attitude					
Intervention: None/Pretest	-1.05	0.33	198.23	-3.22	.002
Intervention: Analytical	-0.09	0.16	137.61	-0.56	.579
Intervention: Narrative	0.18	0.16	147.72	1.11	.267
Dependent Variable: Behavioral intention					
Intervention: None/Pretest	-0.29	0.18	220.53	-1.66	.098
Intervention: Analytical	-0.06	0.12	151.79	-0.46	.649
Intervention: Narrative	0.00	0.12	150.63	-0.04	.971

Note: Combined modality is established as the reference group for comparison purposes. Coefficients for design group not displayed for concision.

The pretest showed lower attitude (B = -1.05, p = .002) compared to the combined intervention. There were no associations between the single modalities and combined modalities for attitude. Thus, hypothesis 13 was not supported. There were no significant associations between the intervention modalities and behavioral intention. Therefore, hypothesis 14 was not supported.

Intervention Modality and Normative Beliefs, Control Beliefs, Subjective Norms, Perceived Behavioral Control

H_{15}: *Combined modality has no effect on normative or control beliefs.*

H_{16}: *Combined modality has no effect on subjective norms or perceived behavioral control.*

To address H_{15} and H_{16}, the independent variable included in the models were the video type (pretest, analytical, narrative, or combined modality) with combined serving as the reference group. The dependent variables were normative beliefs, control beliefs, subjective norms, and perceived behavioral control. An examination of normal P-P plots of the regression residuals revealed that the residuals were approximately normally distributed. An examination of scatterplots of residuals versus predicted values revealed that the data were homoscedastic. Variance inflation factors were all below 10 (Max = 1.00), indicating that there was no severe multicollinearity in the models.

Table 4.18 displays the fixed effects regression coefficients for the models. The pretest showed lower levels of normative beliefs (B = -6.88, p = .004), and the narrative intervention was associated with higher levels of normative beliefs (B = 4.92, p = .012) compared to combined modalities. There were no significant associations between the video types and control beliefs. Hypothesis 15 was partially supported.

The pretest showed lower levels of subjective norms (B = -0.56, p = .003) and perceived behavioral control (B = -1.67, p < .001) compared to the combined intervention. The analytical intervention was associated with lower levels of perceived behavioral control (B = -0.66, p = .015) compared to the combined. Thus, hypothesis 16 was not supported.

Table 4.18 Intervention Modality Predicting Normative Beliefs, Control Beliefs, Subjective Norms, and Perceived Behavioral Control

Parameter	Estimate	Std. Error	*df*	*t*	Sig.
Dependent Variable: Normative beliefs					
Intervention: None/Pretest	-6.88	2.37	240.66	-2.90	.004
Intervention: Analytical	1.28	1.96	138.25	0.65	.515
Intervention: Narrative	4.92	1.93	170.64	2.55	.012
Dependent Variable: Control beliefs					
Intervention: None/Pretest	-1.47	2.69	208.55	-0.55	.586
Intervention: Analytical	-2.21	2.57	195.47	-0.86	.391
Intervention: Narrative	3.76	2.17	143.72	1.73	.085
Dependent Variable: Subjective norms					
Intervention: None/Pretest	-0.56	0.19	211.56	-2.99	.003
Intervention: Analytical	-0.18	0.14	132.48	-1.26	.210
Intervention: Narrative	0.02	0.13	153.66	0.13	.899
Dependent Variable: Perceived behavioral control					
Intervention: None/Pretest	-1.67	0.35	196.13	-4.70	< .001
Intervention: Analytical	-0.66	0.27	156.18	-2.45	.015
Intervention: Narrative	-0.51	0.28	177.58	-1.85	.066

Note: Combined modality is established as the reference group for comparison purposes. Coefficients for design group not displayed for concision.

Emotional Response, Behavioral Beliefs, Attitude, and Behavioral Intention

H_{17}: Emotional response has a positive effect on behavioral beliefs.

H_{18}: Emotional response has a positive effect on attitude.

H_{19}: Emotional response has a positive effect on behavioral intention.

To address H_{17}, H_{18}, and H_{19}, the independent variables included in the models were the measures of discrete emotions (anger, disgust, fear, anxiety, sadness, desire, relaxation, and happiness). The dependent variables were behavioral beliefs, attitude, and behavioral intention.

An examination of normal P-P plots of the regression residuals revealed that the residuals were approximately normally distributed. An examination of scatterplots of residuals versus predicted values revealed that the data were homoscedastic. Variance inflation factors were all below 10 (Max = 9.48), indicating that there was no severe multicollinearity in the models.

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Table 4.19 displays the fixed effects regression coefficients for the models. There were

no significant associations between the discrete emotions and behavioral beliefs. Therefore,

hypothesis 17 was not supported.

Table 4.19 Discrete Emotions Predicting Behavioral Beliefs, Attitude, and Intention

Parameter	Estimate	Std. Error	df	t	Sig.
Dependent Variable: Behavioral beliefs					
Anger	-0.17	0.89	407.21	-0.19	.849
Disgust	0.13	1.04	382.11	0.13	.898
Fear	1.43	1.16	352.39	1.24	.218
Anxiety	-0.97	1.07	370.39	-0.90	.369
Sadness	-0.56	1.08	362.25	-0.52	.607
Desire	-1.55	1.01	410.81	-1.54	.124
Relaxation	0.15	0.74	401.88	0.20	.838
Happiness	0.33	0.89	379.55	0.37	.715
Dependent Variable: Attitude					
Anger	0.04	0.12	324.10	0.33	.740
Disgust	-0.11	0.14	314.59	-0.79	.432
Fear	0.16	0.15	298.21	1.07	.287
Anxiety	-0.01	0.14	302.78	-0.07	.946
Sadness	0.09	0.14	304.61	0.62	.538
Desire	-0.35	0.14	347.84	-2.55	.011
Relaxation	0.10	0.10	329.62	1.03	.303
Happiness	-0.04	0.12	325.09	-0.31	.755
Dependent Variable: Behavioral intention					
Anger	0.07	0.09	361.94	0.79	.432
Disgust	-0.08	0.10	332.90	-0.76	.446
Fear	0.08	0.11	280.13	0.74	.459
Anxiety	-0.01	0.10	325.60	-0.09	.927
Sadness	0.00	0.10	293.86	0.04	.969
Desire	-0.41	0.10	375.05	-4.10	< .001
Relaxation	0.02	0.07	359.23	0.33	.743
Happiness	0.04	0.09	339.46	0.50	.616

Note. Coefficients for design group not displayed for concision.

Desire scores were significantly negatively related to attitude ($B = -0.35$, $p = .011$). There were no other significant associations between discrete emotions and attitude. Thus, hypothesis 18 was not supported.

Desire scores were also significantly negatively related to behavioral intention ($B = -0.41$, $p < .001$). similarly, there were no other significant associations between discrete emotions and behavioral intention. Therefore, hypothesis 19 was not supported.

Emotional Response, Normative Beliefs, Control Beliefs, Subjective Norms, and Perceived Behavioral Control

H_{20}: Emotional response has no effect on normative or control beliefs.

H_{21}: Emotional response has no effect on subjective norms or perceived behavioral control.

To address H_{20}, and H_{21}, the independent variables included in the models were the measures of discrete emotions (anger, disgust, fear, anxiety, sadness, desire, relaxation, and happiness). The dependent variables were control beliefs, normative beliefs, subjective norms or perceived behavioral control.

An examination of normal P-P plots of the regression residuals revealed that the residuals were approximately normally distributed. An examination of scatterplots of residuals versus predicted values revealed that the data were homoscedastic. Variance inflation factors were all below 10 (Max = 9.48), indicating that there was no severe multicollinearity in the models.

Table 4.20 displays the fixed effects regression coefficients for the models. Anger ($B = 4.65$, $p = .001$) and anxiety ($B = 3.26$, $p = .047$) were significantly positively related to normative beliefs. Disgust ($B = -4.09$, $p = .010$) and desire ($B = -5.17$, $p = .001$) were significantly negatively related to normative beliefs. Thus, hypothesis 20 was partially supported.

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Table 4.20 Discrete Emotions Predicting Normative Beliefs, Control Beliefs, Subjective Norms, and Perceived Behavioral Control

Parameter	Estimate	Std. Error	df	t	Sig.
Dependent Variable: Normative beliefs					
Anger	4.65	1.38	350.18	3.37	.001
Disgust	-4.09	1.59	341.79	-2.58	.010
Fear	-0.81	1.74	324.50	-0.46	.644
Anxiety	3.26	1.63	320.55	2.00	.047
Sadness	-1.80	1.64	326.39	-1.10	.272
Desire	-5.17	1.58	369.31	-3.28	.001
Relaxation	-0.02	1.16	352.14	-0.01	.989
Happiness	1.62	1.40	346.62	1.16	.247
Dependent Variable: Control beliefs					
Anger	0.10	1.59	418.60	0.06	.950
Disgust	1.75	1.83	371.40	0.96	.340
Fear	-3.74	2.00	283.19	-1.87	.063
Anxiety	0.77	1.91	352.55	0.40	.687
Sadness	3.26	1.91	305.18	1.71	.088
Desire	-1.50	1.82	416.78	-0.82	.411
Relaxation	-0.67	1.34	412.08	-0.50	.618
Happiness	0.30	1.64	392.99	0.18	.856
Dependent Variable: Subjective norms					
Anger	0.26	0.10	355.65	2.58	.010
Disgust	-0.19	0.12	322.80	-1.60	.111
Fear	0.21	0.12	263.20	1.70	.091
Anxiety	-0.11	0.12	314.62	-0.89	.375
Sadness	-0.07	0.12	279.05	-0.55	.581
Desire	-0.22	0.12	360.08	-1.87	.062
Relaxation	-0.04	0.08	345.48	-0.48	.629
Happiness	0.10	0.10	322.13	0.97	.332
Dependent Variable: Perceived behavioral control					
Anger	0.41	0.20	358.62	2.09	.038
Disgust	-0.45	0.23	330.17	-1.99	.048
Fear	0.36	0.25	299.33	1.43	.153
Anxiety	-0.20	0.24	341.61	-0.85	.394
Sadness	-0.11	0.24	321.10	-0.48	.631
Desire	-0.28	0.23	375.70	-1.24	.217
Relaxation	-0.26	0.16	357.07	-1.57	.117
Happiness	0.23	0.20	338.22	1.14	.254

Note. Coefficients for design group not displayed for concision.

There were no significant associations between the discrete emotions and control beliefs. Anger was significantly positively related to subjective norms ($B = 0.26$, $p = .010$) and perceived behavioral control ($B = 0.41$, $p = .038$). Disgust was significantly negatively related to perceived behavioral control ($B = -0.45$, $p = .048$). Therefore, hypothesis 21 was not supported.

Summary of Hypothesis Tests

Due to the large number of tested hypothesis from several measures, this section provides an overview of the findings. A summary of the hypotheses test results follows.

The antecedents (participant need for affect approach, need for affect avoidance, transportability; and video narrative characteristic) of narrative involvement (measures of transportation and narrative engagement) for a group of 12 food safety training videos that differed by topic, length, and instructional style were compared. Need for affect approach and need for affect avoidance were not significantly related to either of the narrative involvement measures transportation or narrative engagement. However, the participant characteristic of transportability was significantly positively related to both transportation and narrative engagement. The video characteristic narrative structure was significantly positively related to both measures of narrative involvement.

Narrative involvement measures were positively related to some of the discrete emotion measures. Transportation was significantly positively related to happiness. Narrative engagement was significantly positively related to disgust, anxiety, fear, and sadness, but significantly negatively related to relaxation and happiness. Both measures of narrative involvement were significantly positively related to cognitive processing. Outcomes of narrative involvement were differentially related to training effectiveness. Fear and happiness showed positive relationships with training effectiveness, whereas disgust and sadness showed negative

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relationships with training effectiveness. Cognitive processing was significantly positively related to training effectiveness.

When narrative outcomes of three food safety training interventions (analytical, narrative, combined) about the topic of safe cooking temperatures were compared, analytical was associated with lower levels of transportation and narrative engagement compared to combined. There were no differences in transportation and narrative engagement between the narrative and combined intervention modalities.

There were differential effects on outcomes of narrative involvement when comparing analytical and narrative to the combined intervention. The analytical was associated with lower levels of anger, disgust, fear, anxiety, and sadness, and higher levels of relaxation and happiness compared to the combined. The narrative was associated with higher levels of anger, disgust, fear, anxiety, sadness, and lower levels of happiness compared to combined. The analytical was associated with lower levels of cognitive processing compared to combined; cognitive processing did not differ between the narrative and the combined. Both the analytical and narrative intervention showed significantly lower levels of training effectiveness than the combined.

A TPB framework was used to compare the analytical, narrative, and combined food safety training intervention modalities about safe cooking temperatures. There were no significant differences in behavioral beliefs, attitude, or behavioral intention between the intervention modalities. Normative beliefs differed by intervention, the pretest showed lower levels of normative beliefs, while the narrative intervention was associated with higher levels of normative beliefs compared to the combined intervention. There were no differences in control beliefs by intervention modality. The pretest showed lower levels of subjective norms and

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perceived behavioral control compared to the combined; the analytical was associated with lower levels of perceived behavioral control compared to combined modalities.

Emotional responses were also examined from within the TPB framework. There were no significant associations between the discrete emotions and behavioral beliefs. There were no positive associations between emotions and attitude or behavioral intention. However, desire was significantly negatively related to attitude and behavioral intention. There were no significant associations between the discrete emotions and control beliefs, but there were associations with normative beliefs. Anger and anxiety were significantly positively related to normative beliefs; disgust and desire were significantly negatively related to normative beliefs. Anger was significantly positively related to subjective norms and perceived behavioral control. Disgust was significantly negatively related to perceived behavioral control.

Chapter 5 - Discussion

In this study, four areas of inquiry were pursued; 1) What are the antecedents to and outcomes of involvement with food safety training videos; 2) how do narrative, analytical, and combined narrative and analytical food safety training intervention modalities differ in their outcomes of narrative involvement; 3) how do theory of planned behavior (TPB) constructs differ in response to viewing narrative, analytical, and combined narrative and analytical food safety training intervention modalities, and 4) How do discrete emotional responses effect the TPB framework. Explanation of the results are presented in the following paragraphs.

Repeated measures linear mixed effect models with random intercepts for participants were used. The repeated measurements across videos were modeled assuming an unstructured covariance structure. Specific fixed effects and outcome variables were included in the models to address the research objectives. To analyze the antecedents to and outcomes of involvement with food safety training videos 15 linear mixed models were used. Post hoc analysis of differences between means with a Bonferroni adjustment for multiple comparisons, with a significance level of $p =.05$ were used to compare transportation, narrative engagement, emotional response, cognitive response, and training effectiveness of the 12-video set.

To analyze how the narrative involvement outcomes of narrative, analytical, and combined food safety training intervention modalities differed, 12 linear mixed models were used. Post hoc analysis of differences between means with a Bonferroni adjustment for multiple comparisons, with a significance level of $p =.05$ were used to compare transportation, narrative engagement, emotional response, cognitive response, and training effectiveness of the four-intervention modality set.

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To determine how the TPB constructs differed in response to viewing narrative, analytical, and combined narrative and analytical food safety training intervention modalities, 14 linear mixed models were used. The combined intervention was used as the reference category, and t-tests were used to determine difference between regression parameters with a significance level of $p = .05$.

Data Collection

Data was collected through online surveys in multiple phases, first during the qualification, demographic, and participant characteristic phase, and then again after viewing either the videos or the intervention modalities. Surveys were hosted in Qualtrics and distributed to participants through the MTurk system. Location verification and ballot box stuffing prevention were utilized within MTurk and Qualtrics. A third-party solution was also employed to prevent these issues. Attention check questions were used to ensure data quality. During phase 2, participants selected the order and number of videos to view. Surveys were completed after each video. During phase 3 participants completed a TPB pretest, and were then assigned to one of six viewing order groups in which to watch the interventions. Surveys were completed after each intervention.

Participant Characteristics

Demographic characteristics of participants varied from national average characteristics in notable ways. Most participants were women (58.9%) and identified their race as White (72.3%). Nationally, foodservice and preparation workers were less likely to be female (52.5%) and less likely to be white (50.7%) than study participants (Gangopadhyaya & Waxman, 2020). There are also fewer Black (10.9% vs. 12.3%) and Hispanic (4.5% vs. 26.5%) participants than are seen nationally (Gangopadhyaya & Waxman, 2020). The median age of study participants

was 33 years, where the median age for foodservice employees nationally is 30 years (U.S. Bureau of Labor Statistics, 2020). A possible reason there are discrepancies between the demographics of study participants and the national foodservice workforce lies within the makeup of the MTurk population. Within the platform, 57.0% identify as female, 79.9% White, 9.1% Black, 20.4% Hispanic, and 66.5% under the age of 40 years (CloudResearch, 2020). With the exception of the race category Hispanic, the MTurk percentages are similar to those reported in this study. There could be fewer Hispanic participants than are reported in the MTurk population due to participants selecting the other, or more than one race categories within the survey.

Narrative Involvement and Food Safety Videos

Antecedents and Narrative Involvement

Overall, antecedents known to have significant effects on narrative involvement in other areas of persuasion, such as health behaviors or marketing, tend to be similar for food safety training videos. The following section discusses the interactions of need for affect approach, avoidance, and transportability with transportation and narrative engagement.

Need for Affect

In this study, the individual characteristics of need for affect approach, and avoidance, were not significantly related to either transportation or narrative engagement with the 12 food safety videos. Need for affect avoidance has been shown previously to be unrelated to transportation, but the lack of relationship between need for affect approach and narrative involvement is inconsistent (Appel & Richter, 2010). It would be imprudent, however, to suggest these findings are generalizable to other message contexts. One reason why approach and avoidance were not related to narrative involvement could be due to the lower levels of

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emotion generally found in training videos. Stronger emotion evoking content could be required to differentiate between individuals high in affect approach. Appel and Richter state that narratives must have enough emotional content for individuals high in need for affect to respond in an emotional way. Thus, it is possible that this group of food safety training videos did not possess enough emotion inducing content to generate a significant relationship between need for affect approach and the narrative involvement measures transportation and narrative engagement.

Nevertheless, food safety educators should resist the urge to blindly fill videos with emotional content in the hopes of increasing narrative persuasion. In this study, as affect avoidance levels increased, narrative involvement showed a decreasing trend. Though this trend did not reach significance, it suggests narrative content in food safety videos is decreasing levels of involvement for those who wish to avoid experiencing emotions. Thus, using too much emotional content may hinder, rather than assist, in persuading affect avoiding food handlers to perform safety behaviors.

Transportability

The individual characteristic transportability was significantly positively related to transportation and narrative engagement, which is consistent with the extended transportation imagery model (Van Lear et al., 2013), and the narrative engagement model (Busselle & Bilandzic, 2009). Busselle and Bilandzic (2009) describe transportation as a phenomenological state associated with narrative engagement. This study's findings that transportability had a significant positive relationship with narrative engagement supports their view.

Ethical Concerns for Persuasion Profiling

The use of dispositional traits such as transportability or need for affect is of both theoretical and applied interest. Taking personal differences in persuasion into account should increase the effectiveness of a food safety intervention by determining if an analytical or narrative approach is more appropriate. And if a narrative is chosen, how much affective content should be included. To accomplish this, persuasive profiles of individuals must be developed, which raises ethical concerns that food safety educators must consider (Berdichevsky & Neuenschwander, 1999; Appel et al., 2011). From a utilitarian perspective, employing persuasion profiles to reduce foodborne illness through improved messaging appears to be an ethically sound and efficient choice. But in reality, use of persuasive profiles is a means-adapted strategy (e.g., strategy that is outcome independent and can be applied to any belief or behavior change topic), persuasion profiles may not be clearly revealed as such to the message consumer (Appel et al., 2011). Further, narrative persuasion based on individual dispositional traits may occur outside of an individual's awareness, and without their consent to be persuaded. Food safety educators must carefully consider the ethics of gathering, protecting, and disclosing the use of persuasive traits in targeting interventions to individuals.

Narrative Structure

Last, narrative structure scores of the food safety videos were significantly positively related to transportation and narrative engagement, consistent with the extended transportation imagery model (Van Lear et al., 2013), and Busselle and Bilandzic (2009) views characteristics of the narratives as integral to narrative engagement. The narrative structure scale, which was developed to evaluate narrative advertisements, presents a useful tool for food safety educators to gauge narrative involvement.

Narrative Involvement and Outcomes

Despite the similarities of the narrative engagement and transportation persuasive models, the two measures of narrative involvement produced different cognitive and emotional outcomes within the food safety context. The following section discusses the interactions of transportation and narrative engagement with cognitive and emotional response, and perceived message effectiveness.

Transportation

The relationship between transportation and emotional and cognitive responses are shown in Figure 5.1. Based on Banerjee and Green (2012), who found transportation influenced both cognition and emotion in a parallel process of persuasion, this study hypothesized transportation would result in higher cognitive (more favorable) and emotional responses to the food safety videos. Transportation was significantly positively related to cognitive processing scores and one emotion, happiness. Because transportation is believed to reduce counterarguing and negative thoughts, findings of this study are consistent with the literature (Dunlop et al., 2010; Escalas, 2004; Green & Brock, 2000). The association of transportation with happiness is possibly context specific for the set of food safety videos, as surprise, anger, fear, sadness, happiness, guilt, and contentment have been associated with transportation in persuasion literature (Banerjee & Green, 2012; Dillard & Peck, 2001).
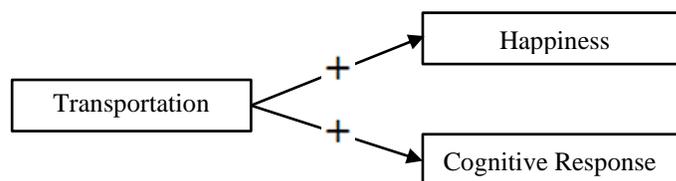

Figure 5.1 Emotion and Cognitive Outcomes of Transportation

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Narrative Engagement

In contrast to transportation, narrative engagement scores had significant relationships to many more discrete emotions. The relationship between narrative engagement and emotional and cognitive responses are shown in Figure 5.2. Narrative engagement was positively related to disgust, anxiety, fear, and sadness scores; and were significantly negatively related to relaxation and happiness. The richer profile of emotional responses could be a result of the narrative engagement scale measuring multiple facets of narrative involvement, as the subscales have been shown to produce different effects on cognitive and emotional outcomes (Johnson & Sangalang, 2017). Further, the concept of emotional flow (e.g., the path from one emotional state to another during narrative exposure) has been proposed as important in maintaining narrative involvement (Nabi & Green 2015). The multiple subscales of the narrative engagement measure could be detecting emotional changes experienced during narrative exposure in ways the unidimensional transportation scale cannot.
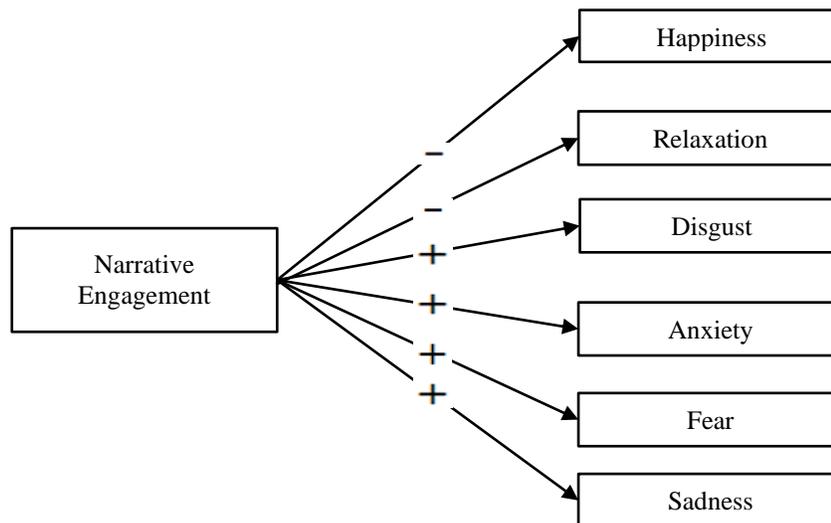

Figure 5.2 Emotion Outcomes of Narrative Engagement

Though the possibility of the narrative engagement scale being sensitive to changes in emotional flow is intriguing theoretically, this study only examined narrative involvement of the food safety videos as a group. Further study on individual messages should be conducted to determine how narrative engagement relates to discrete emotions within a single safety training offering.

Last, narrative engagement demonstrated no significant relationship to cognitive response. This is consistent with findings from Van Leeuwen et al. (2017) who suggested dimensions of narrative engagement influenced narrative outcomes through an experiential rather than cognitive pathway. In order to facilitate narrative persuasion, the experiential pathway relies on two components, emotional response and self-referencing, which is processing information by linking it to aspects of one's experiences (Burnkrant & Unnava, 1989). Thus, food safety educators have three possible mechanisms to exploit when creating interventions, cognitive, emotional, and experiential. Future research is warranted to determine which of these three proposed pathways are the most useful for persuasive message design within a food safety construct.

Perceived Effectiveness

Understanding perceived effectiveness of a persuasive narrative is important from both a pragmatic and theoretical standpoint, though perceived effectiveness is somewhat poorly operationalized in literature. If perceived effectiveness can predict anticipated message outcomes with sufficient precision, then perceived effectiveness could, at minimum, identify messages which are less effective before committing to their use.

In this study, perceived effectiveness was evaluated with a modified version of the general training effectiveness scale (Aziz, 2015), to better capture the perception of message

effectiveness for food safety training videos. Predictors of perceived effectiveness are shown in Figure 5.3. Cognitive processing was significantly positively related to perceived training effectiveness, a finding consistent with Dillard et al. (2007), meaning videos were found to produce agreement with the topics, and that these videos are likely to be successful in training. Fear and happiness scores were significantly positively related to training effectiveness. Disgust and sadness scores were significantly negatively related to training effectiveness. Unlike the Dillard et al. study, anger and surprise were not found to be predictive of perceived training effectiveness for the 12-video food safety training set studied. As a group, these videos did not possess enough emotion inducing content to generate a significant relationship between these emotions and perceived training effectiveness.

Aziz's general training effectiveness scale demonstrated significant associations with cognitive processing and emotional responses known to be activated in persuasion processes. Further development of a modified general training effectiveness scale as a measure of perceived effectiveness for use by food safety educators in the food safety intervention development process is warranted.
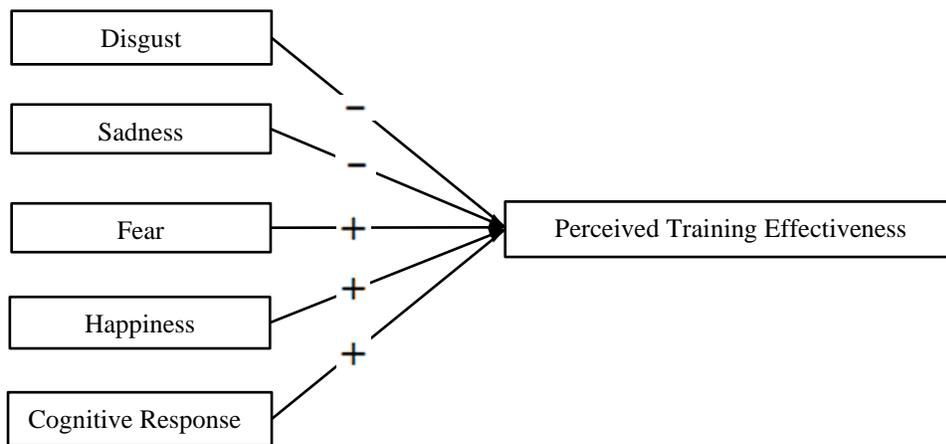

Figure 5.3 Cognitive and Emotion Predictors of Perceived Effectiveness

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Emotion Outcomes and Narrative Involvement

Six discrete emotions were found to have significant associations with narrative involvement measures for the food safety training videos studied, happiness, relaxation, disgust, anxiety, fear, and sadness. Four of them showed significant associations with perceived message effectiveness, disgust, sadness, fear, and happiness. The implications of these discrete emotions for food safety training are discussed in the next paragraphs.

Happiness and Relaxation. Relaxation, also referred to as satisfaction by Harmon-Jones et al. (2016a), and happiness are both positive emotions demonstrating varying degrees of approach motivation. Happiness is associated with strong approach motivation for goal attainment, whereas relaxation exhibits either a low approach or avoidance motivation that results in stasis, immobility, or a cessation of goal seeking after goal attainment (Harmon-Jones et al., 2016; Dillard & Shen, 2013). In persuasion, the felt emotion happiness results from the perception that a goal related event or acute movement toward a goal has occurred (Dillard & Nabi 2006). Similarly, relaxation is felt after a goal has been met. In this study, relaxation and happiness were most closely related to the analytical videos, which discussed practical applications of food safety topics in a lecture format, likely to be familiar with food handlers. Applying the food safety tactics presented in the analytical videos is likely congruent with the goals already established in their workplaces, so happiness and relaxation being significant is consistent with persuasion theory. Food safety educators could use the presence of expressed happiness and relaxation as indicators of consumer acceptance of the intervention.

Anxiety and Fear. Anxiety and fear are closely related high arousal negative emotions, which show avoidance motivational tendencies in response to a potential negative outcome (Harmon-Jones et al., 2016a; Wimmer et al., 2018). Anxiety is experienced as a result of

behavioral conflict or ambiguous potential threats, whereas fear occurs in the context of an acute threat with a high probability of immediate danger or harm (Dillard & Nabi 2006). Anxiety results in the desire to reduce ambiguity, increase situational control, and increase social affiliation. Anxiety has also been shown to result in the desire to both seek and heed advice from others while simultaneously decreasing the ability to evaluate advice quality (Gino et al., 2012). Similarly, fear is thought to activate a cascade of cognitive and emotional responses resulting first in increased attention to the threatening stimulus, followed by cognitive withdrawal, if the level of threat increases further. Additionally, a health behavior meta-analysis has shown that fear appeals were most effective when portraying a relevant threat in combination with solutions that increase perceptions of self-efficacy (Witte & Allen, 2000).

In this study, anxiety and fear were more closely associated with the narrative videos, which did not provide specific, overt information about how to address the food safety violations in an operational setting. Despite this, fear was still positively related to perceived training effectiveness for the food safety video group, suggesting the levels of fear were not high enough to induce cognitive withdrawal. Nevertheless, to maximize intervention effectiveness, food safety educators should include easy to implement operational solutions within narratives that induce the emotion fear. Anxiety inducing interventions could maximize their effectiveness by employing a similar strategy to fear, but provide operational solutions in a format that satisfies the desire to increase social affiliation and seek advice, such as small group discussions moderated by food safety educators.

Sadness and Disgust. Sadness is a negative, low arousal, and low control emotion. Though a part of the approach motivational system, sadness is characterized by avoidance, inaction, or withdrawal, and as such is the only negative emotion with low motivation intensity

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(Dillard & Nabi, 2006; Harmon-Jones et al., 2016). Sadness can result from the perception of irreversible loss or failure to achieve a goal, is usually assigned to situational factors or when fault cannot be attributed, and does not result in a retaliatory response or behavior (Angie et al., 2011). In this study, sadness was a response to the narrative videos, and was negatively related to video perceived training effectiveness. Previous research has shown that though message strength tends to be the most important predictor of effectiveness, consumers experiencing sadness or other negative emotions tend to participate in more systematic and issue relevant message processing. Thus, message consumers experiencing sadness recall and scrutinize weak messages more closely than strong ones (Mitchell et al., 2001). Educators who wish to induce sadness for persuasive effect should do so only with strong messages.

Disgust is a negative, high arousal, high control, aversive emotion with strong withdrawal tendencies. Disgust results from proximity to a noxious object or idea that results from the perception of defilement, and violations of purity or sanctity (Nabi, 2002). Disgust is associated with rejection and sanction, and therefore is a proactive strategy of avoidance.

There are four kinds of disgust, core, caused by body products or foods; animal nature, produced by features humans share with animals; interpersonal, elicited by strangers and outgroups; and sociomoral, produced by the violation of cultural norms or moral values (Rozin et al, 2016). Food safety frequently concerns topics including raw foods, pathogens, bodily products such as vomit or feces, and human sanitation behaviors. Therefore, multiple kinds of disgust are likely to be elicited in a food safety training context. Disgust may evoke such strong aversive and defensive responses that it may reduce engagement with safety interventions. Food safety educators may follow the suggestions of Rozin et al. (2016) who suggest habituation tactics as a possible way to reduce the counterproductive effects of disgust.

In mixed emotion messages, disgust and fear have been found to interact in unexpected ways. Disgust can have a negative effect in fear messaging, specifically high levels of fear and disgust together may result in withdrawal of cognitive resources (Leshner et al., 2010). Thus, food safety educators should avoid combining disgust and fear in the same intervention, and instead focus on one or the other.

Intervention Modality and Outcomes of Narrative Involvement

Intervention Modality and Narrative Involvement

Three food safety interventions (analytical, narrative, and combined analytical narrative) about cooking food to safe internal temperatures were created from two videos, one analytical and one narrative, selected from the original 12-video set. Measures of narrative involvement for the single intervention modalities (analytical and narrative) were compared to those of the combined intervention.

The analytical intervention was associated with lower levels of transportation and narrative engagement than the combined intervention. There was no significant difference in the relationship of transportation or narrative engagement when comparing the narrative intervention to the combined intervention.

It is unsurprising that the analytical intervention would produce lower levels of narrative involvement. However, it is notable that the combined intervention produced levels of narrative involvement that are no different than the narrative intervention. In other words, the presence of analytical training material (e.g., successive listing of specific time and temperature combinations for different foods) in the combined intervention did not interfere with the persuasive mechanisms of narrative involvement that were activated during the story about two school children dying from consuming undercooked foods. The results of this study are relevant

for future intervention design, as these findings suggest that the presence of analytical (fact-based) evidence may not diminish the possible beneficial persuasive outcomes of narrative involvement, which include cognitive efficiency, reduced counterarguing, and potential story-related attitude and belief changes (Busselle & Bilandzic, 2009; Dainton & Zelley, 2017; Green & Brock, 2000).

Cognitive, Emotion, and Perceived Effectiveness Outcomes

The outcomes of narrative involvement, cognitive response, discrete emotions, and perceived training effectiveness for the single intervention modalities (analytical and narrative) were compared to those of the combined intervention using linear mixed models. The analytical intervention was associated with lower cognitive processing scores than the combined. Further, cognitive processing levels were not significantly different between the narrative and combined interventions. These findings support literature that states narratives activate different persuasive pathways than analytical messages (Mazzocco & Green, 2011), and are consistent with the parallel process of cognitive and emotional activation in narrative persuasion as described by Banerjee and Greene (2012). The development of message consistent beliefs about using a thermometer to take the temperature of foods in the combined intervention was the same as in the narrative.

In most instances, discrete emotion outcomes for the combined intervention were intermediate to the analytical and narrative modalities. The analytical intervention was associated with significantly higher levels of relaxation and happiness, and lower levels of anger, disgust, fear, anxiety, and sadness.

The narrative intervention was associated with higher levels of the negative emotions anger, disgust, fear, anxiety, and sadness, and a lower level of happiness compared to the

combined intervention. These results suggest the discrete emotion outcomes for the analytical

(high relaxation and happiness) and narrative (high anger, disgust, fear, anxiety, sadness) were

significantly reduced when combined in an intervention. An understanding that analytical

message content might attenuate emotional responses could be relevant for future training design

as it is suggested in literature that a minimum threshold of emotional content must be present in a

message before narrative persuasion processes are initiated (Appel & Richter, 2010).

Perceived training effectiveness was highest for the combined intervention when

compared to the analytical and narrative interventions. The effectiveness of the combined

intervention is consistent with research by Kim et al. (2012) and Witte and Allen (2000), both of

whom noted the inclusion of more individual persuasive elements increased the effectiveness of

messages. As has been previously discussed, persuasive messages that employ fear are more

effective when they present a relevant threat (fatal foodborne illness from consuming

undercooked food) in combination with solutions that increase perceptions of self-efficacy (time

and temperature combinations for cooking foods safely). The inclusion of narratives should be

considered a viable option to increase the effectiveness of analytical food safety training

interventions, particularly when the narratives produce negative emotions like fear.

Comparing Intervention Modality within TPB Framework

The objective of this portion of the study was to determine how TPB constructs differ in

response to viewing narrative, analytical, and combined narrative and analytical food safety

training interventions, and to determine how discrete emotional responses effect the TPB

framework. Generalized estimating equations and linear mixed models were used to determine

the significant predictors of intention to cook foods to specific internal temperatures for each

intervention, and the relationships between the interventions and the TPB constructs. Discussion of the results are presented in the following paragraphs.

TPB Constructs by Intervention Modality

Linear mixed models with random intercepts for participants were used to examine the scores of the TPB constructs in the pretest and each of the intervention modalities. Scores for intention to cook foods to specific internal temperature were high in the pretest, analytical, narrative, and combined interventions. Behavioral intention scores increased slightly over the pretest for all three interventions post-test, but the increases did not reach significance. Intention at pretest was high, with a summated score of 19.12 ($SE = 0.20$) out of 21. This suggests the possibly of a ceiling effect that would make detecting increases post-intervention difficult.

All three of the intervention modalities produced higher scores for attitudes and perceived behavioral control than the pretest for cooking foods to specific internal temperatures. Narrative and combined interventions generated higher subjective norm scores than pretest. The analytical intervention had subjective norm levels similar to those found in the pretest. This may have occurred because the narrative featured strong emotion evoking content about foodborne illness deaths resulting from improperly prepared foods. Some of the normative referents identified in the elicitation study were featured in the intervention (e.g., coworkers, customers, family) and were likely more poignant in the narrative only intervention. Though no significant differences between the analytical, narrative, or combined interventions and other TPB constructs (e.g., behavioral intention, attitude, subjective norms, behavioral or control beliefs) were found, there is still some evidence that combining narrative and analytical persuasive message components could be useful for targeting perceived behavioral control and normative beliefs.

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Based on increases in TPB direct measure scores that are known predictors of behavioral intention, the use of narrative was more effective as an intervention than the analytical either when combining narrative and analytical elements together or when used alone. Though all three interventions showed increases in scores of attitude and perceived behavioral control over pretest, only the interventions containing narrative showed increases in levels of subjective norms. Subjective norms are considered highly influential on behavioral intention for food safety topics (Lin & Roberts, 2020). Because the increase in subjective norm scores occurred only in the intervention modalities containing the narrative, it is reasonable to assume educators could include narrative persuasive components, emotions in particular, in food safety interventions in order to specifically target subjective norms.

Predictors of Behavioral Intention

As is consistent with the findings of many other studies, attitudes, subjective norms, and perceived behavioral control are found to predict the intention to perform food safety behavior. However, the manifestations of the relationships vary from pre- to post-intervention. Population averaged models from generalized estimating equations using robust estimators of covariance indicated that at baseline, as determined by the pretest measures, subjective norm and perceived behavioral control were significant predictors of intention to cook foods to specific internal temperatures. This indicates participants felt positive social pressure and an ability to cook foods to specific internal temperatures as important in determining their intention to do so. At baseline, attitude was not found to significantly predict intention, indicating a lack of favorable appraisal of cooking foods to specific internal temperatures in their intentions. This could be because food handlers may follow suboptimal food safety practices and rely on other indicators of doneness while cooking, or consider "doneness" rather than safety when finishing food. It is

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not unusual for cooks to judge food doneness by physical appearance (e.g., changes in color or firmness), instead of using a thermometer to check if safe internal temperatures are reached.

However, significant predictors of behavioral intention changed post-intervention for all three interventions. Post-intervention, attitude and subjective norm predicted behavioral intention. This can be interpreted to mean that all three of the interventions increased the favorable evaluation of cooking foods to specific internal temperatures. Likewise, all three of the intervention modalities increased participant views that people of importance feel they should cook foods to specific internal temperatures. Perceived behavioral control lost direct significance as predictor of behavioral intention post intervention for all of the intervention modalities.

It should be noted that perceived behavioral control can have complex effects within the TPB framework. Some research suggests perceived behavioral control may show moderating effects on attitude and subjective norms, without showing direct effects on intention (Martinez & Lewis, 2016). This study investigated only direct effects of perceived behavioral control on behavioral intention. A more sophisticated analysis of perceived behavioral control as a moderator of attitudes and subjective norms could provide additional insight into changes in TPB constructs post intervention.

Emotion Outcomes and the TPB

Four discrete emotions were found to have significant associations with the TPB constructs, anger, anxiety, desire, and disgust. The relationships between emotions and the TPB construct are summarized in Figure 5.4. Anger and anxiety were associated with positive effects on the TPB constructs, while disgust and desire were associated with negative effects on TPB constructs. Only one of the TPB indirect measures showed significant relationships to the

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discrete emotions. Anger and anxiety had significant positive relationships to normative beliefs.

Disgust and desire had significant negative relationships to normative beliefs. All of the direct

measures of the TPB were associated with at least one discrete emotion. Desire had a significant

negative relationship with attitude and behavioral intention. Anger had a significant positive

relationship to subjective norms and perceived behavioral control. Disgust had a significant

negative relationship with perceived behavioral control. The relationship of emotions to the TPB

constructs are discussed in the next sections.

Anger

A previously mentioned, anger is a high arousal negative emotion known to show

approach motivational tendencies (Harmon-Jones et al., 2016a). Anger occurs when one feels

their efforts are threatened with negative outcomes by events or other people, which then
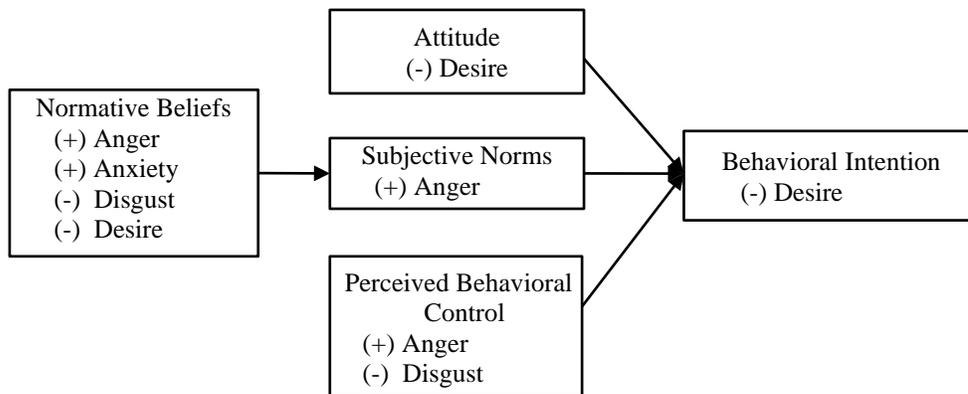
Figure 5.4 Effects of Discrete Emotions on TPB Constructs

motivates a punitive response. Anger, along with disgust and contempt, in some instances may

be considered an other-condemning moral emotion when it is focused on the interests of others

rather than the self, and is prompted by moral norm violations (Dastani & Pankov, 2017; Haidt

2003; Rozin et al., 1999). When moral anger is triggered, responses are intended to motivate

morally congruent behavior in defense of someone other than the person experiencing moral anger. The narrative intervention in this study presented a story where food handlers are shown failing to take the cooking temperatures of food they are preparing, resulting in the death of two children from eating the unsafely prepared food. It is reasonable to assume anger resulting from the narrative and combined interventions is moral anger expressed towards the food handlers on behalf of the dead children. In this study, anger's association with normative beliefs, subjective norms, and perceived behavioral control would be expected under conditions where moral anger was provoked. Anger predicted participants' strong desire to conform with the normative pressures of people who think they should cook foods to specific internal temperatures, and that they felt in control of cooking foods to specific internal temperatures. So, food safety training aimed at increasing subjective norms or perceived behavioral control could use anger to motivate uptake of the training behavior.

Disgust

Disgust is a negative high arousal withdrawal emotion associated with avoidance motivation (Harmon-Jones et al., 2016a; Wimmer et al., 2018). Disgust possesses both a core and moral component, and the outcomes of both should be considered in a discussion of disgust's relationship to TPB constructs. Though it seems counterintuitive for disgust to be negatively associated with adopting food safety behaviors, disgust can be a highly effective withdrawal emotion, and that those experiencing it may demonstrate general, rather than specific, avoidance behaviors (Shook et al., 2019). General avoidance behavior results in withdrawal from all stimulus and may limit information uptake. This limited information uptake could then result in incorrect or biased beliefs. Participants who experienced disgust may have withdrawn so fully that no information from the interventions were received. Similarly, if moral

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disgust is provoked, those who experience it respond in ways to separate themselves from the offending action, and possibly extinguish the desire to participate in the action (Dastani & Pankov, 2017; Haidt 2003; Rozin et al., 1999). The narrative intervention presented a story in which a supervisor tells food handlers to rush and finish cooking, then instructs them not to take the temperature of the food they are preparing. In this study, participants identified both supervisors and coworkers as important normative referents, thus it is reasonable to assume moral disgust from the narrative and combined interventions resulted in a desire to distance from the characters in the video, causing a negative relationship to normative beliefs. Further, the video showed a situation where food handlers were not allowed to take food temperatures by a supervisor, which is a situation that would reasonably result in a reduction in perceived behavioral control.

Disgust was a negative predictor of normative beliefs, which was related to a lack of willingness to conform to normative pressures of people who think they should cook foods to specific internal temperatures. Disgust was also a negative predictor of perceived behavioral control, which could have meant participants did not uptake the information needed to determine the perceived ease of cooking foods to specific internal temperatures. Or the narrative content had the unintended consequence of leading to the belief that participants do not have control over temperature practices, as was presented in the video. In the context of food safety, educators should be careful about the strong withdrawal tendencies produced by disgust.

Anxiety

As has been previously discussed, anxiety is a high arousal negative emotion closely related to the emotion fear, which shows avoidance motivational tendencies (Harmon-Jones et al., 2016a; Wimmer et al., 2018). Anxiety's tendency to result in the desire to increase social

affiliation is likely responsible for the positive relationship of anxiety to subjective norms. This

suggested participants strongly desired to avoid the negative outcomes of failing to conform with

the normative pressures of not cooking foods to specific internal temperatures. From a practical

standpoint, food safety educators could successfully use anxiety to increase normative constructs

within the TPB. Further, anxiety may be a preferred negative emotion over fear in persuasion, as

fear can result in cognitive withdrawal if elicited too strongly in a message.

Desire

Desire is a positive high arousal emotion associated with approach motivation (Harmon-

Jones et al., 2016a; Wimmer et al., 2018). Desire in the discrete emotions questionnaire is an

expression of the SEEKING[1] system which is associated with foraging behaviors in its simplest

form in animals, and curiosity or complex learning in humans (Wright & Panksepp, 2012).

When considering the SEEKING system from the complex perspective of human experience,

Kashdan (2012) explains that biologically, learning is necessary for survival, but that the

SEEKING system must be disengaged to assimilate information during the learning process.

Therefore, if SEEKING is still activated, it is possible the learning process is still in the

information gathering stage. Thus, higher scores of the discrete emotion desire could have

indicated participants were in early stages of learning.

Desire was found to be a negative predictor of normative beliefs, attitude, and behavioral

intention. High levels of desire may have indicated participants have yet to develop a

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[1] The term SEEKING, along with the designations of six other emotional control systems, is capitalized by convention of the affective neuroscientist Jaak Panksepp to differentiate these brain systems from common language emotion labels. For example, activity of the SEEKING brain system may be described by the emotional terms desire or expectancy.

willingness to conform to normative pressures of people who think they should cook foods to specific internal temperatures (normative beliefs), have not developed a positive evaluation of cooking foods to specific internal temperatures (attitude), and are unready to cook foods to specific internal temperatures (behavioral intention) because they are still actively seeking information in order to make these belief changes.

If the inclusion of narratives is considered a viable option to increase the effectiveness of analytical food safety training interventions, careful consideration must be given to the selection of motivational emotions present in the narrative. Anger and anxiety could be effective emotions for motivating food safety behavior change. This research suggests the use of disgust, due to the strong general withdrawal response it can induce, may inhibit the uptake of food safety behaviors.

Chapter 6 - Conclusion

The findings of this research are summarized in this chapter. Implications, limitations, and suggestions for future research are discussed.

Summary of Study

Food safety education continues to be an important tool in the fight against foodborne illness. Using narratives may be more persuasive and increase knowledge retention compared to traditional analytical delivery methods used in education and training. This research examined the effectiveness of both analytical educational videos and videos using narrative techniques on food safety behavior outcomes.

The extended transportation imagery model was employed as the theoretical basis for investigating the emotional and cognitive antecedents and outcomes of food safety interventions (Van Laer et al., 2013). The theory of planned behavior (TPB) was used as the framework for determining the relationship between food safety behavior outcomes (e.g., attitude, subjective norms, perceived behavioral control, behavioral intention) and the emotional and cognitive outcomes of food safety interventions (Ajzen, 1985).

This study crowd sourced survey data from MTurk participants during three phases of research. Linear mixed models and generalized estimating equations were used to explore the relationships between the antecedents and outcomes of narrative involvement, and the relationship of emotional responses to attitude, subjective norms, perceived behavioral control, and behavioral intention after viewing narrative and analytical food safety videos.

Phase 1

The goal of phase 1 was to characterize both participants and food safety training videos for study in the project. Demographic data and characteristics thought to affect interaction with narratives (e.g., antecedents of narrative involvement) were collected from participants.

A two-part survey, distributed through MTurk, collected demographic, need for affect, and transportability data. Participant qualification procedures combined demographic filters available through MTurk and demographic questions composed in the Qualtrics survey platform. The survey was open to MTurk workers who resided in the USA. No restrictions on number of human intelligence tasks (HITs) or approval rating percentage were utilized. Narrative characteristics of available food safety training videos were also measured.

Twelve food safety training videos were selected for study through a two-part process, consisting of identification and narrative characteristics scoring. YouTube was searched for analytical and narrative videos about food safety topics. Criteria for inclusion in the study were: (a) less than nine minutes; (b) in English; and (c) professionally produced with clear audio and video elements. Videos meeting these criteria were primarily analytical covering topics such as allergies, cross contamination, health and hygiene, cleaning and sanitizing, temperature control, handwashing, and norovirus control. Next, a panel of three food safety experts independently scored the group of 12 food safety videos using the narrative structure scale. The six-item narrative structure scale was used to further support video characterization as narrative or analytical (Escalas et al., 2004). The narrative structure scale assessed features known to be present in narratives, such as chronology, causal relationships, character development, and focus on a specific event rather than abstractions or generalities. Responses were scaled from 1 (not at all) to 7 (very much so).

Phase 2

In phase 2, participants were invited to view up to 12 of the food safety videos characterized in phase 1 and completed a survey after each measuring narrative involvement and its outcomes. Outcomes of narrative involvement measured were cognitive response, discrete emotional response, and perceived training effectiveness. Further, a set of two videos about a single food safety topic, one narrative and one analytical, were selected for further study in phase 3. The videos were selected based on high narrative involvement, emotion, and training effectiveness scores.

Narrative involvement was evaluated by measuring two constructs, transportation and narrative engagement. The six-item transportation scale-short form (Appel, et al., 2015) measured participants' emotional and mental involvement with the videos and the degree to which participants are transported into a story. Responses were scaled from 1 (not at all) to 7 (an extreme amount). The 12-question narrative engagement scale asked questions from factors associated with narrative involvement beyond the phenomenological state of transportation. Responses were scaled from 1 (strongly disagree) to 7 (strongly agree).

Cognitive response was gauged by a six-item scale measuring the valence and amount of cognitive processing (Stephenson & Palmgreen 2001). The cognitive response scale measures agreement with the information provided in the video from 1 (strongly disagree) to 7 (strongly agree), and how much the participant thought in general about the contents of the video from 1 (not at all) to 7 (a great deal). Composite scores combining valence and amount were calculated by multiplying the average valence by average amount.

Individual discrete emotions were measured by the 40-item discrete emotions questionnaire (Harmon-Jones et al., 2016a). The discrete emotions questionnaire sought to

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determine the level of eight discrete emotions (e.g., anger, disgust, fear, anxiety, sadness, desire, relaxation, happiness) experienced in response to a stimulus. Responses were scaled from 1 (not at all) to 7 (very much so) for each emotion.

Perceived training effectiveness was measured by a modified version of the general training effectiveness scale which rated the success of training interventions based on perceptions of learning, individual performance, and organizational performance (Aziz, 2015). Responses to the 10-item general training effectiveness scale questions were measured from 1 (not at all) to 7 (an extreme amount).

Two training videos, one analytical and one narrative about cooking foods to specific internal temperatures were selected for study in phase 3. The videos were selected based on high narrative involvement, emotion, and training effectiveness scores.

Phase 3

Phase 3 had three purposes: (1) to compare the antecedents and outcomes of narrative involvement of combined video modalities (e.g., analytical and narrative together), versus single modalities; (2) to compare the effects of combined and single modalities on TPB constructs; and (3) compare the effects of emotions evoked by combined and single modalities on TPB constructs. To achieve this three food safety intervention modalities were tested from the videos selected in phase 2. One narrative and one analytical video about using safe cooking temperatures were selected as the narrative and analytical modalities. A combined intervention was created by editing the analytical and narrative videos together into a two-part intervention. Participants viewed three food safety video interventions and then completed a survey measuring narrative involvement, cognitive response, emotional response, training effectiveness, direct and

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indirect measures of attitude, subjective norms, perceived behavioral control, and behavioral intention.

As recommended by Ajzen (2011), an elicitation study was performed to determine the salient behavioral, normative, and control beliefs about cooking food to a specific internal temperature. A salient belief questionnaire was developed, which included a definition of using cooking foods to specific internal temperatures, followed by seven open-ended questions that probed beliefs about safe temperatures. These salient beliefs were used to construct the indirect measures of attitude, normative beliefs, and perceived behavioral control within the TPB measure.

The TPB surveys contained both direct and indirect measures of attitudes, subjective norms, and perceived behavioral controls (Ajzen, 2011a; Roberts et al., 2008; Roberts et al., 2018). In the 17-item direct measure section of the questionnaire, participants were presented with four subscales measuring attitudes, subjective norms, perceived behavioral control, and behavioral intention. Five semantic differential items measured attitude about specific cooking temperatures with responses scaled from 1 (extremely bad, worthless, useless, foolish, unpleasant) to 7 (extremely good, valuable, useful, wise, pleasant). Perceived behavioral control was measured by five items, which rated if participants felt they could cook foods to specific temperatures. Responses were scaled from 1 (strongly disagree) to 7 (strongly agree). Subjective norms were measured by three items which rated the beliefs of important people about cooking foods to specific temperatures. Responses were scaled from 1 (strongly disagree) to 7 (strongly agree). Behavioral intention was measured by three items which rated participant intention to cook food to specific temperatures. Responses were scaled from 1 (strongly disagree) to 7 (strongly agree).

Behavioral beliefs, normative beliefs, and control beliefs were determined by the combination of belief strengths and belief outcomes related to cooking foods to specific temperatures. Responses from the elicitation study guided the development of questions for the indirect measures. Composite scores were generated by multiplying belief strengths and belief outcomes, with composite scores ranging from -21 to 21. Behavioral beliefs were measured by four items rating behavioral belief strength from 1 (strongly disagree) to 7 (strongly agree). Corresponding outcome evaluations of behavioral beliefs were rated from -3 (extremely unimportant) and 3 (extremely important). Normative beliefs were measured by seven items rating beliefs of important persons from 1 (strongly disagree) to 7 (strongly agree). Motivation to comply with normative beliefs were measured by seven items from -3 (strongly don't care) and 3 (strongly care). Control belief strengths were measured by five items rating factors affecting the ease (or difficulty) of cooking foods to specific internal temperatures from 1 (strongly disagree) to 7 (strongly agree). Perceived power of control beliefs was rated from -3 (strongly disagree) and 3 (strongly agree).

Analysis

Scale reliability analysis was conducted in JASP (version 0.11). Main analysis of models was conducted in SPSS (version 27). Narrative characteristic score, an ICC estimate with 95% confidence interval was calculated based on a mean-rating ($k = 3$), absolute-agreement and 2-way mixed-effects model. Linear mixed models and generalized estimating equations were used to determine relationships between predictor and outcome variables.

Major Findings

Out of a total of 8,723 screened MTurk workers, 502 were eligible for participation in the study. There were more females (58.9%) than males. Most participants (58.1%) possessed a

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food safety certification. Number of years employed as a food handler ranged from one to 35. The majority (36.1%) of the participants had attended at least some college.

Research objective 1: Determine how need for affect and transportability effect narrative involvement by measuring consumer transportation and narrative engagement.

The antecedents (participant transportability, need for affect approach and avoidance) of narrative involvement (measures of transportation and narrative engagement) were compared for a group of 12 food safety training videos that differed by topic, length, and instructional style. Need for affect approach and avoidance were not significantly related to the either of the narrative involvement measures of transportation or narrative engagement. Thus, no relationship between either narrative involvement measures and an individual's motivation to approach or avoid emotion was found. The individual characteristic transportability was significantly positively related to transportation. Transportability was also significantly related to narrative engagement.

Research objective 2: Determine how narrative characteristics effect narrative involvement by measuring consumer transportation and narrative engagement.

Narrative structure scores of the food safety videos were significantly positively related to transportation and narrative engagement, consistent with the extended transportation imagery model. Food safety training videos possessing features known to be present in narratives, such as chronology, causal relationships, character development, and focus on a specific event, rather than abstractions or generalities, resulted in more narrative involvement as evidenced by higher transportation and narrative engagement scores.

Research objective 3: Determine how emotional outcomes vary with transportation and narrative engagement by measuring the discrete emotions experienced.

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Both transportation and narrative engagement were significantly related to discrete emotions, though their relationships to emotions differed in number and complexity. Transportation was significantly positively related to happiness. Transportation was not related to other emotions in response to viewing the food safety video panel. Narrative engagement was significantly positively related to the four discrete emotions of disgust, anxiety, fear, and sadness. Narrative engagement was significantly negatively related to two emotions, relaxation, and happiness. Narrative engagement was significantly related to more emotions overall and had both positive and negative associations.

Research objective 4: Determine how cognitive outcomes vary with transportation and narrative engagement by measuring cognitive response.

Transportation and narrative engagement were not related to cognitive processing in the same way. Transportation was positively related to cognitive response. Narrative engagement demonstrated no significant relationship to cognitive response. Different pathways of narrative influence have been proposed for transportation and narrative engagement, and evidence for these different pathways are seen in this study. Transportation is thought to influence narrative through emotions and narrative consistent cognitions, while narrative engagement through a different pathway referred to as experiential rather than cognitive.

Research objective 5: Determine how perceived effectiveness varies with cognitive and emotional responses by measuring perceived training effectiveness.

Both cognitive and discrete emotion outcomes of narrative involvement were significantly related to perceived training effectiveness. Discrete emotions showed positive and negative relationships with perceived training effectiveness. Fear and happiness were significantly positively related to training effectiveness. Disgust and sadness were significantly

negatively related to perceived training effectiveness. Similarly, cognitive processing was significantly positively related to training effectiveness. Surprisingly, anger and surprise were not found to be predictive of perceived training effectiveness for the 12-video food safety training set studied. This could be because as a group, these videos did not possess enough emotion inducing content to generate a significant relationship between these emotions and perceived training effectiveness.

Research objective 6: Examine how narrative modality, e.g., narrative, analytical, or a combination of narrative and analytical, influences narrative involvement, emotional, cognitive, and perceived effectiveness outcomes.

Three food safety interventions (analytical, narrative, and combined analytical narrative) about cooking food to safe internal temperatures were created from two videos, one analytical and one narrative, selected from the original 12-video set. Measures of narrative involvement, discrete emotions, cognitive response, and perceived training effectiveness for the single intervention modalities (analytical and narrative) were compared to those of the combined intervention. The analytical intervention was associated with lower levels of transportation and narrative engagement than the combined intervention. There was no significant difference in the relationship of transportation or narrative engagement when comparing the narrative intervention to the combined.

The analytical intervention was associated with lower levels of cognitive processing than the combined intervention. Further, cognitive processing levels were not significantly different between the narrative and combined interventions.

In most instances, discrete emotion outcomes for the combined intervention fell between the levels of discrete emotions achieved by the analytical and narrative modalities. The

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analytical intervention was associated with significantly higher levels of relaxation and happiness, but was associated with lower levels of anger, disgust, fear, anxiety, and sadness than the combined intervention. The narrative intervention was associated with higher levels of anger, disgust, fear, anxiety, and sadness, and lower levels of happiness compared to the combined intervention. These results suggest the discrete emotion outcomes for the analytical intervention (high relaxation and happiness) and narrative intervention (high anger, disgust, fear, anxiety, sadness) were significantly reduced when combined in a single intervention.

Perceived training effectiveness was highest for the combined intervention when compared to the analytical and narrative modalities. This relationship between intervention and perceived training effectiveness is consistent with findings that the inclusion of more persuasive elements increased message effectiveness.

Research objective 7: Determine if combining narrative and analytical modalities increases beliefs associated with intention to perform food safety behaviors within the TPB framework over analytical or narrative modalities alone.

A TPB framework was used to compare the analytical, narrative, and combined food safety training intervention modalities for the food safety behavior of cooking foods to specific internal temperatures. When considering the direct measures of attitude, subjective norms, perceived behavioral control, and behavioral intention, there were no significant differences in attitude or behavioral intention between the intervention modalities. The pretest showed lower levels of subjective norms and perceived behavioral control compared to the combined intervention. The analytical intervention was associated with lower levels of perceived behavioral control compared to the combined intervention.

When considering the indirect measures of behavioral beliefs, normative beliefs, and control beliefs, no significant differences in behavioral beliefs were found between the intervention modalities. Normative beliefs varied by intervention, the pretest showed lower levels of normative beliefs, while the narrative was associated with higher levels of normative beliefs compared to combined. There were no differences in control beliefs by intervention.

Research objective 8: Determine if relationships exist between emotional response outcomes and TPB constructs.

Discrete emotional responses to the analytical, narrative, and combined training interventions were also examined within the TPB framework. When considering the direct measures of attitude, subjective norms, perceived behavioral control, and behavioral intention, desire was found to be significantly negatively related to attitude and behavioral intention. Anger was significantly positively related to subjective norms and perceived behavioral control. Disgust was significantly negatively related to perceived behavioral control.

When considering the indirect measures of behavioral beliefs, normative beliefs, and control beliefs, there were significant associations between four discrete emotions and normative beliefs. Anger and anxiety were significantly positively related to normative beliefs. Disgust and desire were significantly negatively related to normative beliefs. There were no significant associations between the discrete emotions and behavioral beliefs or control beliefs.

Implications

The importance of stories and narrative persuasion in education, training, and marketing has been documented in literature. This study investigates the antecedents and outcomes of narrative persuasion in response to food safety training videos and applies the extended transportation imagery model, the narrative engagement and comprehension model, and the TPB

to food safety training. This provides a new view of the mechanisms involved in food safety behavior change.

Extensive research in persuasion exits in health behavior, marketing, and other disciplines, but little research applying these mechanisms has been done within a food safety context. Previous studies have explored the antecedents (participant need for affect approach, avoidance, and transportability) of narrative involvement (measures of transportation and narrative engagement) within marketing, communication, and health behavior disciplines. This research was the only known to study these antecedents and outcomes of narrative involvement for a group of 12 food safety training videos that differed by topic, length, and instructional style. This research provides insight into food handler traits and narrative persuasion mechanisms within food safety training, giving food safety educators additional tools for judging the effectiveness of interventions. For example, several characteristics of narratives have been shown to increase persuasive effectiveness, and this research adapted a scale previously used for marketing research to the study of food safety training interventions. Narrative structure from this adapted measure was found to be positively related to both transportation and narrative engagement, thus demonstrating its potential utility in studying both mechanisms of narrative persuasion because it is predictive of both transportation and narrative engagement mechanisms.

The narrative structure scale indicated many food safety training videos possessed features known to be present in narratives, such as chronology, causal relationships, character development, and focus on a specific event rather than abstractions or generalities. These features resulted in more narrative involvement. The narrative structure scale could be used in future food safety training design to measure levels of narrative characteristics needed to induce behavior change.

The importance of storytelling and narrative persuasion in education, training, and marketing is becoming increasingly realized. This project studied emotion directly and expanded knowledge of what makes a successful food safety intervention. Affect analysis has not been widely used in food safety intervention studies, and this research supports the utility of using emotion in designing educational interventions in the future. Studies could target specific emotions (anger, disgust) in training to determine the effectiveness of the intervention. Food safety educators could then design more effective interventions by carefully considering the complex effects of emotional responses.

This study used a scale of eight self-reported discrete emotions, rather than general positive or negative affect, as a measure of the emotional outcomes of transportation and narrative engagement. Previous research has shown transportation and narrative engagement were related to emotional outcomes, but suggested the association was through different mechanisms. Results of this study support that transportation and narrative engagement differ in their mechanisms of narrative persuasion within a food safety discipline. This provides two ways to investigate the effectiveness of narratives in future training design; through the state change induced by transportation, or through the multifaceted lens of engagement and comprehension. This study did not investigate the subscales of the engagement and comprehension model, but the results that both transportation and engagement detect the emotional and cognitive outcomes related to persuasion shows promise for food safety educators to use either scale to judge the potential success of an intervention.

Additional support for different mechanisms for narrative persuasion can be seen through the relationship of transportation to cognitive response in this study. No relationship of narrative engagement to narrative consistent cognitions was found. Future research should focus on which

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subscales of the narrative engagement measure are most useful for food safety intervention design.

Understanding perceived effectiveness of a persuasive narrative is important from both a pragmatic and theoretical standpoint. Though perceived effectiveness is somewhat poorly defined in literature, its importance when implementing an intervention is clear. This study uses a modified version of the general training effectiveness scale (Aziz, 2015) to overcome the lack of definition consensus for message effectiveness. Both cognitive processing and discrete emotions showed significant relationships to perceived effectiveness. A modified version of the perceived training effectiveness scale provides a fuller operationalization of training effectiveness which could provide a more complete evaluation of intervention effectiveness in the future. Use of the general training effectiveness scale benefits food safety training designers because it focuses on training outcomes such as knowledge and operational outcomes. As a result, it assists food safety educators involved in intervention design by providing a way to proactively evaluate interventions before implementation rather than reactively after training.

Previous research suggests combining different persuasive elements increased the effectiveness of a message. In this study, when narrative message components were combined with analytical ones, better narrative involvement outcomes resulted, which should result in better safety training outcomes. Further, this relationship was found to extend to perceived training effectiveness. Future food safety intervention design should benefit from the combination of narrative elements with analytical trainings by means of increasing the uptake of food safety behavior knowledge featured in the training.

This study provides evidence for how discrete emotion outcomes change when combining analytical and narrative components in an intervention. The combined intervention

emotion levels were intermediate to those of the analytical, which showed lowest levels, and narrative modalities which showed the highest levels. An understanding that combining analytical and narrative message content might attenuate emotional responses could be relevant for future training design, as it is suggested in literature that a minimum threshold of emotional content must be present in a message before narrative persuasion processes are activated.

A considerable body of research supports the TPB as a successful framework for predicting the intention to perform a food safety behavior. All three video intervention types demonstrated improvement in one or more of the TPB direct measures that predict behavioral intention. In all intervention modalities, subjective norms were the most influential predictor of behavioral intention. Though no significant increases in mean levels of behavioral intention were found over pretest levels, as behavioral intention was high in all cases, the findings of this study further support the importance of subjective norms in identifying intention to perform a food safety behavior.

This is the only food safety intervention study to-date that identifies a set of discrete emotions (e.g., anger, anxiety, disgust, desire) associated with TPB constructs. As future food safety interventions are developed, this knowledge will be useful in furthering the understanding of the affective basis of motivation within the TPB by determining which emotions are most likely to induce changes in the measured constructs, knowledge that is vital to tailoring an effective intervention. For example, if initial research suggests influencing subjective norms as a viable way to improve behavioral intention, creating narratives that provoke emotions with moral responses such as anger or disgust may be warranted. Though in this study emotions such as anger, anxiety, or disgust were not found to have a relationship with behavioral intention, their relationship with other TPB constructs can be used as a starting point to investigate how

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emotions can be integrated into interventions to achieve greater intention to perform food safety behaviors.

Motivation to adopt a food safety behavior is essential to successful food safety training. This study has shown that narrative content of the interventions effects the trainee's food safety beliefs and should be an important consideration when seeking to change attitudes, subjective norms, and perceived behavioral control. If emotion provoking components are employed, this study provides evidence for the careful consideration of the use of four emotions, anger, anxiety, disgust, and desire in food safety training. There is evidence to support the use of anger and anxiety to increase food safety behavior associated normative and control beliefs. So, food safety training aimed at increasing subjective norms or perceived behavioral control could use anger or anxiety to motivate uptake of the training behavior. Food safety training educators should be cautious about presenting threat in narratives that provoke fear rather than anxiety, as fear, particularly in combination with disgust can result in a cascade of responses resulting in cognitive withdrawal. As some level of disgust will always be a part of food safety education due to the nature of the topic, the level of threat presented in narratives should be carefully evaluated.

Moreover, evidence that the emotions desire and disgust interfere with safety behavior associated beliefs are also important. Disgust is strongly associated with many of the topics of food safety (e.g., illness, contamination, bodily fluids). Food safety professionals may enjoy reading about foodborne illness symptomology, but the food handlers taking the training intervention may not. Therefore, educators must be careful not to invoke disgust too powerfully, because withdrawal from the food safety message could result. The emotion desire likely does

not inhibit behavioral intention. Rather, it is an indicator that more information is being sought to support adoption of the food safety behavioral intention.

Limitations

There are limitations to this research that should be considered. This study was limited to foodservice workers within the MTurk marketplace. Demographic differences between the MTurk population and the general United States population are frequently noted in literature (Cheung et al.,2017; Harms & DeSimone, 2015; Smith et al., 2015). Additionally, differences between the demographics of MTurk workers describing themselves as at least part-time food handlers differs from the population of foodservice workers in the United States. Additionally, this study was limited to English speaking participants, which may have resulted in demographic differences between what was observed in the participants and the population of foodservice workers in the United States. Therefore, the ability to generalize the findings of this study to the wider population of foodservice workers in the United States may be limited and should be undertaken with care.

Of the 8,723 workers screened, approximately 175 were identified as accessing the surveys from outside of the United States. Theoretically, survey access was limited to workers within the United States through the MTurk system, nevertheless workers from outside of the United States were able to access the qualifying questions. A third-party service was used to verify participant locations by comparing IP addresses to those recognized as from outside of the United States. The absolute accuracy of this third-party service is unknown. Thus, even with this second line of defense against workers from outside of the United States accessing the surveys, it is difficult to know with certainty the geographic location of all participants.

For ease of data collection, the food safety training videos selected for study in this research were less than nine minutes long. Nine minutes was chosen as the maximum video length in order to accommodate a specific food safety training narrative of interest to the researchers. Only videos shorter than this length were considered for inclusion. Using only short videos, rather than a random sample of all available food safety videos potentially introduced bias into the study.

The measures of emotion used in this research were based in discrete emotion theory, which states a small group of biologically determined emotional responses are associated with distinct neurological activity and facial expressions, which are universal across cultures. Studying only this small group of discrete emotions provides no information about the wider theorized emotional states, such as amusement, aesthetic appreciation, or boredom (Cowen & Keltner, 2017), that may be relevant to food safety training design.

Measuring the antecedents and outcomes of narrative involvement along with TPB constructs made it difficult to balance measuring multiple theoretical constructs with an acceptable survey length. Often, the choice to use short forms of measures or reduced item sets was necessary to reduce survey length. Using reduced item measures limits the ability to fully explore the relative contribution of subscales in the original measures. Additionally, the transportation scale short form was developed for written material. Though it can be easily reworded to reflect video viewing, the transportation scale short form was not developed with video stimuli.

Though reduced length measures were used where appropriate, the surveys were relatively long. Questionnaire length and constraints within the MTurk system may have resulted in nonresponse bias. Both nonresponse during the initial wave of surveys and attrition in the

follow up surveys occurred, though it is unknown if survey attrition was due to failure to recontact participants, submission failures due to technical issues, or participant noncooperation.

Further limitations became apparent during data analysis. Not all variables met the assumptions of normality and homoskedasticity. Fixed effects within linear mixed models generally are quite robust to conditions of non-normality and heteroskedasticity, so where possible, linear mixed models were used without data transformation. Under conditions of marked non-normality, heteroskedasticity, or when linear mixed models failed to converge, generalized estimating equations were employed.

This study examined the effects of combining narrative and analytical interventions for one food safety behavior. Though the combined cooking temperature intervention was more effective than narrative and analytical interventions alone, this finding currently cannot be generalized to other food safety behaviors. Further study on other food safety behaviors is warranted.

The TPB is a successful framework for predicting the intention to perform a food safety behavior, however some constructs in this study did not demonstrate expected relationships. There was a lack of relationship between control beliefs and perceived behavioral control. Additionally, perceived behavioral control did not predict behavioral intention after any of the intervention modalities. Last, there was no change in behavioral intention from pre- to post-intervention for any of the interventions.

Last, and perhaps most important within a TPB framework, this study did not address actual food safety behavior, only behavioral intent. Though intent predicts behavior, it does not do so perfectly. This research made no attempt to measure participants actual safe cooking

temperature behavior. Additional research should examine which intervention modalities are more successful in increasing observed food safety behaviors.

Future Research

This research was largely exploratory and provides a basis for future investigation of narrative persuasion and affect analysis within a food safety training framework. Considering the limitations previously discussed, some recommendations for future research exist. First, the use of a MTurk convenience sample of workers self-reporting as food handlers met the goals of the current study within economic constraints. However, a study using a sample drawn from a general foodservice worker population should be replicated in the future. Results should be more appropriately generalizable. Further, replication of the study will provide results that can be compared to the findings of the current study to further evaluate whether the relationships between narrative persuasion, emotion, TPB constructs, and food safety behaviors are confirmed.

Second, research should be replicated using the full measures of transportation, transportability, and need for affect. Because the short forms contain fewer items assessing each measure, using the long-form measures could allow a more nuanced investigation of the subscales within the measures and emotional, cognitive, belief, and intention outcomes. Additionally, a more complete investigation of narrative engagement should be performed to determine how the component subscales are related to discrete emotions, cognition, training effectiveness, and the TPB constructs.

Greater understanding of how narrative involvement affects changes in beliefs, attitudes, and behavioral intentions within a food safety training framework is warranted. Future research should explore how the state of transportation and the process of narrative engagement predict changes attitude, subjective norms, perceived behavioral control, and behavioral intention. Based

on differences in emotions and cognition, this research supports transportation and narrative engagement differ in their mechanisms of narrative persuasion within a food safety discipline. This provides two ways to investigate the effectiveness of narratives in future training design; through the state change induced by transportation, or through the multifaceted lens of engagement and comprehension.

Though this study looked broadly at the narrative persuasion mechanisms for a 12-video group of food safety training interventions, it only investigated a single food safety behavior in-depth. Most foodborne illness that is caused by food handlers results from one of three food safety failure types, temperature control, sanitation and food handling, and handwashing. Future research should investigate the influence of different food safety failures within the narrative persuasion paradigm.

This study showed four discrete emotions affected constructs within the TPB for interventions associated with cooking food to specific internal temperatures, future research should investigate the association of emotions with different food safety behaviors and interventions. Though it is likely discrete emotions, such as anger, will have an association with motivation to adopt a food safety behavior, whether anger functions the same way for different types of food safety concerns has not been determined.

Equally important research would be to determine the impact of emotions, particularly disgust, on other food safety behaviors. Research should explore if the relationship seen between emotional response and cooking food to specific internal temperatures is also found when studying other food safety behaviors. Future research could also explore the threshold levels of disgust within an intervention that induce general avoidance behavior.

Within the TPB framework, additional studies should be conducted to explain why constructs in this study did not demonstrate expected relationships. There was a lack of relationship between control beliefs and perceived behavioral control. Similarly, perceived behavioral control did not predict behavioral intention after any of the intervention modalities. Last, there was no change in behavioral intention from pre- to post-intervention for any of the interventions. Further research is needed to better understand these relationships.

Last, and perhaps most important within a TPB framework, the effects of narrative persuasion and emotion inducing food safety interventions must be determined on actual food safety behaviors. Future research should attempt to measure participants actual behavior in conjunction with their self-reported intention to cook to safe temperatures. Additional research should examine which intervention modalities, narrative, analytical, or combined are more successful at increasing observed food safety behaviors.

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Appendix A - IRB Approvals

KANSAS STATE
UNIVERSITY | University Research Compliance Office

TO: Dr. Kevin Roberts   Proposal Number: 9712
            Hospitality Management
            106 Justin Hall

FROM: Rick Scheidt, Chair
            Committee on Research Involving Human Subjects

DATE: 03/25/2019

RE: Proposal Entitled, "Food safety makes me happy: Using emotion to improve training"

The Committee on Research Involving Human Subjects / Institutional Review Board (IRB) for Kansas State University has reviewed the proposal identified above and has determined that it is EXEMPT from further IRB review. This exemption applies only to the proposal - as written – and currently on file with the IRB. Any change potentially affecting human subjects must be approved by the IRB prior to implementation and may disqualify the proposal from exemption.

Based upon information provided to the IRB, this activity is exempt under the criteria set forth in the Federal Policy for the Protection of Human Subjects, **45 CFR §46.101, paragraph b, category: 2, subsection: ii.**

Certain research is exempt from the requirements of HHS/OHRP regulations. A determination that research is exempt does not imply that investigators have no ethical responsibilities to subjects in such research; it means only that the regulatory requirements related to IRB review, informed consent, and assurance of compliance do not apply to the research.

Any unanticipated problems involving risk to subjects or to others must be reported immediately to the Chair of the Committee on Research Involving Human Subjects, the University Research Compliance Office, and if the subjects are KSU students, to the Director of the Student Health Center.

TO: Dr. Kevin Roberts
Hospitality Management
106 Justin Hall

FROM: Rick Scheidt, Chair
Committee on Research Involving Human Subjects

DATE: 04/25/2019

RE: Proposal #9712.1, entitled "Food safety makes me happy: Using emotion to improve training."

A MINOR MODIFICATION OF PREVIOUSLY APPROVED PROPOSAL #9712,
ENTITLED, "Food safety makes me happy: Using emotion to improve training"

The Committee on Research Involving Human Subjects at Kansas State University has approved the proposal identified above as a minor modification of a previously approved proposal, and has determined that it is exempt from further review. This exemption applies only to the most recent proposal currently on file with the IRB. Any additional changes affecting human subjects must be approved by the IRB prior to implementation and may disqualify the proposal from exemption.

Unanticipated adverse events or problems involving risk to subjects or to others must be reported immediately to the IRB Chair, and / or the URCO.

It is important that your human subjects project is consistent with submissions to funding/contract entities. It is your responsibility to initiate notification procedures to any funding/contract entity of changes in your project that affects the use of human subjects.

203 Fairchild Hall, Lower Mezzanine, 1601 Vattier St., Manhattan, KS 66506-1103 | 785-532-3224 | fax: 785-532-3278
comply@k-state.edu | k-state.edu/comply

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TO: Dr. Kevin Roberts
Hospitality Management
106 Justin Hall

FROM: Rick Scheidt, Chair
Committee on Research Involving Human Subjects

DATE: 03/02/2020

RE: Proposal #9712.2, entitled "Food safety makes me happy: Using emotion to improve training."

A MINOR MODIFICATION OF PREVIOUSLY APPROVED PROPOSAL #9712.1,
ENTITLED, "Food safety makes me happy: Using emotion to improve training"

The Committee on Research Involving Human Subjects at Kansas State University has approved the proposal identified above as a minor modification of a previously approved proposal, and has determined that it is exempt from further review. This exemption applies only to the most recent proposal currently on file with the IRB. Any additional changes affecting human subjects must be approved by the IRB prior to implementation and may disqualify the proposal from exemption.

Unanticipated adverse events or problems involving risk to subjects or to others must be reported immediately to the IRB Chair, and / or the URCO.

It is important that your human subjects project is consistent with submissions to funding/contract entities. It is your responsibility to initiate notification procedures to any funding/contract entity of changes in your project that affects the use of human subjects.

Appendix B - Informed Consent Survey Items

Informed Consent Phase 1

PRINCIPAL INVESTIGATOR: Kevin Roberts, PhD
CO-INVESTIGATOR: Tracee Watkins, MBA

CONTACT NAME AND PHONE FOR ANY PROBLEMS/QUESTIONS:
Tracee Watkins, Department of Hospitality Management, 152 Justin Hall, tracee1@ksu.edu,
Manhattan, KS 66506

IRB CHAIR CONTACT/PHONE INFORMATION:
Rick Scheidt, Chair, Committee on Research Involving Human Subjects, 1 Fairchild Hall,
Kansas State University, Manhattan, KS 66506, (785) 532-3224.
Cheryl Doerr, Associate Vice President for Research Compliance, 203 Fairchild Hall, Kansas
State University, Manhattan, KS 66506, (785) 532-3224

SPONSOR OF PROJECT: Kansas State University

PURPOSE OF THE RESEARCH: The purpose of this research is to determine how stories
presented in videos may be used to improve safety training.

PROCEDURES OR METHODS TO BE USED: Surveys and video observations will be
conducted to determine what videos, or combinations of videos, are most effective for safety
training. This research measures viewer facial muscle movements, emotions, involvement with
videos, attitudes, and beliefs about safety. Participant opinion of training video effectiveness
will also be evaluated.

LENGTH OF STUDY: The qualifying survey should take no longer than three minutes.

RISKS OR DISCOMFORTS ANTICIPATED: No known risks to health or mental capacity
are expected.

BENEFITS ANTICIPATED: Videos are designed for safety training; there is a potential
educational benefit to you for participating. Additionally, this research will benefit society by
increasing safety training knowledge.

EXTENT OF CONFIDENTIALITY: Information provided will be confidential. No personal
information will be collected. The information that will be collected as part of this research could

be used for future research studies or distributed to other investigators for future research studies without additional informed consent.

I understand this project is research, and that my participation is completely voluntary. I also understand that if I decide to participate in this study, I may withdraw my consent at any time, and stop participating at any time without explanation. I understand withdrawing from the study prohibits participation in any additional HITS associated with this research. By checking the box below, I verify that I have read and understood this consent document, and willingly agree to participate in this study under the terms described.

- ❍ Agree
- ❍ Disagree

Welcome to the survey

After viewing a short video, you will be asked a series of questions about what you saw. On average, answering the questions should take you around 10 minutes. If you would like to contact the principal investigator in the study to discuss this research, please e-mail Tracee Watkins, tracee1@ksu.edu

You must be able to see and hear the video. Please watch the video carefully and give it your full attention, as you will be asked questions about the content.

Failure to complete all parts of the survey, completing the survey in an unreasonably short time, or providing poor quality data will invalidate your survey response. **This survey employs attention checks**.

Please note that this survey is best displayed on a laptop or desktop computer. Some features may be less compatible for use on a mobile device.

      ❍ Agree to participate
      ❍ Disagree to participate

Phase 3: Elicitation Study

This survey will ask questions about your beliefs on using a thermometer to check temperatures while preparing food as a part of your job. These questions require answers that are **short phrase** or **sentence** answers, though you may write more if needed.

Some questions may seem similar, but they are measuring different aspects of your beliefs. Please provide thoughtful responses to all questions about cooking temperatures and thermometer use beliefs.

Detailed consent forms and IRB information are found in the qualifying survey that you completed to join this study. If you would like more information, contact the principal investigator through the MTurk system, or e-mail Tracee Watkins, tracee1@ksu.edu.

Would you like to participate in this survey?
   ○ Yes, I would like to participate.
   ○ No thanks, I do not want to participate.

Phase 3: Theory of Planned Behavior Pretest

This survey will ask questions relating to your beliefs about food safety.
Some questions may seem similar, but they are measuring different aspects of your beliefs.
Please provide thoughtful responses to all questions.
Detailed consent forms and IRB information are found in the qualifying survey that you completed to join this study. If you would like more information, contact the principal investigator through the MTurk system, or e-mail Tracee Watkins, tracee1@ksu.edu.

Would you like to participate in this survey?

- ❍ Yes, I would like to participate.
- ❍ No thanks, I do not want to participate.

Phase 3: Theory of Planned Behavior Posttest

This survey employs attention checks

 Failure to complete all parts of the survey, completing the survey in an unreasonably short time, or providing poor quality data will invalidate your response and you will not receive the completion code. Please note that this survey is best displayed on a laptop or desktop computer.

Consent forms and IRB information are found in the qualifying survey that you completed to join this study. If you would like more information, contact the principal investigator through the MTurk system, or e-mail Tracee Watkins, tracee1@ksu.edu.

Would you like to participate in this survey?
- ❍ Agree to participate
- ❍ Disagree

Appendix C - Phase 1 Survey

Phase 1 Qualifying Survey

WARNING: Due to our IRB specifications, this survey is only open to respondents in the United States. You may not use a virtual private server, network, or proxy to hide your country. This survey uses a protocol to check that you are responding from inside the United States. In order to take this survey, you must turn off your VPS/VPN/proxy and add-blocking applications if you are using them. Failure to do so may prevent you from completing the HIT. Additionally, this survey employs attention checks to verify data quality. Failure of attention checks and other indicators of poor data quality will prevent you from completing and/or receiving compensation for the HIT.

Our check has detected that you are using a Virtual Private Server (VPS) or proxy to mask your country location. This has caused a number of problems with MTurk data.

Because of this, you are ineligible to participate in this study. If you are located in the United States, please turn off your VPS the next time you participate in a survey-based HIT as requested in the warning message at the beginning. If you are outside of the United States, we apologize but this study is limited to U.S. participants.

Thank you for your interest in our study.

If you have received this message in error, please report it to the requester for this study and enter your MTurk Worker ID below.

_____

Our check indicates that you are attempting to take this survey from a location outside of the United States. As per our IRB protocol, this study is limited to U.S. participants only.

Thank you for your interest in our study.

Our checks were unable to verify your country location. We ask you to please assist us in getting

this protocol correct. Please contact the requester for this HIT to report the problem.

Please enter your MTurk Worker ID number below.

Once you select Next, you will be taken to the survey (and thus certifying that you are taking this survey from the United States and not using a VPS). We will be checking locations manually for those who reach this point, and you will be contacted if this check identifies you as violating these requirements.

_____

Informed Consent Phase 1

PRINCIPAL INVESTIGATOR: Kevin Roberts, PhD
CO-INVESTIGATOR: Tracee Watkins, MBA **CONTACT NAME AND PHONE FOR ANY PROBLEMS/QUESTIONS:**
Tracee Watkins, Department of Hospitality Management, 152 Justin Hall, tracee1@ksu.edu, Manhattan, KS 66506
IRB CHAIR CONTACT/PHONE INFORMATION:
Rick Scheidt, Chair, Committee on Research Involving Human Subjects, 1 Fairchild Hall, Kansas State University, Manhattan, KS 66506, (785) 532-3224.
Cheryl Doerr, Associate Vice President for Research Compliance, 203 Fairchild Hall, Kansas State University, Manhattan, KS 66506, (785) 532-3224
SPONSOR OF PROJECT: Kansas State University
PURPOSE OF THE RESEARCH: The purpose of this research is to determine how stories presented in videos may be used to improve safety training.
PROCEDURES OR METHODS TO BE USED: Surveys and video observations will be conducted to determine what videos, or combinations of videos, are most effective for safety training. This research measures viewer facial muscle movements, emotions, involvement with videos, attitudes, and beliefs about safety. Participant opinion of training video effectiveness will also be evaluated.
LENGTH OF STUDY: The qualifying survey should take no longer than three minutes.
RISKS OR DISCOMFORTS ANTICIPATED: No known risks to health or mental capacity are expected.
BENEFITS ANTICIPATED: Videos are designed for safety training; there is a potential educational benefit to you for participating. Additionally, this research will benefit society by increasing safety training knowledge.
EXTENT OF CONFIDENTIALITY: Information provided will be confidential. No personal information will be collected. The information that will be collected as part of this research could be used for future research studies or distributed to other investigators for future research studies without additional informed consent. **I understand this project is research, and that my**

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participation is completely voluntary. I also understand that if I decide to participate in this study, I may withdraw my consent at any time, and stop participating at any time without explanation. I understand withdrawing from the study prohibits participation in any additional HITS associated with this research. By checking the box below, I verify that I have read and understood this consent document, and willingly agree to participate in this study under the terms described.

    ❍ Agree
    ❍ Disagree

I understand this is a qualifying survey. Answering the questions honestly is vital to the success of the research. Your truthful and thoughtful contribution is greatly appreciated.

What is your MTurk ID number? Please copy and paste it below.

If you previously entered your MTurk ID number during the country verification process, please enter it again.

_____

Employment: In your job, or jobs if you have more than one, what percent of your time is spent performing these tasks? In this question, a job is defined as a paid position of regular employment.

Food preparation : _____
Administrative tasks : _____
Directly managing or supervising others : _____
Cleaning, sanitation : _____
Customer service, support, sales : _____
Teaching, researching, educating, training others : _____
Manufacturing, construction : _____
Operations management : _____
Medical, dental, nursing, healthcare : _____
Other, please describe briefly : _____
Total : _____

End of Block: Welcome and Consent

Start of Block: Do Not Qualify Notification

We are sorry, but you do not meet the demographic qualifications for this study.

Doggos don't demographic either, but you are still awesome.

Please select a three-digit code and enter it in the space below and in the survey identification code area inside MTurk. Codes that do not match cannot be verified and may not be compensated.

Thank you for your interest in our research.

_____

When considering emotions, it is important for me to _____

	Strongly disagree	Disagree	Somewhat disagree	Neither	Somewhat agree	Agree	Strongly agree
be in touch with my feelings.	○	○	○	○	○	○	○
know how others are feeling.	○	○	○	○	○	○	○
explore my own feelings.	○	○	○	○	○	○	○

I think emotions _____

	Strongly disagree	Disagree	Somewhat disagree	Neither	Somewhat agree	Agree	Strongly agree
help people get along in life.	○	○	○	○	○	○	○
are dangerous- they tend to get me into situations that I would rather avoid	○	○	○	○	○	○	○

When considering my own emotions, I _____

	Strongly disagree	Disagree	Somewhat disagree	Neither	Somewhat agree	Agree	Strongly agree
feel that I need to experience strong emotions regularly.	○	○	○	○	○	○	○
would prefer not to experience either the lows or highs of emotion.	○	○	○	○	○	○	○
find strong emotions overwhelming and therefore try to avoid them.	○	○	○	○	○	○	○

When considering my own emotions, I _____

	Strongly disagree	Disagree	Somewhat disagree	Neither	Somewhat agree	Agree	Strongly agree
do not know how to handle my emotions, so I avoid them.	❍	❍	❍	❍	❍	❍	❍
see that in the past I tended to be afraid of emotions, so I avoided them.	❍	❍	❍	❍	❍	❍	❍

When watching videos _____

	Strongly disagree	Disagree	Somewhat disagree	Neither	Somewhat agree	Agree	Strongly agree
characters seem real to me.	❍	❍	❍	❍	❍	❍	❍
they affect me emotionally.	❍	❍	❍	❍	❍	❍	❍

When watching videos _____

	Strongly disagree	Disagree	Somewhat disagree	Neither	Somewhat agree	Agree	Strongly agree
I can become so absorbed in watching videos that I forget the world around me.	○	○	○	○	○	○	○
I am mentally involved in videos while watching them.	○	○	○	○	○	○	○
This is an attention check, please select "disagree"	○	○	○	○	○	○	○

End of Block: Attention Check

Start of Block: Attention Check Warning

Unfortunately, you did not successfully complete the data quality attention checks that were referenced in the warning at the beginning of this study:

WARNING: Due to our IRB specifications, this survey is only open to respondents in the United States. You may not use a virtual private server, network, or proxy to hide your country. This survey uses a protocol to check that you are responding from inside the United States. In order to take this survey, you must turn off your VPS/VPN/proxy and add-blocking applications if you are using them. Failure to do so will prevent you from completing the HIT. ___Additionally, this survey employs attention checks to verify data quality. Failure of attention checks and other indicators of poor data quality will prevent you from completing and/or receiving compensation for the HIT.___

Thank you for your interest in our research.

End of Block: Attention Check Warning

Start of Block: Demographics

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Now we would like to learn a bit more about you.
These questions provide depth to the data we gather and allows us to make better use of our results. Thank you for your truthful responses.

What is your gender?
- ○ Male
- ○ Female
- ○ Nonbinary, other _____
- ○ Prefer not to answer

What is your age in years?

_____

Does a hearing problem cause you difficulty when listening to TV or radio?
- ○ No
- ○ Yes

What is your race or ethnicity?
- ❑ White
- ❑ Hispanic or Latinx
- ❑ Black or African American
- ❑ American Indian or Alaska Native
- ❑ Asian
- ❑ Native Hawaiian or Pacific Islander
- ❑ Some other race or origin

What is your first or primary language?
- ○ English
- ○ Spanish
- ○ French
- ○ Chinese (Cantonese, Mandarin, or other)
- ○ Some other language _____

Which of the following best describes your educational level?
- ○ High school degree or equivalent
- ○ Some college
- ○ Associate degree (2-year degree)
- ○ Bachelor's degree (4-year degree)
- ○ Graduate degree

What is your employment status?
- ○ Full time, greater than 34 hours per week
- ○ Part time, 1 to 34 hours per week
- ○ Currently unemployed

In what industry or industries are you employed? Please select all that apply.
- ❑ Education, institutions, or health service
- ❑ Leisure and hospitality
- ❑ Other, please describe _____

In which part or parts of the leisure and hospitality industry are you employed? Please select all that apply.

- ❑ Food and beverage
- ❑ Travel and tourism
- ❑ Lodging
- ❑ Recreation
- ❑ Other, please describe _____

Which best describes your job or jobs in the leisure and hospitality industry? Please select all that apply.
- ❑ Management
- ❑ Cook, chef, cafeteria worker, food handler
- ❑ Server, cashier, hostess, bar
- ❑ Event planning
- ❑ Reservations, front desk
- ❑ Other, please describe _____

In which part or parts of the education, institutions, or health service industries are you employed? Please select all that apply.

- ❑ Hospital or retirement facility
- ❑ School
- ❑ University
- ❑ Other, please describe _____

Which best describes your job or jobs in the education, institutions, or health service industries? Please select all that apply.
- ❑ Management, administration
- ❑ Cook, chef, cafeteria worker, food handler
- ❑ Server, cashier, dietary aide
- ❑ Education
- ❑ Medical, dental, nursing
- ❑ Corrections
- ❑ Other, please describe _____

End of Block: Employment

Start of Block: Data Quality Check 2

How many years in total have you been employed in the production of food?

If you are not involved in the production of food, enter 0.

_____

End of Block: Data Quality Check 2

Start of Block: Food Safety Training

Have you received any formal (classroom, online, seminar) food safety training?
- ○ Yes
- ○ No

Have you received any on-the-job food safety training?
- ○ Yes
- ○ No

Do you have a certification in food safety/safe food handling?
- ○ Yes
- ○ No

What food safety certification do you have? Please provide the name of the certification.

_____

End of Block: Food Safety Training

Start of Block: ID Number

Thank you for completing the survey.
The survey identification number is: ${e://Field/Random%20ID}
Please copy your survey identification number and paste it in the appropriate question in MTurk. When you have copied the survey identification number, please click below to verify you have completed the identification process.

- ○ I have copied my survey identification number into MTurk.

Thank you for participating in our survey.
Please click the arrow button below to submit your survey responses.

End of Block: ID Number

Appendix D - Phase 2 Survey

Phase 2 Survey Video 2

Welcome to the survey
After viewing a short video, you will be asked a series of questions about what you saw. On average, answering the questions should take you around 10 minutes. If you would like to contact the principal investigator in the study to discuss this research, please e-mail Tracee Watkins, tracee1@ksu.edu

You must be able to see and hear the video. Please watch the video carefully and give it your full attention, as you will be asked questions about the content.

Failure to complete all parts of the survey, completing the survey in an unreasonably short time, or providing poor quality data will invalidate your survey response. **This survey employs attention checks**.

 Please note that this survey is best displayed on a laptop or desktop computer. Some features may be less compatible for use on a mobile device.

- ❍ Agree to participate
- ❍ Disagree to participate

I understand this is a survey for a scientific research project. Answering the questions **honestly** is vital to the success of the research. Truthful and thoughtful contributions are greatly appreciated.

What is your MTurk ID number? Please copy and paste it here.

_____

Please give the video your undivided attention- we suggest you finish other HITs before beginning.

Do not advance to the questions before watching the entire video.

Timing
First Click
Last Click
Page Submit
Click Count

We are sorry, advancing from the video page before the video has ended prevents you from participation in this HIT.
Thank you for your interest in our research.

Which of the following best describes the topic of the video you just watched?
- ○ Allergy Communication
- ○ Handwashing
- ○ Temperature Control
- ○ Norovirus Control
- ○ Cleaning and Hygiene
- ○ Cross Contamination Control
- ○ *E. coli* Illness

We are sorry, failing attention checks and other measures of data quality prevents you from participation in this HIT.
Thank you for your interest in our research.

The next four questions will present a series of statements about how involved you were with the training video while you were watching it. Please consider each statement carefully before selecting your answer.

How strongly do you agree or disagree with the following statements about the training video?

	Strongly disagree	Disagree	Somewhat disagree	Neither	Somewhat agree	Agree	Strongly agree
The video affected me emotionally	○	○	○	○	○	○	○
I wanted to learn how the video ended	○	○	○	○	○	○	○
I was mentally involved in the video while watching it	○	○	○	○	○	○	○
I could picture myself in the scene of the events described in the video	○	○	○	○	○	○	○

How strongly do you agree or disagree with the following statements about the training video?

	Strongly disagree	Disagree	Somewhat disagree	Neither	Somewhat agree	Agree	Strongly agree
The story created a new world, and then that world suddenly disappeared when the video ended	○	○	○	○	○	○	○
I felt sorry for some characters in the video	○	○	○	○	○	○	○
I had a hard time keeping my mind on the video	○	○	○	○	○	○	○
During the video, when a main character succeeded, I felt happy and when they suffered in some way, I felt sad	○	○	○	○	○	○	○

How strongly do you agree or disagree with the following statements about the training video?

	Strongly disagree	Disagree	Somewhat disagree	Neither	Somewhat agree	Agree	Strongly agree
While the video was on, I found myself thinking about other things	❍	❍	❍	❍	❍	❍	❍
My understanding of the characters is unclear	❍	❍	❍	❍	❍	❍	❍
The video affected me emotionally	❍	❍	❍	❍	❍	❍	❍
During the video, my body was in the room, but my mind was inside the world created by the story	❍	❍	❍	❍	❍	❍	❍

How strongly do you agree or disagree with the following statements about the training video?

	Strongly disagree	Disagree	Somewhat disagree	Neither	Somewhat agree	Agree	Strongly agree
At points, I had a hard time making sense of what was going on in the video	○	○	○	○	○	○	○
I found my mind wandering while the video was on	○	○	○	○	○	○	○
At times during the video, the story world was closer to me than the real world	○	○	○	○	○	○	○
I had a hard time recognizing the thread of the video	○	○	○	○	○	○	○
This is an attention check, please select "disagree"	○	○	○	○	○	○	○

End of Block: Narrative Involvement

Start of Block: Training Effectiveness

The next three questions present a series of statements about how effective the video could be for food safety training. Please consider each statement carefully before selecting your answer.

When considering how effective the video is for food safety training, how strongly do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Somewhat disagree	Neither	Somewhat agree	Agree	Strongly agree
I can list all the important facts emphasized in this video	O	O	O	O	O	O	O
My personal skills for safe food handling will improve after watching this video	O	O	O	O	O	O	O
I know how to work more safely using the knowledge learned in this video	O	O	O	O	O	O	O
The safe food preparation of my organization will improve due to the skills I learned and used from this video	O	O	O	O	O	O	O

When considering how effective this video is for food safety training, how strongly do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Somewhat disagree	Neither	Somewhat agree	Agree	Strongly agree
I know how to solve certain food safety problems using the skills taught in this video	○	○	○	○	○	○	○
I will be better at food safety tasks after watching this video	○	○	○	○	○	○	○
What I have learned in this video will improve my food safety job performance	○	○	○	○	○	○	○
This is an attention check, please select "agree"	○	○	○	○	○	○	○

When considering how effective this video is for food safety training, how strongly do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Somewhat disagree	Neither	Somewhat agree	Agree	Strongly agree
My performance of food safety tasks will improve because of applying the skills emphasized in this video	○	○	○	○	○	○	○
I can perform the food safety skills taught in this video	○	○	○	○	○	○	○
I will contribute to improving my organization's reputation for serving safe food due to this video	○	○	○	○	○	○	○

End of Block: Training Effectiveness

Start of Block: Cognitive Response Temperature Control

The next two questions present a series of statements about your thoughts while watching the training video. Please consider each statement carefully before selecting your answer.

How strongly do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Somewhat disagree	Neither	Somewhat agree	Agree	Strongly agree
In general, while watching the video did you agree or disagree with the effects of controlling temperatures in food?	○	○	○	○	○	○	○
In general, while watching the video did you agree or disagree about what failure to control temperatures in food can do to people?	○	○	○	○	○	○	○

Overall, how much did you:

	Not at all	Very little	Little	Somewhat	Much	Very much	A great deal
Think about reasons for controlling temperatures in food	O	O	O	O	O	O	O
Think rather than feel	O	O	O	O	O	O	O
Think about the consequences of not controlling temperatures in food described in the video	O	O	O	O	O	O	O
Think about how failure to control temperatures of food might affect your life or job	O	O	O	O	O	O	O

The next four questions present a series of words describing feelings or emotions you may have experienced while watching the training video. Please consider each word carefully before selecting your answer.

While watching the video, to what extent did you experience these feelings or emotions?

	Not at all	Slightly	Somewhat	Moderately	Quite a bit	Very much	An extreme amount
Sad	❍	❍	❍	❍	❍	❍	❍
Easy going	❍	❍	❍	❍	❍	❍	❍
Terror	❍	❍	❍	❍	❍	❍	❍
Wanting	❍	❍	❍	❍	❍	❍	❍
Lonely	❍	❍	❍	❍	❍	❍	❍
Desire	❍	❍	❍	❍	❍	❍	❍
Nausea	❍	❍	❍	❍	❍	❍	❍
Satisfaction	❍	❍	❍	❍	❍	❍	❍
Select "very much"	❍	❍	❍	❍	❍	❍	❍

While watching the video, to what extent did you experience these feelings or emotions?

	Not at all	Slightly	Somewhat	Moderately	Quite a bit	Very much	An extreme amount
Enjoyment	❍	❍	❍	❍	❍	❍	❍
Sickened	❍	❍	❍	❍	❍	❍	❍
Panic	❍	❍	❍	❍	❍	❍	❍
Nervous	❍	❍	❍	❍	❍	❍	❍
Empty	❍	❍	❍	❍	❍	❍	❍
Craving	❍	❍	❍	❍	❍	❍	❍
Calm	❍	❍	❍	❍	❍	❍	❍
Pissed-off	❍	❍	❍	❍	❍	❍	❍

While watching the video, to what extent did you experience these emotions or feelings?

	Not at all	Slightly	Somewhat	Moderately	Quite a bit	Very much	An extreme amount
Anger	❍	❍	❍	❍	❍	❍	❍
Grossed out	❍	❍	❍	❍	❍	❍	❍
Happy	❍	❍	❍	❍	❍	❍	❍
Dred	❍	❍	❍	❍	❍	❍	❍
Chilled out	❍	❍	❍	❍	❍	❍	❍
Scared	❍	❍	❍	❍	❍	❍	❍
Anxiety	❍	❍	❍	❍	❍	❍	❍
Mad	❍	❍	❍	❍	❍	❍	❍
Select "slightly"	❍	❍	❍	❍	❍	❍	❍

While watching the video, to what extent did you experience these emotions or feelings?

	Not at all	Slightly	Somewhat	Moderately	Quite a bit	Very much	An extreme amount
Rage	○	○	○	○	○	○	○
Revulsion	○	○	○	○	○	○	○
Fear	○	○	○	○	○	○	○
Relaxation	○	○	○	○	○	○	○
Grief	○	○	○	○	○	○	○
Longing	○	○	○	○	○	○	○
Worry	○	○	○	○	○	○	○
Liking	○	○	○	○	○	○	○

In the previous section you did not successfully complete the attention checks.

Data quality is very important to our team, but so is being fair to you- we know accidents can happen.
If you choose, you may retake four questions, or you may voluntarily leave the survey.
Failing the attention checks a second time invalidates your survey response and you will not receive the completion code.
We really hope you give it another try.

 Please indicate your decision below.
- ○ Retake the questions
- ○ Leave survey

The survey is complete.
Your survey identification number is ${e://Field/Random%20ID}

Please copy your survey identification number and paste it in the appropriate question in MTurk.

When you have copied the survey identification number, please click below to verify you have completed the identification process.

❍ I have copied my survey identification number. I understand the survey number will be used to match responses to my MTurk account for payment.

Thank you for participating in our survey.
Please click the forward arrow below to submit your response.

End of Block: ID Number

Appendix E - Phase 3 Surveys

Temperature Belief Elicitation Study

This survey will ask questions about your beliefs on using a thermometer to check temperatures while preparing food as a part of your job. These questions require answers that are **short phrase** or **sentence** answers, though you may write more if needed.

Some questions may seem similar, but they are measuring different aspects of your beliefs. Please provide thoughtful responses to all questions about cooking temperatures and thermometer use beliefs.

Detailed consent forms and IRB information are found in the qualifying survey that you completed to join this study. If you would like more information, contact the principal investigator through the MTurk system, or e-mail Tracee Watkins, tracee1@ksu.edu.

Would you like to participate in this survey?
- ❍ Yes, I would like to participate.
- ❍ No thanks, I do not want to participate.

Please enter your MTurk ID below.

_____

In this survey you will be asked about your beliefs on COOKING FOODS TO SPECIFIC INTERNAL TEMPERATURES.
COOKING FOODS TO SPECIFIC INTERNAL TEMPERATURES is defined as:
  1.   Cooking to specific internal temperatures AND holding at that temperature for the determined amount of time for different foods:
       * Poultry, stuffed meats or pasta, mixed dishes to 165°F for 15 seconds
       * Ground meat and beef and ratites to 155°F for 15 seconds
       * Seafood, whole meat chops, and shell eggs to 145°F for 15 seconds
       * Meat roasts to 145°F for 4 minutes
       * Plant foods to 135°F
  2.   Using a THERMOMETER to verify the internal temperatures are reached.
In order to answer each question completely, it may be helpful to consider all parts of the COOKING FOODS TO SAFE INTERNAL TEMPERATURES definition.

What are some advantages of **COOKING FOODS TO SPECIFIC INTERNAL TEMPERATURES**?
Hint: Click the back button to see the cooking foods to specific internal temperatures definition again to help answer the question completely.

_____

_____

_____

_____

_____

What are some reasons why you or other employees would want to **COOKING FOODS TO SPECIFIC INTERNAL TEMPERATURES?**
Hint: Click the back button to see the cooking foods to specific internal temperatures definition again to help answer the question completely.

_____

_____

_____

_____

_____

What are some disadvantages of **COOKING FOODS TO SPECIFIC INTERNAL TEMPERATURES**?
Hint: Click the back button to see the cooking foods to specific internal temperatures definition again to help answer the question completely.

_____

_____

_____

_____

_____

What are some reasons why you or other employees might not **COOK FOODS TO SPECIFIC INTERNAL TEMPERATURES**?

Hint: Click the back button to see the cooking foods to specific internal temperatures definition again to help answer the question completely.

_____

_____

_____

_____

_____

What makes, or would make, it easier for you or other employees to **COOK FOODS TO SPECIFIC INTERNAL TEMPERATURES**?

Hint: Click the back button to see the cooking foods to specific internal temperatures definition again to help answer the question completely.

_____

_____

_____

_____

_____

What makes it difficult for you, or other employees to **COOK FOODS TO SPECIFIC INTERNAL TEMPERATURES**?

Hint: Click the back button to see the cooking foods to specific internal temperatures definition again to help answer the question completely.

_____

_____

_____

_____

_____

List all the people that you think care (either approve or disapprove) about whether or not you and other employees **COOK FOODS TO SPECIFIC INTERNAL TEMPERATURES**?
Hint: Click the back button to see the cooking foods to specific internal temperatures definition again to help answer the question completely.

_____

_____

_____

_____

_____

End of Block: Questions

Start of Block: Block 3

Thank you for completing the survey.

The survey identification number is: ${e://Field/Random%20ID}

Please copy your survey identification number and paste it in the appropriate question in MTurk.

When you have copied the survey identification number, please click below to verify you have completed the identification process.

❍   I have copied my survey identification number. I understand the survey number will be used to match responses to my MTurk account for payment.

Thank you for participating in our survey.
 Please click the arrow button below to submit your survey responses.

End of Block: Block 3

Pretest

This survey will ask questions relating to your beliefs about food safety.
Some questions may seem similar, but they are measuring different aspects of your beliefs.
Please provide thoughtful responses to all questions.
Detailed consent forms and IRB information are found in the qualifying survey that you completed to join this study. If you would like more information, contact the principal investigator through the MTurk system, or e-mail Tracee Watkins, tracee1@ksu.edu.

Would you like to participate in this survey?

- ○ Yes, I would like to participate.
- ○ No thanks, I do not want to participate.

Please enter your MTurk ID below.

_____

In this survey you will be asked about your beliefs on COOKING FOODS TO SPECIFIC INTERNAL TEMPERATURES while you are at work.
COOKING FOODS TO SPECIFIC INTERNAL TEMPERATURES is defined as:
Cooking to specific internal temperatures,
Using a thermometer to verify that specific internal temperatures are reached,
Holding at that temperature for the determined amount of time for different foods:
 Poultry, stuffed meats or pasta, mixed dishes to 165°F for 15 seconds
 Ground meats, beef, and ratites to 155°F for 15 seconds
 Seafood, whole meat chops, and shell eggs to 145°F for 15 seconds
 Meat roasts to 145°F for 4 minutes
 Plant foods to 135°F
In order to answer each question completely, it may be helpful to consider all parts of the COOKING FOODS TO SPECIFIC INTERNAL TEMPERATURES while you are at work definition.
You may copy and paste this definition into a word document for reference as you answer the survey questions.

How important is _____ to cooking foods to specific internal temperatures?

	Extremely unimportant	Moderately unimportant	Slightly unimportant	Neither	Slightly important	Moderately important	Extremely important
Keeping my customers satisfied	○	○	○	○	○	○	○
Decreasing the likelihood that customers will get sick	○	○	○	○	○	○	○
Ensuring high quality food	○	○	○	○	○	○	○
Not taking too much time	○	○	○	○	○	○	○

Cooking foods to specific internal temperatures will _____.

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
Keep my customers satisfied	○	○	○	○	○	○	○
Decrease the likelihood that customers will get sick	○	○	○	○	○	○	○
Ensure high quality food	○	○	○	○	○	○	○
Not take too much time	○	○	○	○	○	○	○

_____ think(s) that I should cook foods to specific internal temperatures.

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
Inspectors/ Government regulators	○	○	○	○	○	○	○
Owners	○	○	○	○	○	○	○
My family	○	○	○	○	○	○	○
Customers	○	○	○	○	○	○	○
General manager	○	○	○	○	○	○	○
Coworkers	○	○	○	○	○	○	○
My immediate supervisor	○	○	○	○	○	○	○
Attention check, select "agree"	○	○	○	○	○	○	○

Generally speaking, how likely are you to care what_____ think(s) you should do?

	Strongly don't care	Don't care	Somewhat don't care	Neutral	Somewhat Care	Care	Strongly care
Inspectors/ government regulators	○	○	○	○	○	○	○
Owners	○	○	○	○	○	○	○
My family	○	○	○	○	○	○	○
Customers	○	○	○	○	○	○	○
General manager	○	○	○	○	○	○	○
Coworkers	○	○	○	○	○	○	○
My immediate supervisor	○	○	○	○	○	○	○

End of Block: Question group 1

In the previous section you did not successfully complete the attention checks.

Data quality is very important to our team, but so is being fair to you- we know accidents can happen.
If you choose, you may retake four questions, or you may voluntarily leave the survey.
<u>Failing the attention checks a second time invalidates your survey response</u> and you will not receive the completion code.
We really hope you give it another try.

Please indicate your decision below.
- ○ Retake the questions
- ○ Leave survey

We are sorry, failing attention checks twice prevents you from participation in this HIT.
Thank you for your interest in our research.

Please indicate your level of agreement to the following statements by choosing the most appropriate answer.

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
Most people who are important to me think that I should cook foods to specific internal temperatures when preparing food at work.	○	○	○	○	○	○	○
I want to cook foods to specific internal temperatures when preparing food at work.	○	○	○	○	○	○	○
I am confident I could cook foods to specific internal temperatures when preparing food for customers.	○	○	○	○	○	○	○
The decision to cook foods to specific internal temperatures is entirely up to me.	○	○	○	○	○	○	○

Please indicate your level of agreement to the following statements by choosing the most appropriate answer.

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
It is mostly up to me whether I cook foods to specific internal temperatures.	○	○	○	○	○	○	○
I expect to cook foods to specific internal temperatures when preparing food for customers.	○	○	○	○	○	○	○
It is difficult for me to use a thermometer to take the internal temperature of foods when rushing to prepare food for customers.	○	○	○	○	○	○	○
It is expected that I will cook foods to specific internal temperatures when preparing food for customers.	○	○	○	○	○	○	○

Please indicate your level of agreement to the following statements by choosing the most appropriate answer.

I have complete control over cooking foods to specific internal temperatures.	○	○	○	○	○	○	○
I intend to cook foods to specific internal temperatures when preparing food at work.	○	○	○	○	○	○	○
It is easy for me to cook foods to specific internal temperatures when preparing food at work.	○	○	○	○	○	○	○
The people in my life whose opinions I value would want me to cook foods to specific internal temperatures.	○	○	○	○	○	○	○

Each pair of (A) and (B) words are opposites. Please complete the following statement with the appropriate item: "**For me, cooking foods to specific internal temperatures is _____.**"

(A) Extremely bad	○	○	○	○	○	○	○	(B) Extremely good
(A) Extremely worthless	○	○	○	○	○	○	○	(B) Extremely valuable
(A) Extremely useless	○	○	○	○	○	○	○	(B) Extremely useful
(A) Extremely unpleasant	○	○	○	○	○	○	○	(B) Extremely pleasant
(A) Extremely foolish	○	○	○	○	○	○	○	(B) Extremely wise

_____**makes it more difficult for me to cook foods to specific internal temperatures.**

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
Being rushed / not having enough time	○	○	○	○	○	○	○
Not having a thermometer	○	○	○	○	○	○	○
Having to calibrate the thermometer	○	○	○	○	○	○	○
Cleaning and sanitizing thermometers between uses	○	○	○	○	○	○	○
Not knowing the proper temperatures	○	○	○	○	○	○	○

How likely is _____ to prevent me from cooking food to specific temperatures?

Being rushed / not having enough time	❍	❍	❍	❍	❍	❍	❍
Not having a thermometer	❍	❍	❍	❍	❍	❍	❍
Having to calibrate the thermometer	❍	❍	❍	❍	❍	❍	❍
Cleaning and sanitizing thermometers between uses	❍	❍	❍	❍	❍	❍	❍
Not knowing the proper temperatures	❍	❍	❍	❍	❍	❍	❍
Attention check, select "moderately unlikely"	❍	❍	❍	❍	❍	❍	❍

In the previous section you did not successfully complete the attention checks.

Data quality is very important to our team, but so is being fair to you- we know accidents can happen.
If you choose, you may retake five questions, or you may voluntarily leave the survey.
Failing the attention checks a second time invalidates your survey response
 and you will not receive the completion code.
We really hope you give it another try.

 Please indicate your decision below.
- ❍ Retake the questions
- ❍ Leave survey

**We are sorry, failing attention checks twice prevents you from participation in this HIT.
 Thank you for your interest in our research.**

Thank you for completing the survey.

The survey identification number is: ${e://Field/Random%20ID}

Please copy your survey identification number and paste it in the appropriate question in MTurk.

When you have copied the survey identification number, please click below to verify you have completed the identification process.

❍ I have copied my survey identification number. I understand the survey number will be used to match responses to my MTurk account for payment.

**Thank you for participating in our survey.
 Please click the arrow button below to submit your survey responses.**

Phase 3 Post Test Analytical

Welcome!

In this HIT you will complete the following tasks:
1. Watch a short training video.
2. Answer questions relating to your beliefs about the topic of the training video, and
3. Answer a series of questions about emotions you may have experienced while watching the training video.

○ Got it, sounds good!

I understand this is a survey for a scientific research project. Answering the questions **honestly** is vital to the success of the research. Truthful and thoughtful contributions are greatly appreciated.

What is your Mturk ID number? Please copy and paste it here.

_____

This survey employs attention checks
    Failure to complete all parts of the survey, completing the survey in an unreasonably short time, or providing poor quality data will invalidate your response and you will not receive the completion code. Please note that this survey is best displayed on a laptop or desktop computer.
    Consent forms and IRB information are found in the qualifying survey that you completed to join this study. If you would like more information, contact the principal investigator through the MTurk system, or e-mail Tracee Watkins, tracee1@ksu.edu.
Would you like to participate in this survey?
    ○ Agree to participate
    ○ Disagree

Next, you will view a short training video. Please watch it carefully to the end. The video will begin automatically once you leave this page.

Please advance to the next page when you are ready to begin.

Timing
First Click
Last Click
Page Submit
Click Count

What was the last scene in the video prior to the credits?
- ❍ Safe cooking temperatures for vegetables
- ❍ Image representing child fatalities
- ❍ Maria taking food temperatures
- ❍ Safe cooking temperatures for ratites

In the previous section you did not successfully complete the attention check.
Data quality is very important to our team, but so is being fair to you- we know accidents can happen.
If you choose, you may watch the video again or you may voluntarily leave the survey.
<u>Failing the attention checks a second time invalidates your survey response</u>
and you will not receive the completion code.
We really hope you give it another try.
Please indicate your decision below.
- ❍ Watch the video again
- ❍ Leave this HIT

Please advance to the next page when you are ready to watch the video again.

Timing
First Click
Last Click
Page Submit
Click Count

What was the last scene in the video prior to the credits?
- ○ Safe cooking temperatures for vegetables
- ○ Image representing child fatalities
- ○ Maria taking food temperatures
- ○ Safe cooking temperatures for ratites

We are sorry, failing attention checks twice prevents you from participation in this HIT. Thank you for your interest in our research.

The next questions present a series of statements about how effective the video could be for food safety training. Please consider each statement carefully before selecting your answer.

When considering how effective the video is for food safety training, how strongly do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Somewhat disagree	Neither	Somewhat agree	Agree	Strongly agree
I can list all the important facts emphasized in this video	○	○	○	○	○	○	○
My personal skills for safe food handling will improve after watching this video	○	○	○	○	○	○	○
I know how to work more safely using the knowledge learned in this video	○	○	○	○	○	○	○
The safe food preparation of my organization will improve, either directly or indirectly, due to the skills I learned and used from this video	○	○	○	○	○	○	○

When considering how effective this video is for food safety training, how strongly do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Somewhat disagree	Neither	Somewhat agree	Agree	Strongly agree
I know how to solve certain food safety problems using the skills taught in this video	❍	❍	❍	❍	❍	❍	❍
I will be better at food safety tasks after watching this video	❍	❍	❍	❍	❍	❍	❍
What I have learned in this video will improve my food safety job performance as well as my organization's safety performance	❍	❍	❍	❍	❍	❍	❍
This is an attention check, please select "Agree"	❍	❍	❍	❍	❍	❍	❍

When considering how effective this video is for food safety training, how strongly do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Somewhat disagree	Neither	Somewhat agree	Agree	Strongly agree
My performance of food safety tasks will improve because of applying the skills emphasized in this video	○	○	○	○	○	○	○
I can perform the food safety skills taught in this video	○	○	○	○	○	○	○
I will contribute to improving my organization's reputation for serving safe food, either directly or indirectly, due to this video	○	○	○	○	○	○	○

In the previous section you did not successfully complete the attention checks.
Data quality is very important to our team, but so is being fair to you- we know accidents can happen.
If you choose, you may retake questions, or you may voluntarily leave the survey.
<u>Failing the attention checks a second time invalidates your survey response</u>
 and you will not receive the completion code.
We really hope you give it another try.
Please indicate your decision below.
- ○ Retake the questions
- ○ Leave survey

We are sorry, failing attention checks twice prevents you from participation in this HIT. Thank you for your interest in our research.

The next questions will present a series of statements about how involved you were with the training video while you were watching it. Please consider each statement carefully before selecting your answer.

How strongly do you agree or disagree with the following statements about the training video?

	Strongly disagree	Disagree	Somewhat disagree	Neither	Somewhat agree	Agree	Strongly agree
The video affected me emotionally	○	○	○	○	○	○	○
I wanted to learn how the video ended	○	○	○	○	○	○	○
I was mentally involved in the video while watching it	○	○	○	○	○	○	○
I could picture myself in the scene of the events described in the video	○	○	○	○	○	○	○

How strongly do you agree or disagree with the following statements about the training video?

	Strongly disagree	Disagree	Somewhat disagree	Neither	Somewhat agree	Agree	Strongly agree
The story created a new world, and then that world suddenly disappeared when the video ended	❍	❍	❍	❍	❍	❍	❍
I felt sorry for some characters in the video	❍	❍	❍	❍	❍	❍	❍
I had a hard time keeping my mind on the video	❍	❍	❍	❍	❍	❍	❍
During the video, when a main character succeeded, I felt happy and when they suffered in some way, I felt sad	❍	❍	❍	❍	❍	❍	❍

How strongly do you agree or disagree with the following statements about the training video?

	Strongly disagree	Disagree	Somewhat disagree	Neither	Somewhat agree	Agree	Strongly agree
While the video was on, I found myself thinking about other things	❍	❍	❍	❍	❍	❍	❍
My understanding of the characters is unclear	❍	❍	❍	❍	❍	❍	❍
The video affected me emotionally	❍	❍	❍	❍	❍	❍	❍
During the video, my body was in the room, but my mind was inside the world created by the story	❍	❍	❍	❍	❍	❍	❍

How strongly do you agree or disagree with the following statements about the training video?

	Strongly disagree	Disagree	Somewhat disagree	Neither	Somewhat agree	Agree	Strongly agree
At points, I had a hard time making sense of what was going on in the video	○	○	○	○	○	○	○
I found my mind wandering while the video was on	○	○	○	○	○	○	○
At times during the video, the story world was closer to me than the real world	○	○	○	○	○	○	○
I had a hard time recognizing the thread of the video	○	○	○	○	○	○	○
This is an attention check, please select "disagree"	○	○	○	○	○	○	○

End of Block: Narrative Involvement

Start of Block: Attention check notice 2

In the previous section you did not successfully complete the attention checks.
Data quality is very important to our team, but so is being fair to you- we know accidents can happen.
If you choose, you may retake four questions, or you may voluntarily leave the survey.
<u>Failing the attention checks a second time invalidates your survey response</u>
and you will not receive the completion code.
We really hope you give it another try.

Please indicate your decision below.
- ○ Retake the questions
- ○ Leave survey

We are sorry, failing attention checks twice prevents you from participation in this HIT. Thank you for your interest in our research.

The next questions present a series of statements about your thoughts while watching the training video. Please consider each statement carefully before selecting your answer.

How strongly do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Somewhat disagree	Neither	Somewhat agree	Agree	Strongly agree
In general, while watching the video did you agree or disagree with the effects of controlling temperatures in food?	○	○	○	○	○	○	○
In general, while watching the video did you agree or disagree about what failure to control temperatures in food can do to people?	○	○	○	○	○	○	○

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Overall, how much did you:

	Not at all	Very little	Little	Somewhat	Much	Very much	A great deal
Think about reasons for not controlling temperatures in food	○	○	○	○	○	○	○
Think rather than feel	○	○	○	○	○	○	○
Think about the consequences of not controlling temperatures in food described in the video	○	○	○	○	○	○	○
Think about how failure to control temperatures of food might affect your life or job	○	○	○	○	○	○	○

In the next questions, you will be asked about your beliefs on COOKING FOODS TO SPECIFIC INTERNAL TEMPERATURES while you are at work.
COOKING FOODS TO SPECIFIC INTERNAL TEMPERATURES is defined as:
Cooking to specific internal temperatures
Using a thermometer to verify that specific internal temperatures are reached,
Holding at that temperature for the determined amount of time for different foods:
Poultry, stuffed meats or pasta, mixed dishes to 165°F for 15 seconds
Ground meats, beef, and ratites to 155°F for 15 seconds
Seafood, whole meat chops, and shell eggs to 145°F for 15 seconds
Meat roasts to 145°F for 4 minutes
Plant foods to 135°F
 In order to answer each question completely, it may be helpful to consider all parts of the COOKING FOODS TO SPECIFIC INTERNAL TEMPERATURES while you are at work definition. You may copy and paste this definition into a word document for reference as you answer the survey questions.

How important is _____ to cooking foods to specific internal temperatures?

	Extremely unimportant	Moderately unimportant	Slightly unimportant	Niether	Slightly important	Moderately important	Extremely important
Keeping my customers satisfied	○	○	○	○	○	○	○
Decreasing the likelihood that customers will get sick	○	○	○	○	○	○	○
Ensuring high quality food	○	○	○	○	○	○	○
Not taking too much time	○	○	○	○	○	○	○

Cooking foods to specific internal temperatures will _____.

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
Keep my customers satisfied	○	○	○	○	○	○	○
Decrease the likelihood that customers will get sick	○	○	○	○	○	○	○
Ensure high quality food	○	○	○	○	○	○	○
Not take too much time	○	○	○	○	○	○	○

_____ think(s) that I should cook foods to specific internal temperatures.

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
Inspectors/ Government regulators	○	○	○	○	○	○	○
Owners	○	○	○	○	○	○	○
My family	○	○	○	○	○	○	○
Customers	○	○	○	○	○	○	○
General manager	○	○	○	○	○	○	○
Coworkers	○	○	○	○	○	○	○
My immediate supervisor	○	○	○	○	○	○	○
Attention check, select "agree"	○	○	○	○	○	○	○

Generally speaking, how likely are you to care what_____ think(s) you should do?

	Strongly don't care	Don't care	Somewhat don't care	Neutral	Somewhat Care	Care	Strongly care
Inspectors/ government regulators	○	○	○	○	○	○	○
Owners	○	○	○	○	○	○	○
My family	○	○	○	○	○	○	○
Customers	○	○	○	○	○	○	○
General manager	○	○	○	○	○	○	○
Coworkers	○	○	○	○	○	○	○
My immediate supervisor	○	○	○	○	○	○	○

In the previous section you did not successfully complete the attention checks.
Data quality is very important to our team, but so is being fair to you- we know accidents can happen.
If you choose, you may retake four questions, or you may voluntarily leave the survey.
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and you will not receive the completion code.
We really hope you give it another try.

 Please indicate your decision below.
- ❍ Retake the questions
- ❍ Leave survey

We are sorry, failing attention checks twice prevents you from participation in this HIT.
** Thank you for your interest in our research.**

Please indicate your level of agreement to the following statements by choosing the most appropriate answer.

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
Most people who are important to me think that I should cook foods to specific internal temperatures when preparing food at work.	○	○	○	○	○	○	○
I want to cook foods to specific internal temperatures when preparing food at work.	○	○	○	○	○	○	○
I am confident I could cook foods to specific internal temperatures when preparing food for customers.	○	○	○	○	○	○	○
The decision to cook foods to specific internal temperatures is entirely up to me.	○	○	○	○	○	○	○

Please indicate your level of agreement to the following statements by choosing the most appropriate answer.

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
It is mostly up to me whether I cook foods to specific internal temperatures.	○	○	○	○	○	○	○
I expect to cook foods to specific internal temperatures when preparing food for customers.	○	○	○	○	○	○	○
It is difficult for me to use a thermometer to take the internal temperature of foods when rushing to prepare food for customers.	○	○	○	○	○	○	○
It is expected that I will cook foods to specific internal temperatures when preparing food for customers.	○	○	○	○	○	○	○

Please indicate your level of agreement to the following statements by choosing the most appropriate answer.

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
I have complete control over cooking foods to specific internal temperatures.	❍	❍	❍	❍	❍	❍	❍
I intend to cook foods to specific internal temperatures when preparing food at work.	❍	❍	❍	❍	❍	❍	❍
It is easy for me to cook foods to specific internal temperatures when preparing food at work.	❍	❍	❍	❍	❍	❍	❍
The people in my life whose opinions I value would want me to cook foods to specific internal temperatures.	❍	❍	❍	❍	❍	❍	❍

Each pair of (A) and (B) words are opposites. Please complete the following statement with the appropriate item: **"For me, cooking foods to specific internal temperatures is _____."**

	1	2	3	4	5	6	7	
(A) Extremely bad	○	○	○	○	○	○	○	(B) Extremely good
(A) Extremely worthless	○	○	○	○	○	○	○	(B) Extremely valuable
(A) Extremely useless	○	○	○	○	○	○	○	(B) Extremely useful
(A) Extremely unpleasant	○	○	○	○	○	○	○	(B) Extremely pleasant
(A) Extremely foolish	○	○	○	○	○	○	○	(B) Extremely wise

_____makes it more difficult for me to cook foods to specific internal temperatures.

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
Being rushed / not having enough time	○	○	○	○	○	○	○
Not having a thermometer	○	○	○	○	○	○	○
Having to calibrate the thermometer	○	○	○	○	○	○	○
Cleaning and sanitizing thermometers between uses	○	○	○	○	○	○	○
Not knowing the proper temperatures	○	○	○	○	○	○	○

How likely is _____ to prevent me from cooking food to specific temperatures?

	Extremely unlikely	Moderately unlikely	Somewhat unlikely	Neither	Somewhat likely	Moderately likely	Strongly likely
Being rushed / not having enough time	❍	❍	❍	❍	❍	❍	❍
Not having a thermometer	❍	❍	❍	❍	❍	❍	❍
Having to calibrate the thermometer	❍	❍	❍	❍	❍	❍	❍
Cleaning and sanitizing thermometers between uses	❍	❍	❍	❍	❍	❍	❍
Not knowing the proper temperatures	❍	❍	❍	❍	❍	❍	❍
Attention check, select "moderately unlikely"	❍	❍	❍	❍	❍	❍	❍

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We really hope you give it another try.
  Please indicate your decision below.
- ❍ Retake the questions
- ❍ Leave survey

We are sorry, failing attention checks twice prevents you from participation in this HIT. Thank you for your interest in our research.

What emotions did you experience while watching the training video?
The next four questions present a series of words describing feelings or emotions you may have experienced while watching the training video.
Think back to when you were watching the video, and please consider each word carefully before selecting your answer.

While watching the video, to what extent did you experience these feelings or emotions?

	Not at all	Slightly	Somewhat	Moderately	Quite a bit	Very much	An extreme amount
Sad	○	○	○	○	○	○	○
Easy going	○	○	○	○	○	○	○
Terror	○	○	○	○	○	○	○
Wanting	○	○	○	○	○	○	○
Lonely	○	○	○	○	○	○	○
Desire	○	○	○	○	○	○	○
Nausea	○	○	○	○	○	○	○
Satisfaction	○	○	○	○	○	○	○
Select "very much"	○	○	○	○	○	○	○

While watching the video, to what extent did you experience these feelings or emotions?

	Not at all	Slightly	Somewhat	Moderately	Quite a bit	Very much	An extreme amount
Enjoyment	○	○	○	○	○	○	○
Sickened	○	○	○	○	○	○	○
Panic	○	○	○	○	○	○	○
Nervous	○	○	○	○	○	○	○
Empty	○	○	○	○	○	○	○
Craving	○	○	○	○	○	○	○
Calm	○	○	○	○	○	○	○
Pissed off	○	○	○	○	○	○	○

While watching the video, to what extent did you experience these emotions or feelings?

	Not at all	Slightly	Somewhat	Moderately	Quite a bit	Very much	An extreme amount
Anger	○	○	○	○	○	○	○
Grossed out	○	○	○	○	○	○	○
Happy	○	○	○	○	○	○	○
Dread	○	○	○	○	○	○	○
Chilled out	○	○	○	○	○	○	○
Scared	○	○	○	○	○	○	○
Anxiety	○	○	○	○	○	○	○
Mad	○	○	○	○	○	○	○
Select "slightly"	○	○	○	○	○	○	○

While watching the video, to what extent did you experience these emotions or feelings?

	Not at all	Slightly	Somewhat	Moderately	Quite a bit	Very much	An extreme amount
Rage	○	○	○	○	○	○	○
Revulsion	○	○	○	○	○	○	○
Fear	○	○	○	○	○	○	○
Relaxation	○	○	○	○	○	○	○
Grief	○	○	○	○	○	○	○
Longing	○	○	○	○	○	○	○
Worry	○	○	○	○	○	○	○
Liking	○	○	○	○	○	○	○

In the previous section you did not successfully complete the attention checks.
 Data quality is very important to our team, but so is being fair to you- we know accidents can happen.
If you choose, you may retake four questions, or you may voluntarily leave the survey.
Failing the attention checks a second time invalidates your survey response
 and you will not receive the completion code.
We really hope you give it another try.

 Please indicate your decision below.
- ○ Retake the questions
- ○ Leave survey

We are sorry, failing attention checks twice prevents you from participation in this HIT.
 Thank you for your interest in our research.

The survey is complete.
Your survey identification number is ${e://Field/Random%20ID}
Please copy your survey identification number and paste it in the appropriate question in MTurk. When you have copied the survey identification number, please click below to verify you have completed the identification process.

○ I have copied my survey identification number. I understand the survey number will be used to match responses to my MTurk account for payment.

Thank you for participating in our survey.
Please click the forward arrow below to submit your response.

End of Block: ID Number

Appendix F - Item Reliability Analysis

Phase 2 Item Reliability Statistics

Item	Mean	SD	Item-rest correlation	If item dropped McDonald's ω	If item dropped Cronbach's α
Need for affect: Approach					
When considering emotions, it is important for me to be in touch with my feelings	5.67	1.27	.80	.80	.78
When considering emotions, it is important for me to know how others are feeling	5.79	1.16	.62	.85	.83
When considering emotions, it is important for me to explore my own feelings	5.66	1.27	.75	.82	.79
I think emotions help people get along in life	5.47	1.13	.66	.85	.82
When considering my own emotions, I feel that I need to experience strong emotions regularly	4.19	1.71	.54	.87	.87
Need for affect: Avoidance					
I think emotions are dangerous- they tend to get me into situations that I would rather avoid	3.18	1.76	.55	.76	.75
When considering my own emotions, I would prefer not to experience either the lows or highs of emotion	3.82	1.75	.44	.80	.79
When considering my own emotions, I find strong emotions overwhelming and therefore try to avoid them	3.67	1.70	.60	.76	.74
When considering my own emotions, I do not know how to handle my emotions, so I avoid them	2.91	1.64	.66	.73	.72
When considering my own emotions, I see that in the past I tended to be afraid of emotions, so I avoided them	3.35	1.76	.59	.75	.74
Transportability scale short form					
When watching videos characters seem real to me	4.95	1.57	.69	.75	.71
When watching videos, they affect me emotionally	4.84	1.59	.69	.74	.72
I can become so absorbed in watching videos that I forget the world around me	4.75	1.62	.63	.78	.75
I am mentally involved in videos while watching them	5.57	1.00	.51	.82	.81

Phase 2 Item Reliability Statistics

| | | | | If item dropped | |
| | | | | McDonald's | Cronbach's |
Item	Mean	*SD*	Item-rest correlation	ω	α
Narrative engagement					
The story created a new world, and then that world suddenly disappeared when the video ended	3.65	1.95	.49	.77	.82
I felt sorry for some characters in the video	3.92	2.33	.47	.76	.82
I had a hard time keeping my mind on the video R	2.31	1.58	.48	.75	.82
During the video, when a main character succeeded, I felt happy and when they suffered in some way, I felt sad	4.26	1.91	.65	.77	.80
While the video was on, I found myself thinking about other things R	2.39	1.54	.48	.75	.82
My understanding of the characters is unclear R	2.21	1.51	.35	.757	.83
The video affected me emotionally	4.02	2.06	.59	.77	.81
During the video, my body was in the room, but my mind was inside the world created by the story	3.62	2.24	.38	.77	.83
At points, I had a hard time making sense of what was going on in the video R	1.74	1.16	.43	.76	.82
I found my mind wandering while the video was on R	2.45	1.59	.62	.75	.81
At times during the video, the story world was closer to me than the real world	3.88	1.82	.56	.76	.80
I had a hard time recognizing the thread of the video R	1.89	1.29	.41	.73	.81
Transportation scale reduced item set					
The video affected me emotionally	4.52	1.72	.43	.82	.80
I wanted to learn how the video ended	5.23	1.73	.77	.64	.59
I was mentally involved in the video while watching it	6.03	1.15	.57	.77	.73
I could picture myself in the scene of the events described in the video	5.65	1.32	.60	.76	.71

Phase 2 Item Reliability Statistics

Item	Mean	*SD*	Item-rest correlation	If item dropped McDonald's ω	If item dropped Cronbach's α
Anger					
Anger	2.03	1.86	.87	.90	.89
Mad	1.89	1.64	.76	.93	.92
Rage	1.99	1.63	.92	.88	.87
Pissed-off	1.86	1.74	.77	.93	.92
Disgust					
Grossed out	1.83	1.38	.68	.77	.76
Nausea	2.71	1.99	.63	.79	.78
Sickened	2.23	1.78	.60	.81	.79
Revulsion	1.97	1.61	.67	.77	.75
Fear					
Terror	1.96	1.69	.83	.89	.89
Scared	2.20	1.93	.83	.89	.89
Panic	2.21	1.75	.83	.89	.89
Fear	2.49	1.85	.76	.91	.91
Anxiety					
Dread	2.36	1.71	.72	.88	.87
Anxiety	2.23	1.88	.67	.89	.89
Nervous	2.85	2.00	.84	.83	.83
Worry	3.06	1.97	.81	.84	.83
Sadness					
Sad	2.42	2.04	.83	.70	.64
Lonely	1.55	1.26	.54	.83	.79
Empty	1.52	1.10	.46	.85	.82
Grief	2.20	1.90	.75	.73	.68

Phase 2 Item Reliability Statistics

Item	Mean	*SD*	Item-rest correlation	If item dropped McDonald's ω	If item dropped Cronbach's α
Desire					
Wanting	1.68	1.21	.78	.80	.79
Desire	1.79	1.33	.60	.88	.87
Craving	1.42	1.08	.72	.84	.82
Longing	1.58	1.11	.76	.81	.80
Relaxation					
Easy going	2.99	1.89	.75	.82	.82
Chilled out	3.49	2.05	.74	.83	.82
Calm	2.71	1.85	.60	.87	.87
Relaxation	2.91	1.94	.78	.81	.80
Happiness					
Happy	2.41	1.72	.72	.89	.88
Satisfaction	2.49	1.83	.84	.84	.84
Enjoyment	2.53	1.96	.76	.88	.87
Liking	2.64	1.85	.75	.87	.87
Cognitive Response					
In general, while watching the video did you agree or disagree with the effects of controlling temperatures in food [a]	6.11	1.27	.46	-	.46
In general, while watching the video did you agree or disagree about what failure to control temperatures in food can do to people [a]	6.35	0.87	.46	-	.21
Think about reasons for not controlling temperatures in food	3.00	1.95	.15	.75	.68
Think rather than feel	5.06	1.29	.27	.71	.52
Think about the consequences of not controlling temperatures in food described in the video	5.80	1.26	.45	.47	.39
Think about how failure to control temperatures of food might affect your life or job	5.70	1.36	.57	.31	.27

Phase 2 Item Reliability Statistics

Item	Mean	*SD*	Item-rest correlation	If item dropped McDonald's ω	Cronbach's α
Training Effectiveness					
I can list all the important facts emphasized in this video	5.67	1.14	.56	.96	.96
My personal skills for safe food handling will improve after watching this video	5.70	1.39	.83	.95	.95
I know how to work more safely using the knowledge learned in this video	5.70	1.49	.85	.95	.95
Safe food preparation at my job will improve, either directly or indirectly, due to the skills I learned from this video	5.65	1.48	.81	.93	.95
I know how to solve certain food safety problems using the skills taught in this video	5.50	1.61	.89	.95	.95
I will be better at food safety tasks after watching this video	5.83	1.22	.82	.95	.95
What I have learned in this video will improve my food safety job performance as well as my organization's safety performance	5.64	1.36	.92	.95	.95
My performance of food safety tasks will improve because of applying the skills emphasized in this video	5.59	1.49	.86	.95	.95
I can perform the food safety skills taught in this video	5.64	1.60	.73	.96	.96
I will contribute to improving my organization's reputation for serving safe food due to this video	5.65	1.36	.81	.95	.95

Note: [a] McDonald's ω calculations require a minimum of three items.

Phase 3 Item Reliability Statistics

| | | | | If item dropped | |
| | | | | McDonald's | Cronbach's |
Items	Mean	SD	Item-rest correlation	ω	α
Need for affect: Approach					
When considering emotions, it is important for me to be in touch with my feelings	5.44	1.34	.71	.73	.72
When considering emotions, it is important for me to know how others are feeling	5.67	1.17	.58	.79	.76
When considering emotions, it is important for me to explore my own feelings	5.54	1.21	.67	.75	.73
I think emotions help people get along in life	5.37	1.27	.56	.80	.77
When considering my own emotions, I feel that I need to experience strong emotions regularly	4.11	1.64	.44	.83	.82
Need for affect: Avoidance					
I think emotions are dangerous- they tend to get me into situations that I would rather avoid	3.76	1.76	.59	.81	.80
When considering my own emotions, I would prefer not to experience either the lows or highs of emotion	4.13	1.68	.57	.81	.81
When considering my own emotions, I find strong emotions overwhelming and therefore try to avoid them	4.03	1.70	.72	.77	.77
When considering my own emotions, I do not know how to handle my emotions, so I avoid them	3.76	1.76	.59	.81	.80
When considering my own emotions, I see that in the past I tended to be afraid of emotions, so I avoided them	4.13	1.68	.57	.81	.81
Transportability scale short form					
When watching videos characters seem real to me	5.07	1.39	.67	.73	.72
When watching videos, they affect me emotionally	5.16	1.35	.62	.76	.75
I can become so absorbed in watching videos that I forget the world around me	5.00	1.63	.61	.77	.76
I am mentally involved in videos while watching them	5.55	1.24	.57	.79	.77

Phase 3 Item Reliability Statistics

Items	Mean	SD	Item-rest correlation	If item dropped McDonald's ω	Cronbach's α
Narrative Engagement					
The story created a new world, and then that world suddenly disappeared when the video ended	3.86	1.84	.23	.84	.71
I felt sorry for some characters in the video	4.82	2.01	.38	.85	.69
I had a hard time keeping my mind on the video R	2.35	1.63	.44	.82	.68
During the video, when a main character succeeded, I felt happy and when they suffered in some way, I felt sad	4.46	1.66	.38	.85	.69
While the video was on, I found myself thinking about other things R	2.49	1.66	.46	.83	.68
My understanding of the characters is unclear R	2.27	1.56	.28	.83	.70
The video affected me emotionally	4.07	1.95	.39	.85	.69
During the video, my body was in the room, but my mind was inside the world created by the story	3.57	2.08	.04	.84	.74
At points, I had a hard time making sense of what was going on in the video R	2.24	1.66	.41	.82	.68
I found my mind wandering while the video was on R	2.40	1.66	.50	.83	.67
At times during the video, the story world was closer to me than the real world	3.84	1.81	.42	.82	.83
I had a hard time recognizing the thread of the video R	2.02	1.49	.63	.72	.81
Transportation					
The video affected me emotionally	4.25	1.98	.55	.73	.73
I wanted to learn how the video ended	4.99	1.66	.66	.68	.65
I was mentally involved in the video while watching it	5.89	1.20	.50	.76	.75
I could picture myself in the scene of the events described in the video	5.08	1.67	.58	.72	.69

Phase 3 Item Reliability Statistics

| | | | | If item dropped | |
| | | | | McDonald's | Cronbach's |
Items	Mean	SD	Item-rest correlation	ω	α
Anger					
Anger	2.76	2.05	.87	.94	.93
Mad	2.65	1.92	.89	.93	.93
Rage	2.63	1.92	.91	.92	.92
Pissed off	2.47	1.93	.84	.95	.94
Disgust					
Grossed out	2.08	1.65	.77	.90	.90
Nausea	2.85	2.06	.83	.88	.88
Sickened	2.47	1.85	.81	.89	.88
Revulsion	2.53	1.84	.81	.89	.88
Fear					
Terror	2.35	1.86	.86	.93	.93
Scared	2.50	1.85	.84	.94	.94
Panic	2.51	1.84	.89	.92	.92
Fear	2.66	1.89	.89	.92	.92
Anxiety					
Dread	2.71	1.84	.86	.92	.92
Anxiety	2.60	1.80	.83	.93	.93
Nervous	2.95	1.92	.86	.92	.92
Worry	3.30	2.04	.86	.92	.92
Sadness					
Sad	2.94	1.93	.73	.79	.77
Lonely	1.64	1.28	.58	.85	.83
Empty	2.02	1.65	.63	.83	.81
Grief	2.90	2.03	.78	.77	.74

Phase 3 Item Reliability Statistics

Items	Mean	SD	Item-rest correlation	If item dropped McDonald's ω	If item dropped Cronbach's α
Desire					
Wanting	2.01	1.61	.83	.84	.83
Desire	2.12	1.65	.78	.85	.85
Craving	1.85	1.45	.68	.89	.89
Longing	1.97	1.64	.75	.87	.86
Relaxation					
Easy going	2.80	1.92	.80	.88	.88
Chilled out	3.46	2.06	.76	.89	.89
Calm	2.90	1.94	.81	.88	.87
Relaxation	2.71	1.94	.80	.88	.88
Happiness					
Happy	2.56	1.90	.81	.86	.86
Satisfaction	2.39	1.80	.79	.87	.86
Enjoyment	2.32	1.74	.77	.87	.87
Liking	2.46	1.86	.72	.89	.89
Cognitive Response					
In general, while watching the video did you agree or disagree with the effects of controlling temperatures in food [a]	6.08	1.23	.57	-	.57
In general, while watching the video did you agree or disagree about what failure to control temperatures in food can do to people [a]	5.89	1.38	.57	-	.33
Think about reasons for not controlling temperatures in food	3.86	2.05	.22	.73	.66
Think rather than feel	5.10	1.29	.16	.74	.63
Think about the consequences of not controlling temperatures in food described in the video	5.72	1.50	.56	.46	.34
Think about how failure to control temperatures of food might affect your life or job	5.57	1.59	.58	.41	.32

Phase 3 Item Reliability Statistics

Items	Mean	SD	Item-rest correlation	If item dropped McDonald's ω	If item dropped Cronbach's α
Training Effectiveness					
I can list all the important facts emphasized in this video	5.77	1.20	.40	.95	.95
My personal skills for safe food handling will improve after watching this video	5.70	1.44	.86	.93	.93
I know how to work more safely using the knowledge learned in this video	5.65	1.43	.87	.93	.93
Safe food preparation at my job will improve, either directly or indirectly, due to the skills I learned from this video	5.68	1.46	.82	.93	.93
I know how to solve certain food safety problems using the skills taught in this video	5.68	1.37	.68	.94	.93
I will be better at food safety tasks after watching this video	5.74	1.50	.86	.93	.93
What I have learned in this video will improve my food safety job performance as well as my organization's safety performance	5.72	1.43	.88	.93	.92
My performance of food safety tasks will improve because of applying the skills emphasized in this video	5.75	1.47	.86	.93	.93
I can perform the food safety skills taught in this video	6.31	1.02	.41	.95	.94
I will contribute to improving my organization's reputation for serving safe food due to this video	5.91	1.31	.78	.93	.93
Attitude					
For me, cooking foods to specific internal temperatures is extremely bad/good	6.41	1.08	.69	.89	.87
For me, cooking foods to specific internal temperatures is extremely worthless/valuable	6.41	1.14	.83	.86	.84
For me, cooking foods to specific internal temperatures is extremely useless/useful	6.33	1.14	.82	.86	.84
For me, cooking foods to specific internal temperatures is extremely unpleasant/pleasant	5.58	1.42	.61	.90	.90
For me, cooking foods to specific internal temperatures is extremely foolish/wise	6.55	1.06	.75	.87	.86

Phase 3 Item Reliability Statistics

| | | | | If item dropped | |
| | | | | McDonald's | Cronbach's |
Items	Mean	SD	Item-rest correlation	ω	α
Subjective Norms					
Most people who are important to me think that I should cook foods to specific internal temperatures when preparing food at work.	6.02	1.21	.72	.78	.77
It is expected that I will cook foods to specific internal temperatures when preparing food for customers.	6.40	1.01	.68	.82	.82
The people in my life whose opinions I value would want me to cook foods to specific internal temperatures.	5.96	1.23	.74	.76	.75
Perceived Behavioral Control					
I am confident I could cook foods to specific internal temperatures when preparing food for customers.	6.42	0.93	.41	.71	.69
The decision to cook foods to specific internal temperatures is entirely up to me.	4.43	2.14	.54	.74	.64
It is mostly up to me whether I cook foods to specific internal temperatures.	4.73	2.04	.58	.73	.61
It is difficult for me to use a thermometer to take the internal temperature of foods when rushing to prepare food for customers R[b]	3.51	2.06	.05	.59	.71
I have complete control over cooking foods to specific internal temperatures.	5.76	1.47	.53	.67	.63
It is easy for me to cook foods to specific internal temperatures when preparing food at work.	6.12	1.14	.38	.71	.70
Behavioral Intention					
I want to cook foods to specific internal temperatures when preparing food at work.	6.41	0.97	.78	.85	.85
I expect to cook foods to specific internal temperatures when preparing food for customers.	6.41	1.01	.80	.83	.83
I intend to cook foods to specific internal temperatures when preparing food for customers.	6.37	1.05	.78	.85	.85

Note: [a] McDonald's ω calculations require a minimum of three items.

[b] Item was removed from the measure.

Phase 2 Scale Reliability Statistics

	Mean	SD	McDonald's ω	Cronbach's α	Greatest lower bound	Average interitem correlation	95.0% Confidence interval α	
							Lower	Upper
Approach[a]	5.65	0.13	.87	.85	.89	.55	.80	.89
Avoidance[a]	3.38	0.37	.80	.79	.87	.43	.72	.84
Transportability[a]	5.03	0.37	.81	.80	.88	.51	.74	.86
Engagement[b]	3.03	0.93	.77	.83	.77	.30	.76	.88
Transportation[b]	5.36	0.65	.80	.77	.88	.47	.66	.85
Cognitive response valence[b,c]	6.23	0.17	.63	.60	-	.46	.34	.75
Cognitive response amount[b]	4.89	1.30	.67	.54	.77	.26	.33	.70
Anger[b]	1.94	0.08	.93	.92	.96	.76	.89	.95
Disgust[b]	2.18	0.40	.83	.82	.87	.54	.73	.88
Fear[b]	2.21	0.22	.92	.92	.93	.74	.88	.95
Anxiety[b]	2.63	0.39	.89	.89	.91	.67	.84	.93
Sadness[b]	1.92	0.46	.82	.80	.90	.51	.71	.87
Desire[b]	1.62	0.16	.87	.86	.90	.62	.79	.91
Relaxation[b]	3.02	0.33	.87	.87	.90	.61	.80	.91
Happiness[b]	2.52	0.10	.90	.89	.94	.68	.84	.93
Effectiveness[b]	5.65	0.08	.96	.96	.99	.68	.94	.97

Note: [a] Of the observations, 114 were used, 0 were excluded

[b] Of the observations, 67 were used, 0 were excluded.

[c] Greatest lower bound calculations require three or more items.

Phase 3 Scale Reliability Statistics

	Mean	SD	McDonald's ω	Cronbach's α	Greatest lower bound	Average interitem correlation	95.0% Confidence interval α	
							Lower	Upper
Approach[a]	5.23	0.63	.82	.80	.86	.46	.76	.83
Avoidance[a]	3.81	0.33	.83	.83	.88	.49	.80	.85
Transportability[a]	5.19	0.24	.80	.80	.86	.50	.76	.83
Engagement[b]	3.20	1.00	.85	.71	.87	.18	.65	.77
Transportation[b]	5.05	0.67	.77	.76	.79	.46	.70	.81
Cognitive response valence[b,d]	5.98	0.14	.73	.73	-	.57	.63	.79
Cognitive response amount[b]	5.05	1.03	.74	.63	.78	.40	.53	.71
Anger[b]	2.63	0.12	.95	.95	.95	.82	.94	.96
Disgust[b]	2.48	0.32	.91	.91	.93	.73	.89	.93
Fear[b]	2.50	0.13	.94	.94	.95	.81	.93	.96
Anxiety[b]	2.90	0.31	.94	.94	.95	.79	.92	.95
Sadness[b]	2.37	0.65	.84	.84	.90	.57	.79	.87
Desire[b]	1.98	0.11	.89	.89	.91	.67	.86	.91
Relaxation[b]	2.97	0.34	.91	.91	.92	.71	.88	.93
Happiness[b]	2.43	0.10	.90	.90	.92	.69	.87	.92
Effectiveness[b]	5.79	0.20	.94	.94	.96	.58	.92	.95
Attitude[c]	6.26	0.39	.90	.90	.91	.63	.86	.91
Subjective norms[c]	6.13	0.24	.85	.84	.85	.65	.81	.87
Perceived behavioral control[c]	5.49	0.87	.74	.71	.86	.36	.65	.76
Intention[c]	6.40	1.05	.89	.89	.89	.73	.86	.91

Note: [a] Of the observations, 373 were used, 0 were excluded.

[b] Of the observations, 192 were used, 0 were excluded.

[c] Of the observations, 276 were used, 0 were excluded.

[d] Greatest lower bound calculations require three or more items.

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Appendix G - Measured Item Means for Narrative Involvement and Outcomes of Food Safety Videos

Measured Item Means for Narrative Involvement of Food Safety Videos

Narrative Involvement	Video 1 (*n* = 29)		Video 2 (*n* = 22)		Video 3 (*n* = 23)		Video 4 (*n* = 24)		Video 5 (*n* = 22)		Video 6 (*n* = 21)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Transportation												
The video affected me emotionally	3.31	1.78	3.14	1.81	6.04	1.26	3.63	1.81	4.64	1.79	5.48	1.94
I wanted to learn how the video ended	5.24	1.50	4.68	1.81	5.65	1.61	4.71	1.88	5.77	1.74	5.33	1.96
I was mentally involved in the video while watching it	5.69	1.29	5.82	1.14	6.22	1.04	5.67	1.55	5.91	1.11	5.86	1.15
I could picture myself in the scene of the events described in the video	5.07	1.62	4.82	1.79	5.04	1.67	5.38	1.69	5.36	1.73	5.48	1.54
Narrative Engagement												
The story created a new world, and then that world suddenly disappeared when the video ended	3.14	1.87	2.77	1.97	4.83	1.72	3.12	1.62	4.05	2.01	4.57	1.75
I felt sorry for some characters in the video	2.86	1.41	2.45	1.47	6.22	1.09	2.12	1.08	5.55	1.57	5.62	1.94
I had a hard time keeping my mind on the video R	2.48	1.66	2.36	1.36	2.13	1.66	2.50	1.64	1.95	1.05	2.24	1.61
During the video, when a main character succeeded, I felt happy and when they suffered in some way, I felt sad	3.07	1.39	2.82	1.56	5.83	1.27	3.13	1.57	4.41	2.11	5.00	2.03
While the video was on, I found myself thinking about other things R	2.38	1.70	2.36	1.43	2.35	1.64	2.67	1.81	2.05	1.25	2.43	1.80
My understanding of the characters is unclear R	2.59	1.78	2.45	1.68	2.13	1.39	2.13	1.45	2.00	1.31	2.48	1.86
The video affected me emotionally	2.93	1.67	2.86	1.83	6.17	1.11	3.00	1.41	4.27	1.96	5.19	2.06
During the video, my body was in the room, but my mind was inside the world created by the story	3.31	2.24	3.00	1.85	4.30	2.08	3.17	1.79	3.73	2.25	4.19	2.32
At points, I had a hard time making sense of what was going on in the video R	2.28	1.65	1.91	1.38	1.87	1.14	2.13	1.54	1.82	1.26	2.52	1.91
I found my mind wandering while the video was on R	2.52	1.72	2.45	1.50	2.30	1.43	2.71	1.88	1.73	1.08	2.19	1.60
At times during the video, the story world was closer to me than the real world	3.24	1.77	3.05	1.89	4.57	1.67	3.42	1.67	3.86	1.94	4.52	1.78
I had a hard time recognizing the thread of the video R	2.14	1.43	1.91	1.38	1.83	1.03	1.92	1.21	1.55	1.10	2.57	1.96

Note. Participants (*n* = 67) viewed from 1 to 12 of the videos, average videos viewed = 4

Measured Item Means for Narrative Involvement of Food Safety Videos

Narrative Involvement	Video 7 (*n* = 28)		Video 8 (*n* = 22)		Video 9 (*n* = 25)		Video 10 (*n* = 25)		Video 11 (*n* = 26)		Video 12 (*n* = 22)	
	Mean	*SD*	Mean	*SD*	Mean	*SD*	Mean	*SD*	Mean	*SD*	Mean	*SD*
Transportation												
The video affected me emotionally	5.96	1.40	3.45	2.06	4.28	1.57	3.12	1.81	4.92	1.67	2.95	1.73
I wanted to learn how the video ended	5.68	1.57	5.14	1.81	4.88	1.79	4.64	1.63	5.00	1.92	4.73	1.80
I was mentally involved in the video while watching it	6.43	0.63	5.45	1.71	5.80	1.12	5.56	1.69	6.12	0.82	5.82	0.85
I could picture myself in the scene of the events described in the video	5.54	1.58	5.41	1.59	4.28	1.88	5.04	1.77	5.35	1.79	5.32	1.84
Narrative Engagement												
The story created a new world, and then that world suddenly disappeared when the video ended	4.50	2.10	3.05	1.81	3.96	2.05	2.68	1.75	3.96	2.09	3.41	1.76
I felt sorry for some characters in the video	6.43	0.92	4.23	1.60	2.92	1.78	2.00	1.44	3.73	1.91	2.55	1.47
I had a hard time keeping my mind on the video R	2.07	1.51	3.00	1.88	2.36	1.70	2.28	1.51	2.27	1.56	2.41	1.33
During the video, when a main character succeeded, I felt happy and when they suffered in some way, I felt sad	5.25	1.96	3.64	1.79	3.60	1.29	3.00	1.53	3.54	1.50	3.82	1.74
While the video was on, I found myself thinking about other things R	2.18	1.44	3.05	1.68	2.36	1.60	2.56	1.78	2.12	1.48	2.50	1.34
My understanding of the characters is unclear R	2.14	1.58	2.23	1.23	1.96	1.31	2.16	1.60	2.04	1.43	2.23	1.38
The video affected me emotionally	5.93	1.15	3.36	1.92	3.92	1.58	2.36	1.55	4.46	1.70	2.45	1.85
During the video, my body was in the room, but my mind was inside the world created by the story	4.21	2.33	3.14	1.81	3.64	2.16	2.80	1.83	3.69	2.06	2.73	1.83
At points, I had a hard time making sense of what was going on in the video R	2.04	1.45	1.91	1.15	2.12	1.42	2.12	1.72	1.92	1.38	2.00	1.45
I found my mind wandering while the video was on R	2.07	1.49	3.00	1.69	2.24	1.54	2.60	1.66	2.38	1.72	2.36	1.40
At times during the video, the story world was closer to me than the real world	4.54	2.08	3.50	1.79	3.32	2.12	3.12	1.92	3.96	2.05	3.23	1.85
I had a hard time recognizing the thread of the video R	2.11	1.55	1.95	1.43	1.96	1.21	2.16	1.60	1.88	1.31	2.00	1.45

Note. Participants (*n* = 67) viewed from 1 to 12 of the videos, average videos viewed = 4

Measured Item Means for Outcomes of Food Safety Videos

Outcomes	Video 1 (*n* = 29)		Video 2 (*n* = 22)		Video 3 (*n* = 23)		Video 4 (*n* = 24)		Video 5 (*n* = 22)		Video 6 (*n* = 21)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Cognitive Response												
Thoughts consistent with the information presented in the video	31.95	9.01	27.47	8.41	27.22	9.42	27.33	8.08	30.53	7.63	29.98	10.98
Training Effectiveness												
I can list all the important facts emphasized in this video	6.03	0.82	5.77	1.11	5.26	1.21	5.79	0.93	5.82	1.14	5.67	1.49
My personal skills for safe food handling will improve after watching this video	6.00	0.93	5.86	1.13	5.17	1.70	6.08	0.78	5.68	1.13	5.19	2.04
I know how to work more safely using the knowledge learned in this video	5.90	1.11	6.09	0.81	4.61	1.85	6.08	0.88	5.45	1.41	5.05	1.94
Safe food preparation at my job will improve, either directly or indirectly, due to the skills I learned from this video	5.79	1.45	6.05	0.84	4.78	1.86	6.17	0.57	5.45	1.30	5.29	1.77
I know how to solve certain food safety problems using the skills taught in this video	5.86	0.95	6.05	1.00	4.17	2.13	6.00	1.02	5.32	1.32	5.29	1.68
I will be better at food safety tasks after watching this video	6.07	0.88	6.05	0.84	4.96	1.69	6.08	1.02	5.73	1.03	5.38	1.77
What I have learned in this video will improve my food safety job performance as well as my organization's safety performance	5.83	1.14	5.91	0.87	4.91	1.88	6.08	0.83	5.59	1.53	5.57	1.43
My performance of food safety tasks will improve because of applying the skills emphasized in this video	5.93	0.96	6.00	1.07	4.61	1.78	6.08	0.78	5.64	1.29	5.24	1.84
I can perform the food safety skills taught in this video	5.97	1.30	6.09	0.97	4.30	1.96	6.21	0.98	6.05	0.95	5.33	1.80
I will contribute to improving my organization's reputation for serving safe food due to this video	5.79	1.29	5.86	0.99	5.43	1.62	6.13	0.85	5.59	1.44	5.29	2.10

Note. Participants (*n* = 67) viewed from 1 to 12 of the videos, average videos viewed = 4

Measured Item Means for Outcomes of Food Safety Videos

Outcomes	Video 7 (n = 28)		Video 8 (n = 22)		Video 9 (n = 25)		Video 10 (n = 25)		Video 11 (n = 26)		Video 12 (n = 22)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Cognitive Response												
Thoughts consistent with the information presented in the video	32.12	5.76	26.33	9.38	28.18	8.11	29.18	8.06	29.77	9.63	28.60	9.96
Training Effectiveness												
I can list all the important facts emphasized in this video	6.11	1.20	5.68	1.36	5.48	1.33	5.68	1.11	5.81	1.13	6.05	1.09
My personal skills for safe food handling will improve after watching this video	6.04	1.23	5.36	1.53	5.80	1.44	5.64	1.35	5.77	1.37	6.05	1.09
I know how to work more safely using the knowledge learned in this video	5.96	1.29	5.50	1.54	5.92	1.15	5.80	1.32	6.00	1.10	5.95	1.17
Safe food preparation at my job will improve, either directly or indirectly, due to the skills I learned from this video	6.11	1.13	5.32	1.46	5.64	1.38	5.40	1.61	5.88	0.95	5.95	1.33
I know how to solve certain food safety problems using the skills taught in this video	6.00	1.02	5.36	1.53	5.48	1.56	5.52	1.53	5.88	1.21	5.77	1.45
I will be better at food safety tasks after watching this video	6.04	1.20	5.45	1.22	5.72	1.21	5.56	1.26	5.92	1.13	5.95	1.33
What I have learned in this video will improve my food safety job performance as well as my organization's safety performance	6.04	1.17	5.55	1.26	5.84	1.21	5.48	1.33	5.96	1.00	5.86	1.32
My performance of food safety tasks will improve because of applying the skills emphasized in this video	5.89	1.20	5.36	1.62	5.60	1.38	5.60	1.23	5.73	1.31	5.95	1.40
I can perform the food safety skills taught in this video	6.04	0.96	6.23	0.81	5.96	1.17	5.84	1.31	5.96	1.22	6.41	0.91
I will contribute to improving my organization's reputation for serving safe food due to this video	6.00	1.02	5.55	1.10	5.80	1.08	5.72	1.21	6.08	0.94	5.91	1.11

Note. Participants (n = 67) viewed from 1 to 12 of the videos, average videos viewed = 4

Measured Item Means for Emotion Outcomes of Food Safety Videos

Emotions	Video 1 (n = 29)		Video 2 (n = 22)		Video 3 (n = 23)		Video 4 (n = 24)		Video 5 (n = 22)		Video 6 (n = 21)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Anger												
Anger	1.38	1.21	1.27	0.88	2.91	1.91	1.17	0.64	1.82	1.18	3.19	2.56
Mad	1.34	1.05	1.36	1.18	3.04	1.82	1.17	0.64	1.82	1.22	2.95	2.06
Rage	1.41	1.21	1.27	0.88	3.30	1.77	1.17	0.64	2.05	1.36	3.10	1.95
Pissed off	1.38	1.21	1.41	1.33	2.39	1.75	1.17	0.82	1.55	1.10	3.05	2.29
Disgust												
Grossed out	1.34	1.17	1.27	0.63	2.09	1.31	1.17	0.64	1.82	1.40	2.33	1.88
Nausea	1.38	0.90	1.32	0.95	3.39	1.90	1.25	0.68	2.05	1.17	3.95	2.20
Sickened	1.34	0.77	1.27	0.94	2.83	1.85	1.38	0.82	1.95	1.43	1.76	1.34
Revulsion	1.34	1.05	1.41	1.10	2.74	1.98	1.21	0.83	1.77	1.19	2.43	1.96
Fear												
Terror	1.45	1.02	1.41	1.18	3.04	1.72	1.17	0.48	1.45	0.91	3.33	2.29
Scared	1.31	1.00	1.32	0.95	2.35	1.67	1.21	0.66	1.95	1.65	3.19	2.34
Panic	1.55	1.27	1.41	1.05	3.91	2.00	1.29	0.91	2.45	1.60	3.52	2.14
Fear	1.45	0.91	1.36	1.05	4.04	1.75	1.21	0.66	2.45	1.50	3.52	2.14
Anxiety												
Dread	1.62	0.98	1.36	1.14	3.22	1.70	1.42	0.97	2.18	1.30	3.52	1.86
Anxiety	1.38	1.21	1.32	0.89	2.83	1.90	1.21	0.51	1.77	1.31	2.71	1.79
Nervous	1.69	1.26	1.45	0.96	3.70	1.49	1.33	0.87	2.73	1.35	3.33	1.98
Worry	1.93	1.33	1.45	1.18	4.22	1.51	1.29	0.69	2.64	1.18	4.05	2.44
Sadness												
Sad	1.52	1.18	1.27	0.88	4.48	1.81	1.25	0.74	2.41	1.56	4.10	2.45
Lonely	1.28	0.88	1.41	1.18	1.43	1.24	1.21	0.66	1.45	1.18	1.71	1.31
Empty	1.21	0.56	1.32	0.89	1.65	1.27	1.17	0.48	1.68	1.25	1.67	1.28
Grief	1.34	1.05	1.32	0.89	3.65	1.82	1.13	0.45	1.68	0.95	3.48	2.32
Desire												
Wanting	1.48	1.09	1.68	1.43	1.57	1.50	1.79	1.84	1.91	1.54	1.95	1.43
Desire	1.59	1.35	1.95	1.50	1.22	0.85	1.46	1.10	1.95	1.73	1.52	1.25
Craving	1.45	1.21	1.45	1.18	1.30	1.02	1.25	0.74	1.36	0.95	1.52	1.17
Longing	1.41	1.12	1.27	0.88	1.57	1.20	1.29	0.81	1.50	1.19	1.76	1.30
Relaxation												
Easy going	3.03	1.84	3.45	1.85	1.83	1.75	3.46	1.89	2.36	1.50	1.62	1.12
Chilled out	3.41	2.03	4.27	1.58	2.13	1.71	3.71	1.78	3.50	2.06	1.86	1.39
Calm	3.24	1.73	3.32	1.94	1.52	1.20	2.92	1.67	2.55	1.63	1.57	1.03
Relaxation	2.59	1.48	3.59	1.74	1.74	1.51	3.63	1.93	2.86	1.89	1.86	1.49
Happiness												
Happy	2.38	1.86	3.36	1.92	1.74	1.79	3.12	1.83	2.18	1.59	1.62	1.20
Satisfaction	1.93	1.51	2.95	1.79	1.43	1.47	2.67	2.04	2.18	1.74	1.48	1.12
Enjoyment	2.10	1.74	3.09	1.85	1.78	1.73	2.75	1.85	1.82	1.14	1.57	1.40
Liking	2.28	1.60	2.95	1.89	1.78	1.81	3.00	2.00	2.50	1.97	1.52	0.87

Note. Participants were presented the emotion terms after being asked question, "While watching the video, to what extent did you experience these feelings or emotions." Participants (*n* = 67) viewed from 1 to 12 of the videos, average videos viewed = 4

Measured Item Means for Emotion Outcomes of Food Safety Videos

Emotions	Video 7 (n = 28) Mean	SD	Video 8 (n = 22) Mean	SD	Video 9 (n = 25) Mean	SD	Video 10 (n = 25) Mean	SD	Video 11 (n = 26) Mean	SD	Video 12 (n = 22) Mean	SD
Anger												
Anger	3.29	2.05	1.73	1.03	1.40	0.96	1.24	0.83	2.00	1.36	1.36	1.18
Mad	3.43	1.83	1.55	1.01	1.28	0.89	1.32	0.90	2.35	1.57	1.32	1.04
Rage	3.43	1.87	1.77	1.38	1.24	0.72	1.32	0.90	2.12	1.56	1.45	1.18
Pissed off	2.75	1.82	1.45	0.96	1.36	0.91	1.28	0.79	1.81	1.42	1.27	0.94
Disgust												
Grossed out	1.86	1.38	1.50	1.19	2.20	1.38	1.16	0.55	2.46	1.99	1.50	1.34
Nausea	3.14	1.74	2.05	1.53	2.44	1.61	1.56	1.26	3.58	2.30	1.50	1.10
Sickened	1.46	1.20	2.09	1.44	3.16	1.77	1.64	1.32	3.85	2.34	1.86	1.55
Revulsion	2.18	1.54	1.64	1.14	2.32	1.52	1.52	1.33	2.81	1.96	1.41	0.96
Fear												
Terror	2.71	1.78	1.45	1.10	1.48	0.87	1.28	0.89	2.15	1.67	1.45	1.22
Scared	2.89	1.75	1.77	1.57	1.60	1.00	1.44	1.12	2.42	1.53	1.41	1.22
Panic	3.00	1.56	1.41	1.05	1.84	1.18	1.32	0.80	2.54	1.92	1.55	1.37
Fear	3.46	1.80	1.55	1.37	1.96	1.14	1.60	1.38	2.73	1.95	1.50	1.14
Anxiety												
Dread	3.46	1.73	1.73	0.99	2.08	1.44	1.44	1.19	2.58	1.94	1.32	0.95
Anxiety	3.18	2.13	1.32	0.95	1.60	1.04	1.32	1.11	2.54	1.73	1.32	0.78
Nervous	3.39	1.81	1.68	1.25	2.12	1.36	1.60	1.32	2.58	1.92	1.64	1.33
Worry	4.00	1.54	1.82	1.26	2.44	1.56	1.84	1.38	2.85	2.01	1.55	1.26
Sadness												
Sad	4.75	1.78	1.77	1.34	1.64	1.25	1.56	1.36	2.23	1.56	4.75	1.78
Lonely	1.75	1.48	1.59	1.53	1.48	1.23	1.52	1.26	1.15	0.46	1.75	1.48
Empty	1.61	0.96	1.45	0.91	1.68	1.22	1.28	0.74	1.31	0.74	1.61	0.96
Grief	4.21	1.71	1.36	0.95	1.44	0.92	1.28	0.79	1.73	1.12	4.21	1.71
Desire												
Wanting	1.68	1.25	1.73	1.45	1.72	1.43	1.56	1.29	1.35	0.85	1.68	1.25
Desire	1.50	1.11	1.45	1.10	1.60	1.23	2.08	1.66	1.65	1.55	1.50	1.11
Craving	1.29	0.85	1.36	0.90	1.52	1.50	1.52	1.16	1.12	0.43	1.29	0.85
Longing	1.68	1.16	1.55	1.26	1.52	1.23	1.52	1.05	1.15	0.46	1.68	1.16
Relaxation												
Easy going	1.54	0.96	3.09	1.57	2.92	2.08	3.76	1.99	2.58	2.02	3.95	1.56
Chilled out	1.89	1.52	3.32	1.64	3.56	1.85	4.32	2.04	2.62	2.08	4.45	1.71
Calm	1.64	1.37	2.59	1.76	2.64	1.58	3.80	1.94	2.27	1.99	4.00	1.69
Relaxation	1.64	1.45	2.59	1.62	3.00	1.83	4.04	1.99	2.50	2.21	4.00	1.72
Happiness												
Happy	1.29	0.81	2.68	2.15	2.88	2.03	3.44	1.78	2.04	1.91	3.77	1.88
Satisfaction	1.21	0.79	2.36	2.08	2.80	1.98	3.16	1.93	2.00	1.52	3.09	2.07
Enjoyment	1.46	1.43	2.32	2.12	2.76	1.96	3.40	2.02	1.96	1.87	3.27	1.91
Liking	1.36	0.87	2.23	1.88	2.80	2.02	3.56	2.04	1.88	1.63	3.09	2.02

Note. Participants were presented the emotion terms after being asked question, "While watching the video, to what extent did you experience these feelings or emotions." Participants (*n* = 67) viewed from 1 to 12 of the videos, average videos viewed = 4

Appendix H - Salient Beliefs About Thermometer Usage

Salient Beliefs About Using a Thermometer to Take the Temperature of Food

Belief	Frequency
Behavioral Beliefs- Positive	
Prevent customer illness	18
Ensure food is safe	10
Maintain food quality	6
Job security	2
Legal compliance; stay out of trouble	2
Pride in work	2
Prevent bad publicity	2
Customer satisfaction	1
Safe storage	1
Accurate temperatures	1
Following policies and procedures	1
Behavioral Beliefs- Negative	
In a hurry, rushing, or too busy	11
Do not have a thermometer or thermometer is broken	8
Employee is lazy	6
Customer requests undercooked food	5
Not knowledgeable or trained to check temperatures	3
Do not want to take time to check temperatures	3
Forgot to take the temperature	2
Not enough time	2
Assume another employee took temperature	2
Thermometer not calibrated	1
Go by how the food looks	1
Pressure to get food out	1
Cost of thermometer	1
Lack of resources	1
Equipment not working properly	1
Behavioral Beliefs- Advantages	
Cooking safe food; avoid making someone sick	22
Food is cooked properly or to the proper temperature	9
Increased food quality and consistency	8
Food is reheated properly	3
Customer satisfaction	2
Avoiding trouble; reduced legal exposure	2
Food is held and stored properly	2
Good for business	1
Supports good operational practice	1
Accuracy	1
Prevent food waste	1

Salient Beliefs About Using a Thermometer to Take the Temperature of Food

Belief	Frequency
Behavioral Beliefs Disadvantages	
Takes too much time	16
Reduced food quality	4
Additional task to maintain thermometers	4
Inaccurate readings	2
Extra step	1
Thermometer not working properly	1
Holding the thermometer in position	1
Pressure to get food done	1
Control Beliefs- Facilitator	
Having, or having easy access to, a thermometer	11
Posting safe cooking temperatures	6
More staff working	4
Calibrated thermometers	3
Easy to read and easy to use thermometers	3
Digital thermometers	3
Properly functioning thermometer	2
Clean thermometer	2
Faster thermometer readings	2
Better equipment	2
Smart equipment that measures temperatures automatically	2
Training on temperatures and thermometer use	2
Precooked food	1
More management supervision	1
Mandatory temperature log use	1
Fast repairs of broken equipment	1
Being able to use surface reading thermometers	1
All employees use thermometers	1
More time to take temperatures	1
Control Beliefs- Barriers	
Not enough time or too busy	8
Not having or having access to a thermometer	7
Lack of training on temperatures and thermometer use	5
Rushed or pressured by others to get food out	4
Thermometer not calibrated	3
Thermometer is dirty	3
Fast pace	2
Thermometer not working	2
Difficult to take temperatures properly	2
Not enough workers or heavy workload	2
Workers do not think taking temperatures is important	2
Lack of proper equipment	2
Inconsistently checking temperatures	1

Salient Beliefs About Using a Thermometer to Take the Temperature of Food

Belief	Frequency
Control Beliefs- Barriers	
Using analog thermometers	1
Cost of thermometers	1
Difficult to read thermometers	1
Lower food quality	1
Not having a specific person to take temperatures	1
Difficult to estimate	1
Normative Beliefs	
Customers	23
Managers	15
Health inspectors	12
Coworkers	11
Owners	6
Chefs	3
Servers	3
Family	3
Community	2
Doctors	2
Friends	2
Suppliers	1