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## Effectiveness of short videos to enhance HACCP information for consumers

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### ABSTRACT

The purpose of this study was to investigate the effectiveness of short videos to communicate food safety HACCP information associated with eating in foodservice establishments to consumers. HACCP videos were framed as positive/negative framing in communicating HACCP to consumers and were also designed to provide HACCP information/demonstrate how consumers could inquire about HACCP in foodservice establishments. Results suggest HACCP videos resulted in higher perceptions of learning than the video that did not include HACCP information. For participants who tend to engage in fewer risky food behaviors, effects of Frame and Information communication were stronger. Participants who engage in risky food behaviors less indicated they learned more than those who engage in these behaviors more. Those who saw the Positive Frame with Information Instructions indicated that they learned more than those who saw the Positive Frame with Information Modeling. Given the prominence of digital communication channels in everyday life, this study provides a timely assessment of leveraging short videos for food safety education.



### KEYWORDS

HACCP; food safety information; consumers; short videos

## Introduction

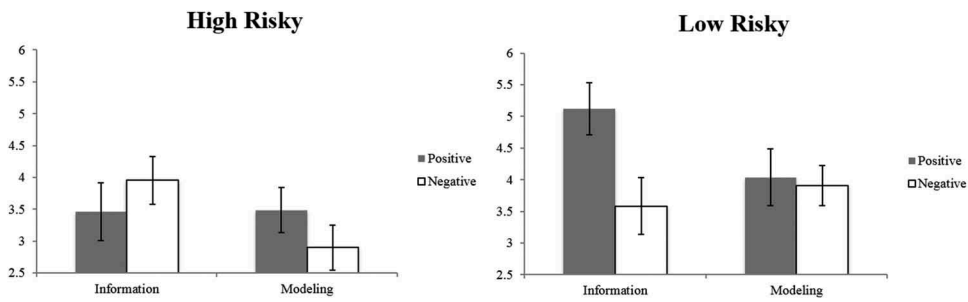
Hazard Analysis and Critical Control Points (HACCP) are a food safety management system responsible for analyzing and controlling biochemical and physical hazards from raw material production and handling, to manufacturing, distribution and consumption of the finished food product (Food and Drug Administration (FDA), 2012). However, foodservice establishments such as restaurants and others in the United States serving prepared ready-to-eat foods are not required by law to implement HACCP. Besides legal requirements, consumer pressure could also prompt the industry to consider HACCP as the accepted food hazard prevention standard, given the risks of falling sick due to the consumption of unsafe foods. However, given the lack of legal requirement, HACCP-related information is not always readily accessible to consumers. Therefore, it is left onto the consumer to ensure they have the self-awareness of food safety risks and how such risks can be better managed or prevented by those providing them food.

While there has been extensive focus on food safety education, and with varied success, rethinking food safety education could present opportunities to enhance consumer

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**Figure 1.** Three-way interaction between frame type, information vs modeling, and participant risky behaviors in predicting perceptions of learning.

knowledge of HACCP through digital communication and media tools, such as short videos, and potentially encourage consumers to act on this food safety knowledge. Consumer knowledge of HACCP is limited and can be enhanced using different approaches. The anticipated outcome is that increased consumer knowledge of HACCP would make them self-aware of the risks associated with food, and allow them to make more informed choices (Odwin & Badrie, 2008).

The purpose of this study was to investigate the effectiveness of HACCP videos, framed differently (positive versus negative framing) aimed at consumers to enhance their awareness of HACCP. We also investigated whether consumers' tendencies toward risky behavior impacted their perceptions of learning. This study adds to the relatively nascent literature on understanding and enhancing HACCP awareness amongst consumers and leveraging digital tools to accomplish this objective.

### ***HACCP, food risk and food safety: foodservice establishments' perspectives***

Risk assessment is a process that determines the likelihood of exposure to a substance (i.e. carcinogens) under certain conditions that can be categorized as safe or risky (Rodricks & Taylor, 1983). Poor food safety management systems and consumer distrust in foodservice pose potential problems for the foodservice industry (Grunert, 2005). As a result, HACCP implementation may be an effective tool to regulate food safety and quality. In addition, it may not only regulate food safety and quality, but it also may increase consumer trust regarding safety practices in foodservice establishments. HACCP planning has the potential to improve food safety by controlling both production and processing, and reducing hazards where they are most likely to occur (Unnevehr & Jensen, 1999).

Consumers may not be aware of food safety practices and methods such as HACCP, and so they may not fully understand the risks of being susceptible to foodborne illness due to food mishandling particularly in the absence of food safety programs in foodservice establishments. Lack of this awareness could be a hindrance to consumers awareness of foodservice establishments' options of the implementation of HACCP or similar programs to mitigate food safety risks.

### ***Food safety consumer information and behavioral change***

On the one hand, there has been extensive research on providing consumers food safety information (Frewer, Howard, Hedderley, & Shepherd, 1996; Kornelis, De Jonge, Frewer, & Dagevos, 2007; Van Kleef et al., 2006), although there is scarce research on providing HACCP information for consumers. On the other hand, even though provision of information has been discussed extensively, consideration of how to deliver the food safety messages has been recently increasing. Use of digital tools to communicate these messages is gaining the attention of researchers. For instance, Kuttschreuter et al. (2014) found that although respondents were inclined to use online information sources such as those on social media and other digitized information as a source of food safety information, they did not think such new sources of information could replace the traditional channels. Furthermore, the study found those most well-informed, motivated to find additional information on food safety, with higher sensitivity to risks of food safety, and relatively younger were more inclined to use digital communication channels together with other traditional channels.

Over the last few years, digital communication has been used extensively to communicate information. This type of communication seems to improve understanding of health-related issues, including food risk behavior (Tanner, Duhe, Evans, & Condrasky, 2008) acting as a complementary tool to both other forms of online media and traditional media (Kuttschreuter et al., 2014). Food risk-related information transmitted through digital media may diffuse faster than other traditional media types (Shan et al., 2014).

Speed and accessibility are the main motives consumers increasingly rely on digital media as a source of information (Rutsaert, Pieniak, Regan, McConnon, & Verbeke, 2013). Consumers appear to identify digital media, through internet videos, a suitable tool to communicate informative messages about food risks. Such new approaches of information sharing has a more important role among consumers having higher levels of perceived food risk (Kornelis et al., 2007). In addition, Mascarello and colleagues (Mascarello et al., 2014) showed that communicating food risk issues through digital video improves learning and increases the likelihood of changing risk perception.

Online sources of information growth may be a potential channel to improve communication of food risk (Barnett et al., 2011). It also may enforce recommended guidelines to minimize food risk levels because of the opportunities for direct communication and interaction with consumers in order to establish trust and credibility as a reliable source of information (Rutsaert et al., 2014, 2013). Among social media, YouTube may be considered an important medium of communicating food risk information due to its accessibility and popularity. Although content may be inaccurate, YouTube videos could be an adequate source of information regarding food risk if specialized official agencies develop accurate videos that may disseminate veridical content that relates to food risk issues (Muise, Freeman, & Blair, 2012). In addition, Rhoades and Ellis (2010) examined both content and messages of educational food safety videos posted on YouTube and found that viewer interest and credible content are the main factors for the success of YouTube videos about food safety.

Although the use of alternative digital and online communication sources for consumer education, particularly short educational videos, is gaining traction, there is still a lack of understanding of whether such videos are effective or not in increasing consumer learning. Particularly, there is a gap in understanding how food safety, and specifically

HACCP-related information might be communicated to consumers using such methods. Basic learning principles suggest watching educational videos focused on a specific topic should increase learning in that subject matter compared to watching a video in which other subject matter is covered. We therefore hypothesize the following:

**Hypothesis 1:** Videos that depict HACCP information will result in higher perceptions of learning than videos that do not depict HACCP information.

### **Framing effects**

Framing effects, a type of judgmental bias resulting from heuristics, involve the idea that individuals' decisions may be affected by how the options are depicted if decision-making involves two risky choices. Framing effects may facilitate risk perception as individuals attempt to process new information based on previous behavior by informing how individuals may assimilate a particular topic after viewing videos.

A number of studies suggest that a selected choice may be influenced by how the perception of choice is framed (Kahneman & Tversky, 1984; Tversky & Kahneman, 1981, 1986). This notion of framing has been applied to a variety of health- and risk-related messages such as screening behaviors related to detecting diseases (Rothman, Salovey, Antone, Keough, & Martin, 1993), risk messages in a narrative context (Steinhardt & Shapiro, 2015) and food safety issues (Rhoades & Ellis, 2010). . In *prospect theory*, if decisions involve different risk prospects, individuals' judgments may not result in the most optimal choice (Kahneman & Tversky, 1979).

*Fuzzy-trace theory* contributes to the understanding of framing effects, postulating that individuals make decisions based on simplifying meaning in order to make a choice (Reyna & Brainerd, 1991). Given the idea that losses are perceived to be more negative than an equivalent gain is perceived to be positive, individuals may be willing to take greater risks in order to minimize potential losses (Tversky & Kahneman, 1992). In addition, positive framing effects may be more effective as they are able to generate more positive associations than negatively framed messages (Krishnamurthy, Carter, & Blair, 2001).

Similarly, *regret theory* asserts that individuals will make decisions that will minimize their future regret (Loomes & Sugden, 1982). Therefore, fear of regrets may lead people into selecting sure gain outcomes over risky outcomes where there is a probability of gaining less. Unlike prospect theory, regret theory could also bias decision-makers into choosing sure losses compared to risky outcomes when they may regret losing more. This suggests that risk aversion or risk-seeking behavior are associated with the amount of perceived regret (Quiggin, 1994). However, Barlow, Warkentin, Ormond, and Dennis (2013) argued that negatively framed information would be more effective in persuading individuals to prevent violating certain policy protocols. We therefore hypothesize the following:

**Hypothesis 2a:** There will be an interaction between Frame and Information such that videos that depict HACCP information in a Positive Frame will result in the highest amount of perceived learning.

Video training programs that model behavior based on evidence based findings, have been extensively leveraged to enhance training and even prevent risky behavior, such as in the case of child maltreatment (Coward-Osborne et al., 2014). Overall, this literature suggests that role modeling training programs have been generally effective in enhancing retention, increasing the satisfaction of convenience in using these modeling videos for training, and increasing the effectiveness in resulting outcomes from such programs. Another benefit of video modeling is that such approaches can emphasize individual attention with relative ease, and therefore can be used widely amongst the target group of learner (Guastaferro, Lutzker, Jabaley, Shanley, & Crimmins, 2013). Despite the use of video modeling training programs in context of higher risk behaviors (mostly related to child maltreatment), such an approach has not been used for food safety training. Given that HACCP programs have strong evidence-based logic to them, our study incorporates behavior modeling in contrast to information presentation. We therefore hypothesize the following:

Hypothesis 2b: Videos that depict HACCP information in a Positive Frame and provide Information Modeling will result in the highest amount of perceived learning.

### ***Food risk and food safety behavior: consumer perspective***

While there are relatively fewer studies on HACCP knowledge of consumers, food safety knowledge, in general, has been extensively studied. The study by Draper and Green (2002) suggests that individuals make rational decisions when they have prior knowledge and risk awareness of inadequate food handling, since knowledge allows consumers to make informed choices. Sanlier (2009) found that low personal perceptions of food safety risks were associated with consumers ignoring the potential risks from microbiological hazards and improper food handling practices. Griffith, Worsfold, and Mitchell (1998) also observed that consumers have a substantial risk of foodborne disease infection originating from home although they associated low food risks in domestic food production.

Although more information is needed in the process of selecting and cooking certain foods in order to inform consumers about food safety practices and risks to be avoided, higher levels of product information may increase consumer concerns as they may be more likely to misinterpret the available information (Grunert, 2005). In addition, consumers appear to have similar misperceptions of food safety revealed in previous studies, such as temperature control, hand-washing, adequate usage of utensils and how to properly handle raw meat, poultry, and fish during food preparation at home (Jevšnik, Hlebec, & Raspor, 2008).

In the context of food safety awareness, Van Kleef et al. (2006) found that, due to their lack of knowledge, consumers felt more 'uncertain and indecisive' about what they understood and felt as food safety practices by the management, generally resulting in consumers making decisions based on their general feeling of 'security or insecurity' and their intuition, not on facts.

A potential 'risk reliever' identified in the literature is information. Quality assurance information could therefore mitigate risk perceptions of consumers, particularly those more concerned with food safety risks (Taylor, 2008). Therefore, increased concern with

food safety risks would increase the likelihood of consumers' need for information, thereby reducing their food risk. In addition, while studies have expressed concerns about consumers' lack of interest in information processing related to food safety, Verbeke, Frewer, Scholderer, and De Brabander (2007) point out the rationally ignorant hypothesis (McCluskey & Swinnen, 2004) as an alternative explanation of why some consumers are not interested in processing food safety information. The reasoning behind this hypothesis is that consumers weigh the price of information/and or transaction cost of information processing versus the marginal benefits of preventing the seemingly small likelihood of a foodborne illness event. We therefore hypothesize the following:

Hypothesis 3: There will be a three-way interaction such that the interaction between Frame and Information will be stronger for participants who are low in Food Risk.

## Methods

### *Participants*

Participants were recruited from the community of a large university town in the American Northeast using an existing listserv of participants in an earlier study (2 years before this study). The researchers had obtained the necessary approvals from the participants to contact them for future studies. The previous study also related to food safety practices in foodservice establishments, however it was not similar to any aspects of the current study. Furthermore, given the 2-year time lag from the previous study, we do not expect there was residual effect onto this study.

In total, 400 recruitment messages were sent. One hundred and sixty-seven individuals were recruited in this manner (response rate = 42%). Participants who agreed to participate were directed to an online survey hosted by the survey administration website [surveymonkey.com](https://www.surveymonkey.com). Participants first completed a measure of their propensity to engage in (un)safe food procedures. They were then randomly assigned to view one of five videos, which varied in accordance with our intended manipulations. After viewing the videos, participants responded to a scale intended to measure how much they felt they learned from the video. Finally, participants were thanked for their time. Twenty-five participants did not fully complete the study procedures and were subsequently omitted from analysis, resulting in a final sample of 142 participants.

### *Data analysis*

Four videos were created by a professional video producer that varied in accordance with our intended manipulations. The videos depicted knowledge of HACCP processes used in foodservice establishments. The script used as the basis for the videos was created with three food safety and HACCP experts. These experts referenced the recommendations of the Office of Food Safety at the US Food and Drug Administration to ensure accuracy of defining and representing HACCP in foodservice establishments (Mitchell, Fraser, & Bearon, 2007). The script for the video included the following dimensions of HACCP from the FDA publication: definition of HACCP; the purpose of its development; seven



key principles of HACCP; emphasis on critical points and an example using temperature control for poultry, stuffed meat, fish, or pasta; emphasis on including personal hygiene of employees in a HACCP plan for foodservice establishments; and a way for consumers to know if a foodservice establishment has a HACCP plan.

There are two ways of knowing whether an establishment may have a HACCP plan; the less certain indirect observation by looking for general cleanliness of the establishment, quality of food, behavior of employees, and a more direct way of either looking for certifications posted on the wall (Sharma, Sneed, & Beattie, 2012), or even asking the manager whether the establishment has a HACCP plan. The second recommendation of directly asking the manager of an establishment was modified to create two different conditions: an information condition where this recommendation would appear on the screen as text, and an information modeling condition where an actor would act-out the process of asking an actor-manager whether the establishment had HACCP. Modeling information for behavior change has been adopted in other contexts, such as by Thompson (2012) to promote healthy behaviors.

The script also included five statements of potential *consequences* if HACCP was not implemented in foodservice establishments (USDHHS, 2013). These five statements were *framed* positively or negatively to develop two different scripts for the positive and negative frame conditions (Barlow et al., 2013). This therefore led to four videos depicting a combination of two manipulations, HACCP information (information instruction and information modeling) and framing (positive or a negative frame) using a two-by-two design. An unrelated video (about penguins) was added as a control condition to assess whether food safety videos had any effect at all over an unrelated video.

Scripts were provided to a professional media expert. The media expert developed *draft* videos using digital props, and hired two actors to act out the information modeling condition. The three food safety experts and the principal researchers verified accuracy of the video depicting the script. In order to ensure effectiveness of the videos, the length of the videos was limited to 3 min in length. In a recent paper, Guo, Kim, and Rubin (2014) found that videos less than 3 min in length had the highest engagement from study participants.

## Measures

The accompanying survey measured participants' propensities to engage in (un)safe food behaviors using seven items created for the purpose of this study (see Appendix A;  $\alpha = .70$ ). Perceptions of learning was measured using three items created for the purpose of this study (see Appendix B;  $\alpha = .92$ ).

## Analysis

We tested Hypothesis 1 using a between-subjects *t*-test, collapsing the four HACCP-related videos into one group and comparing this to the control video that was not related to HACCP. Hypotheses 2 and 3 were tested using a between-subjects ANOVA with Frame, Information, and Food Risk as independent variables.



## Results

With respect to Hypothesis 1, there was an effect of video such that videos about HACCP ( $M = 3.72$ ,  $SD = 1.57$ ) resulted in higher perceptions of learning than videos that did not include HACCP information ( $M = 1.29$ ,  $SD = 0.67$ ),  $t(66.19) = 11.94$ ,  $p < .001$ , CI: 2.03–2.84. We therefore found support for Hypothesis 1.

To test Hypotheses 2 and 3, Food Risk was dichotomized into ‘high’ and ‘low’ categories using a mean split and was entered along with Frame and Information to an ANOVA analysis. With respect to the effect of asking style, there were no main effects of interactions related to Frame or Information type presented. We therefore did not find support for Hypothesis 2b. However, this analysis did reveal a significant three-way interaction,  $F(1, 132) = 5.52$ ,  $p < .05$ ,  $\eta^2 = .04$ . We therefore found initial support for Hypothesis 3 and examine results for high and low Food Risk participants separately.

For participants relatively low in Food Risk, there was a significant main effect of Frame such that those who saw the Positive Frame ( $M = 4.45$ ,  $SD = 1.67$ ) reported higher learning than those who saw the Negative Frame ( $M = 3.75$ ,  $SD = 1.47$ ) or the Control video ( $M = 3.64$ ,  $SD = 1.81$ ),  $F(1, 69) = 5.13$ ,  $p < .05$ ,  $\eta^2 = .07$ . In addition, simple effects tests comparing the Positive and Negative frame (excluding the Control condition) revealed that the difference between these two conditions was significant,  $F(1, 59) = 4.41$ ,  $p < .05$ ,  $\eta^2 = .07$ . There was also a marginal interaction between Frame and Information,  $F(1, 69) = 3.66$ ,  $p = .06$ ,  $\eta^2 = .05$ . Examining this interaction without including the Control condition (which was much lower in learning) revealed that those who saw the Positive Frame with Information Instructions ( $M = 5.12$ ,  $SD = 1.17$ ) indicated that they learned more than those who saw the Positive Frame with Information Modeling ( $M = 4.04$ ,  $SD = 1.83$ ), although this difference was only marginally significant,  $F(1, 27) = 3.07$ ,  $p = .09$ ,  $\eta^2 = .10$ . There was not a significant effect of Information for those who saw the Negative Frame,  $F(1, 32) = 0.41$ ,  $p > .10$ ,  $\eta^2 = .01$ . We therefore found support for Hypothesis 2a for those low in Food Risk (and thus found support for Hypothesis 3).

For participants high in Food Risk, there was no indication of significant main effects of Frame or Information and no indication of an interaction. However, for participants that saw a video with a Negative Frame, there was a marginal effect of Information such that those who saw the Information Instructions ( $M = 5.12$ ,  $SD = 1.17$ ) indicated that they learned more than those who saw the Information Modeling ( $M = 5.12$ ,  $SD = 1.17$ ),  $F(1, 32) = 3.75$ ,  $p = .06$ ,  $\eta^2 < .11$ . These results do not support Hypothesis 2b for those high in Food Risk (and thus do not support Hypothesis 3).

There was a significant main effect of Frame such that those who saw the Positive Frame ( $M = 4.45$ ,  $SD = 1.67$ ) reported higher learning than those who saw the Negative Frame ( $M = 3.75$ ,  $SD = 1.47$ ) or the Control video ( $M = 3.64$ ,  $SD = 1.81$ ),  $F(1, 69) = 5.13$ ,  $p < .05$ ,  $\eta^2 = .07$ . In addition, simple effects tests comparing the Positive and Negative frame (excluding the Control condition) revealed that the difference between these two conditions was significant,  $F(1, 59) = 4.41$ ,  $p < .05$ ,  $\eta^2 = .07$ .

For participants who are relatively high in food risk, there were no significant main effects of interactions related to the type of video they watched.

The nature of this interaction varied as a function of Food Risk. Those who saw a video with Information Instructions and a Positive Frame indicated that they learned more than those who saw a video with Information Instructions and a Negative Frame ( $M = 5.12$ ,  $SD = 1.17$ ),  $F(1, 25) = 9.04$ ,  $p > .01$ ,  $\eta^2 = .27$ . However, there was not an effect of Frame for those who saw a video with Information Modeling,  $F(1, 34) = 0.5$ ,  $p > .10$ ,  $\eta^2 < .01$ .

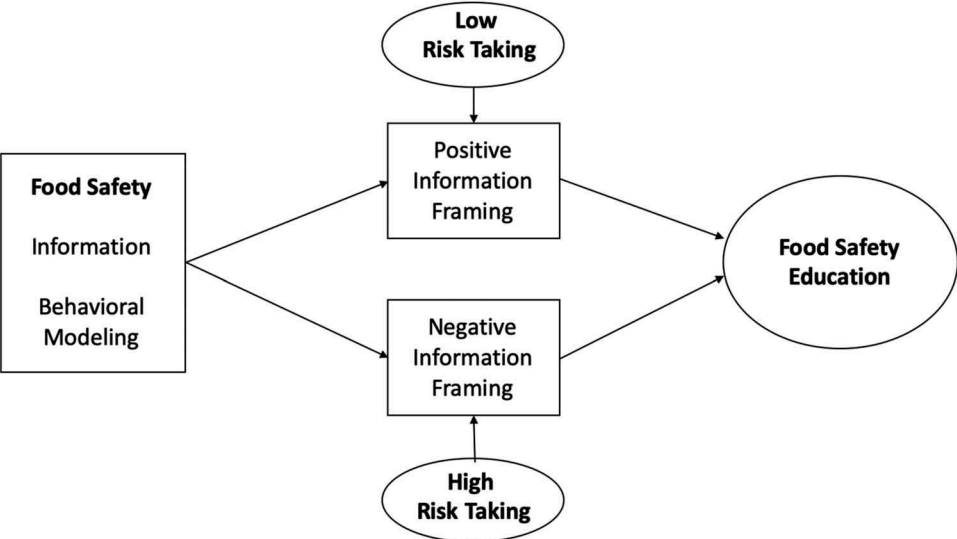
## Discussion

Consumers could be better informed of the food they are consuming. This is particularly true in situations when the food has been produced for them, such as in foodservice establishments. HACCP implementation in commercial foodservice establishments such as restaurants is not required by law – such implementation is only voluntary. However, given that HACCP does reduce the risks of unsafe food, and therefore, the likelihood of foodborne illnesses, it would be desirable for consumers that restaurant establishments would implement HACCP. Given that there are no legal requirements for foodservice establishments to provide this information to consumers, self-awareness amongst consumers could help them inquire about such practices, or at the least be self-aware of the food they are consuming. In order for consumers to demand better food safety practices, studies show consumers must also have the appropriate knowledge of food safety, particularly in the case of HACCP where such knowledge is lacking (Boodhu, Badrie, & Sookdhan, 2008; Ergönül, 2013).

On the other hand, the rationally ignorant hypothesis suggests that the perceived transaction cost of information gathering and processing could discourage consumers from increasing their knowledge of food safety and HACCP processes (Verbeke et al., 2007). Increasingly, short videos and social media are being leveraged to communicate food safety knowledge to consumers. In this paper, we investigated the effectiveness of short videos in enhancing consumer knowledge, in particular by presenting food safety information through positive and negative frames.

Results of our study suggest that videos about HACCP resulted in higher perceptions of learning than videos that did not include HACCP information. This would suggest that videos could be leveraged to educate individuals about food safety processes such as HACCP. Our results also found a marginal interaction between Frame and Information. In other words, the manner of framing this educational information could affect how individuals receive these educational videos.

This study also investigated the interaction between information framing, type of information presented, and the risky behavior of individuals. This was examined in our study through the interaction between Frame and Information at different levels of Food Risk. On the one hand, our results indicate that as Food Risk increases, the effects of Frame and Information increase as well. That is, those with higher risk behavior seemed to be more influenced by the framing effects and the type of information presented. However, these interactions were not statistically significant. On the other hand, our results also suggest that participants who were lower in Food Risk indicated they learned more than those higher in Food Risk. The nature of this interaction varied as a function of Food Risk such that for participants low in Food Risk those who viewed a Positive Frame video indicated that they learned more than those who viewed a Negative Frame video.



**Figure 2.** Information framing and food safety education.

Our findings also indicate a marginal interaction between Frame and Information, or the asking style; those who saw the Positive Frame with Information Instructions indicated that they learned more than those who saw the Positive Frame with Information Modeling. That is, individuals were more receptive to instructions than on the behavior modeling videos. We further found that those who saw a video with Information Instructions and a Positive Frame indicated that they learned more than those who saw a video with Information Instructions and a Negative Frame. However, we did not find any effect of Frame for those who saw a video with Information Modeling.

Surprisingly, for participants in our study that were high in Food Risk, there was no indication of significant main effects of Frame or Information and no indication of an interaction. However, for participants that saw a video with a Negative Frame, there was a marginal effect of Information such that those who saw the Information Instructions indicated that they learned more than those who saw the Information Modeling. This seems to suggest that likely the only way to educate individuals in the high food risk group might be through a negative frame of information instructions, although education and information for those low in food risk could be reinforced using positive framing of information instructions.

We propose a framework (See Figure 2) to articulate these relationships between food safety information and education. Preliminary evidence from this study indicates that positive and negative framing of the Information provision and Behavioral modeling instruction may interact with risk-taking behaviors. Future research will need to verify these preliminary findings, and also extend them beyond perceived learning to observing or measuring actual learning over time.

### Conclusions

Outcomes of this study at least indicate that videos increased the perceived learning of food safety-related information of (HACCP) food safety process. Further, that this

increased perception of learning would be higher for individuals that are in the lower food risk group. The high food risk group did not seem to benefit from such videos. However, we did find there was a possibility to reach this high food risk group through negatively framed videos.

One possibility that our study found effects with low food risk individuals could be that those in this behavioral category might already be better aware of food safety processes. Therefore, they might already be inquisitive about increasing their knowledge. The high food risk group on the other hand, may already be skeptical about food safety information and therefore may not find it valuable, even in a video format. However, when this group is presented with negatively framed information then it is likely the additional information might challenge their pre-determined beliefs about food safety, thereby increasing the uncertainty of their own knowledge. This uncertainty might then be mitigated by the educational video – and therefore the marginal effect in our results for this risk group in the negative frame.

One implication of these results is that additional educational information for the low food risk group might be reinforcing their existing knowledge and awareness. Whereas the negative frame's weak effects in the high food risk group might be challenging the existing knowledge of this group of individuals. In both cases, although individuals seem to prefer the instructions of what is HACCP and what to look for, rather than being told how to behave. Food safety consumer as well as employee educational efforts could adopt these principles in different ways. Particularly leveraging the visual appeal of videos could yield incrementally positive results to increase our awareness of how the food we consume can be made safer.

The broader premise of this study was that increased knowledge of HACCP processes could encourage consumers to demand such information and increase implementation of the processes from restaurants and other foodservice establishments.

Results of this study indicate that such HACCP videos could be valuable for the low food risk group to reinforce their existing knowledge and awareness. However, this study also suggests that the negative frame's weak effects in the high food risk group might helpful raising the awareness of this group of individuals. In both, these group of consumers individuals seem to prefer the instructions of what is HACCP and what to look for, rather than being told how to behave to inquire about the procedures. Such training videos could be adopted by agencies in different ways to increase awareness of food safety among consumers. Videos could also be used to leverage the visual appeal of the messaging to yield incrementally positive results while also increasing our awareness of how the food we consume can be made safer.

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## References

- Barlow, J. B., Warkentin, M., Ormond, D., & Dennis, A. R. (2013). Don't make excuses! Discouraging neutralization to reduce IT policy violation. *Computers and Security*, 39(PARTB), 145–159. doi:10.1016/j.cose.2013.05.006
- Barnett, J., McConnon, A., Kennedy, J., Raats, M., Shepherd, R., Verbeke, W., ... Wall, P. (2011). Development of strategies for effective communication of food risks and benefits across Europe: Design and conceptual framework of the FoodRisC project. *BMC Public Health*, 11(1), 308. doi:10.1186/1471-2458-11-308
- Boodhu, A., Badrie, N., & Sookdhan, J. (2008). Consumers' perceptions and awareness of safe food preparation practices at homes in Trinidad, West Indies. *International Journal of Consumer Studies*, 32(1), 41–48.
- Brad, M. A., Freeman, B., & Blair, E. (2012). YouTube as a source of information on confined space safety. *International Journal of Occupational Safety and Health*, 2(1), 39–42. doi:10.1001/archderm.144.10.1395
- Cowart-Osborne, M., Jackson, M., Chege, E., Baker, E., Whitaker, D., & Self-Brown, S. (2014). Technology-based innovations in child maltreatment prevention programs: Examples from SafeCare®. *Social Sciences*, 3(3), 427–440. doi:10.3390/socsci3030427
- Draper, A., & Green, J. (2002). Food safety and consumers: Constructions of choice and risk. *Social Policy & Administration*, 36(6), 610–625. doi:10.1111/1467-9515.00307
- Ergönül, B. (2013). Consumer awareness and perception to food safety: A consumer analysis. *Food Control*, 32(2), 461–471. doi:10.1016/j.foodcont.2013.01.018
- Food and Drug Administration (FDA), 2012. “Managing food safety: a manual for the voluntary use of HACCP principles for operators of food service and retail establishments”
- Frewer, L. J., Howard, C., Hedderley, D., & Shepherd, R. (1996). What determines trust in information about food-related risks? Underlying psychological constructs. *Risk Analysis*, 16(4), 473–486. doi:10.1111/j.1539-6924.1996.tb01094.x
- Griffith, C., Worsfold, D., & Mitchell, R. (1998). Food preparation, risk communication and the consumer. *Food Control*, 9(4), 225–232. doi:10.1016/S0956-7135(98)00003-6
- Grunert, K. G. (2005). Food quality and safety: Consumer perception and demand. *European Review of Agricultural Economics*, 32(3), 369–391. doi:10.1093/eurrag/jbi011
- Guastaferro, K. M., Lutzker, J. R., Jabaley, J. J., Shanley, J. R., & Crimmins, D. B. (2013). Teaching young mothers to identify developmental milestones. *International Journal of Child Health and Human Development*, 6(2), 223–233.
- Guo, P. J., Kim, J., & Rubin, R., 2014, March. “How video production affects student engagement: An empirical study of mooc videos”, In *Proceedings of the first ACM conference on Learning@ scale conference* (pp. 41–50). ACM.
- Jevšnik, M., Hlebec, V., & Raspor, P. (2008). Consumers' awareness of food safety from shopping to eating. *Food Control*, 19(8), 737–745. doi:10.1016/j.foodcont.2007.07.017
- Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica: Journal of the Econometric Society*, 47(2), 363–391.
- Kahneman, D., & Tversky, A. (1984). Choices, values, and frames. *American Psychologist*, 39(4), 341–350. doi:10.1037/0003-066X.39.4.341
- Kornelis, M., De Jonge, J., Frewer, L., & Dagevos, H. (2007). Consumer selection of food-safety information sources. *Risk Analysis*, 27(2), 327–335. doi:10.1111/j.1539-6924.2007.00885.x
- Krishnamurthy, P., Carter, P., & Blair, E. (2001). Attribute framing and goal framing effects in health decisions. *Organizational Behavior and Human Decision Processes*, 85(2), 382–399. doi:10.1006/obhd.2001.2962
- Kuttschreuter, M., Rutsaert, P., Hilverda, F., Regan, Á., Barnett, J., & Verbeke, W. (2014). Seeking information about food-related risks: The contribution of social media. *Food Quality and Preference*, 37, 10–18. doi:10.1016/j.foodqual.2014.04.006
- Loomes, G., & Sugden, R. (1982). Regret theory: An alternative theory of rational choice under uncertainty. *The Economic Journal*, 92(368), 805–824.

- Mascarello, G., Crovato, S., Pinto, A., Gallina, A., Siegrist, M., & Ravarotto, L. (2014). Communicating chemical risk in food to adolescents. A comparison of web and print media. *Food Control*, 35(1), 407–412. doi:10.1016/j.foodcont.2013.07.031
- McCluskey, J. J., & Swinnen, J. F. (2004). Political economy of the media and consumer perceptions of biotechnology. *American Journal of Agricultural Economics*, 86(5), 1230–1237. doi:10.1111/j.0002-9092.2004.00670.x
- Mitchell, R. E., Fraser, A. M., & Bearon, L. B. (2007). Preventing food-borne illness in food service establishments: Broadening the framework for intervention and research on safe food handling behaviors. *International Journal of Environmental Health Research*, 17(1), 9–24. doi:10.1080/09603120601124371
- Odwin, R., & Badrie, N. (2008). Consumers' perceptions and awareness of food safety practices in Barbados and Trinidad, West Indies—A pilot study. *International Journal of Consumer Studies*, 32(4), 394–398.
- Quiggin, J. (1994). Regret theory with general choice sets. *Journal of Risk and Uncertainty*, 8(2), 153–165. doi:10.1007/sl
- Reyna, V. F., & Brainerd, C. J. (1991). Fuzzy-trace theory and framing effects in choice: Gist extraction, truncation, and conversion. *Journal of Behavioral Decision Making*, 4(4), 249–262. doi:10.1002/bdm.3960040403
- Rhoades, E., & Ellis, J. D. (2010). Food Tube: Coverage of food safety issues through video. *Journal of Food Safety*, 30(1), 162–176. doi:10.1111/j.1745-4565.2009.00198.x
- Rodricks, J., & Taylor, M. R. (1983). Application of risk assessment to food safety decision making. *Regulatory Toxicology and Pharmacology*, 3(3), 275–307.
- Rothman, A. J., Salovey, P., Antone, C., Keough, K., & Martin, C. D. (1993). The influence of message framing on intentions to perform health behaviors. *Journal of Experimental Social Psychology*, 29(5), 408–433. Retrieved from: <http://www.sciencedirect.com/science/article/pii/S002210318371019X>
- Rutsaert, P., Pieniak, Z., Regan, Á., McConnon, Á., Kuttischreuter, M., Lores, M., ... Verbeke, W. (2014). Social media as a useful tool in food risk and benefit communication? A strategic orientation approach. *Food Policy*, 46, 84–93. doi:10.1016/j.foodpol.2014.02.003
- Rutsaert, P., Pieniak, Z., Regan, Á., McConnon, Á., & Verbeke, W. (2013). Consumer interest in receiving information through social media about the risks of pesticide residues. *Food Control*, 34(2), 386–392. doi:10.1016/j.foodcont.2013.04.030
- Sanlier, N. (2009). The knowledge and practice of food safety by young and adult consumers. *Food Control*, 20(6), 538–542. doi:10.1016/j.foodcont.2008.08.006
- Shan, L., Regan, Á., De Brún, A., Barnett, J., van der Sanden, M. C., Wall, P., & McConnon, Á. (2014). Food crisis coverage by social and traditional media: A case study of the 2008 Irish dioxin crisis". *Public Understanding of Science*, 23(8), 911–928. doi:10.1177/0963662512472315
- Sharma, A., Sneed, J., & Beattie, S. (2012). Willingness to pay for safer foods in foodservice establishments. *Journal of Foodservice Business Research*, 15(1), 101–116. doi:10.1080/15378020.2011.650531
- Steinhardt, J., & Shapiro, M. A. (2015). Framing Effects in Narrative and Non-Narrative Risk Messages. *Risk Analysis*, 35(8), 1423–1436. doi:10.1111/risa.12368
- Tanner, A., Duhe, S., Evans, A., & Condrasky, M. (2008). Using student-produced media to promote healthy eating: A pilot study on the effects of a media and nutrition intervention. *Science Communication*, 30(1), 108–125. doi:10.1177/1075547008319435
- Taylor, J. (2008). A new method of HACCP for hospitality: Changing behaviour and proving success. *International Journal of Contemporary Hospitality Management*, 20(5), 542–560. doi:10.1108/09596110820881454
- Thompson, D. (2012). Designing serious video games for health behavior change: Current status and future directions. *Journal of Diabetes Science and Technology*, 6(4), 807–811. doi:10.1177/193229681200600411
- Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science*, 211, 453–458. doi:10.1126/science.7455683



- Tversky, A., & Kahneman, D. (1986). Rational choice and the framing of decisions. *Journal of Business*, S251–S278. doi:10.1086/296365
- Tversky, A., & Kahneman, D. (1992). Advances in prospect theory: Cumulative representation of uncertainty. *Journal of Risk and Uncertainty*, 5(4), 297–323. doi:10.1007/BF00122574
- Unnevehr, L. J., & Jensen, H. H. (1999). The economic implications of using HACCP as a food safety regulatory standard. *Food Policy*, 24(6), 625–635. Retrieved from: <http://www.sciencedirect.com/science/article/pii/S0306919299000743>
- USDHHS (2013). Food safety and Defense. Retrieved from: <https://www.dhhs.nh.gov/dphs/holu/documents/foodsafety.pdf>
- Van Kleef, E., Frewer, L. J., Chrysoschoidis, G. M., Houghton, J. R., Korzen-Bohr, S., Krystallis, T., ... Rowe, G. (2006). Perceptions of food risk management among key stakeholders: Results from a cross-European study. *Appetite*, 47(1), 46–63. doi:10.1016/j.appet.2006.02.002
- Verbeke, W., Frewer, L. J., Scholderer, J., & De Brabander, H. F. (2007). Why consumers behave as they do with respect to food safety and risk information. *Analytica Chimica Acta*, 586(1), 2–7. doi:10.1016/j.aca.2006.07.065

## Appendices

### Appendix A: Food-related risk taking behaviors

1 = agree not at all; 7 = very strongly agree

- (1) A piece of cheese or bread with a little mold on it is still good as long as you cut off the moldy parts
- (2) If a couple of grapes in a bunch have started growing mold it is ok to eat the others that don't have mold
- (3) If something in my fridge has mold on it I will clean the entire fridge out
- (4) I don't usually wash fruit (e.g., apples, strawberries, cherries) that I have bought at the grocery store
- (5) You don't have to wash fruits in which you don't eat the skins (e.g., oranges, lemons, kiwis)
- (6) I follow the 'five second rule' (if food falls on the floor it is still ok to eat)
- (7) It's ok to eat leftovers that you forgot in your car for a few hours

### Appendix B: Perceptions of learning items

1 = agree not at all; 7 = very strongly agree

- (1) I feel that I am more knowledgeable about food safety as a result of watching the video in this study.
- (2) I am more concerned with food safety now than I was before I watched the video in this study.
- (3) I am more likely to ask about food safety when I eat out as a result of having watched the video in this study.