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## Research report

Hamburger hazards and emotions<sup>☆</sup>Nina Veflen Olsen<sup>a,\*</sup>, Elin Røssvoll<sup>a</sup>, Solveig Langsrud<sup>a</sup>, Joachim Scholderer<sup>b</sup><sup>a</sup> Nofima, Oslovn. 1, NO-1430 Ås, Norway<sup>b</sup> MAPP/QUANTS, Aarhus University, Bartholins Allé 10, DK-8000 Aarhus C, Denmark

## ARTICLE INFO

## Article history:

Received 15 November 2013

Received in revised form 6 March 2014

Accepted 7 March 2014

Available online 20 March 2014

## Keywords:

Emotions

Food risk

Consumer behavior

Hamburgers

Fear

Disgust

## ABSTRACT

Previous studies indicate that many consumers eat rare hamburgers and that information about microbiological hazards related to undercooked meat not necessarily leads to more responsible behavior. With this study we aim to investigate whether consumers' willingness to eat hamburgers depends on the emotions they experience when confronted with the food. A representative sample of 1046 Norwegian consumers participated in an online experiment. In the first part, participants were randomly divided into two groups. One group was confronted with a picture of a rare hamburger, whereas the other group was confronted with a picture of a well-done hamburger. The respondents were instructed to imagine that they were served the hamburger on the picture and then to indicate which emotions they experienced: fear, disgust, surprise, interest, pleasure, or none of these. In part two, all respondents were confronted with four pictures of hamburgers cooked to different degrees of doneness (rare, medium rare, medium well-done, well-done), and were asked to state their likelihood of eating. We analyzed the data by means of a multivariate probit model and two linear fixed-effect models. The results show that confrontation with rare hamburgers evokes more fear and disgust than confrontation with well-done hamburgers, that all hamburgers trigger pleasure and interest, and that a consumer's willingness to eat rare hamburgers depends on the particular type of emotion evoked. These findings indicate that emotions play an important role in a consumer's likelihood of eating risky food, and should be considered when developing food safety strategies.

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## Introduction

Eating rare hamburgers can cause an *Escherichia coli* (*E. coli* O157:H7 and other shigatoxigenic *E. coli*) infection, resulting in an illness ranging from mild diarrhea to severe complications that impose a significant health and economic burden on the society (Kassenborg et al., 2004). Despite numerous campaigns conducted by national food safety authorities and widespread news coverage of past *E. coli* outbreaks (such as the one among French children in 2005; King et al., 2009), many consumers still prefer to eat rare hamburgers (Røssvoll et al., 2013; Taylor et al., 2012). Previous studies show that consumers, especially those with high levels of education eat risky food, and that food safety information not always results in proper food handling behavior (Brennan, McCarthy, & Ritson, 2007). To develop prevention strategies, we need a better

understanding of why some consumers eat potentially hazardous foods.

Up until the 1990s, most studies on consumer acceptance of food applied an analytic approach, asking consumers for their rational choice or cognitive rating, ignoring the complex dynamic processes that mediate between exposure to a food stimulus and a consumer's emotional response (Jaeger & Hedderley, 2013). Today, we know that every major problem faced by humans involves emotions (Russell, 2003, 149) and that people appraise food risks both through their feelings and through their reasoning (Leikas, Lindeman, Roininen, & Lähteenmäki, 2007). Emotions influence what we eat, food intake regulates our mood, and even trying to control our eating – dieting – affects us (Edwards, Hartwell, & Brown, 2013; Evers, Adriaanse, de Ridder, & de Witt Huberts, 2013; Macht, 2008). However, we do not know how different emotions influence consumption of risky food. To better understand why some people consume potentially hazardous food this study investigates how product-specific emotions influence consumption of hamburgers.

Previous studies have operationalized emotions in many different ways. Basic (or discrete) emotion theories postulate the existence of a small number of so called basic emotions characterized by emotion-specific response patterns (Ekman, 1984; Izard, 1993;

<sup>☆</sup> Acknowledgments: We thank Kjell J. Merok for arranging and taking the pictures of the hamburgers and the Research Council of Norwegian, the Foundation for Research Levy on Agricultural products and the Norwegian Agricultural Authority for financial support.

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Tomkins, 1984). Depending on the particular theory adopted, the number of basic emotions may vary from six (anger, disgust, fear, sadness, surprise, happiness; e.g. Alaoui-Ismaili, Robin, Rada, Dittmar, & Vernet-Maury, 1997) to 39 as in the EsSense Profile (King & Meiselman, 2010). Desmet and Schifferstein (2008) state that not all emotional terms are relevant for all kinds of food studies. We agree with them, and decided to include two negative emotions (fear and disgust), two positive emotions (pleasure and interest) and one neutral emotion (surprise) in this study (for further discussion of the valence of these emotions, see Bänziger, Mortillaro, & Scherer, 2012; Scherer, 2005).

### Fear

The threat of harm, either physical or psychological, triggers fear and mobilizes us to cope with danger. A worry about what might happen can protect us, warn us, and make us more vigilant. One of the most prominent motivation theories in contemporary psychology, Grey's (1982) reinforcement sensitivity theory, highlights two basic, biologically based motivational systems: a) food as a pleasure to be approached and b) food as a threat to be avoided. Perception of food risk triggers the avoidance motivation system, a system sensitive to signals that indicate punishment, nonreward, and novelty. Individuals with high avoidance motivation experience fear more often and eat less risky food. Accordingly, we predict that the redness of a hamburger, an indicator of microbiological risk, increases the likelihood of experiencing fear (H1), and that fear decreases the likelihood of eating a hamburger (H2).

### Disgust

A culturally learned food-related emotion characterized by aversion toward eating an offensive or contaminated object (Angyal, 1941; Nabi, 1999; Rozin, 1997; Rozin & Fallon, 1987) can restrict unsafe behavior. Universal triggers of disgust, bodily products as: feces, vomit, urine, mucus, and blood, may be risky to eat and, thus, the emotion disgust may protect against consumption of unsafe food. Another explanation for disgust, that the emotion protects us against recognition of our own animality and maintains the line between humans and animals, has less to do with food safety (Haidt, McCauley, & Rozin, 1994; Rozin & Fallon, 1987), and Kubberød, Ueland, Dingstad, Risvik, and Henjesand (2008) speculate if disgust of meat can be explained by associating meat with flesh. The more the meat reminds us of flesh, the more it may remind us of our own animal characteristics – red meat may even activate associations with slaughter and death (Elias, 1978; Kubberød, Ueland, Risvik, & Henjesand, 2006; Miller, 1997). We expect aversion, triggered by dislike of meat in general and associations with animality, to evoke disgust; thus, we predict that the redness of a hamburger increases the likelihood of experiencing disgust (H3), and that disgust decreases the likelihood of eating a hamburger (H4).

### Pleasure

While some consumers have high avoidance motivations, others have high approach motivation (Grey, 1982). The latter group experiences food and eating as more rewarding than individuals with low approach motivation. A previous study by Corr (2002) shows that high approach motivation leads to less effective processing of negative information, indicating that the pleasure of eating, arguably one of the strongest predictors of food choice (Furst, Connors, Bisogni, Sobal, & Falk, 1996), may be a distraction from food risk information. Some consumers perceive a rare hamburger to be the juiciest and tastiest, while others prefer a well-done hamburger; thus, we do not expect the redness of a hamburger to increase the average

experience of pleasure. However, we do hypothesize that experiencing pleasure increases the likelihood of eating a hamburger (H5).

### Interest

Since previous emotion research primarily focused on the upsetting emotions, a broad repertoire of well-defined negative emotions exists and we know more about mental disorder than mental health (Ekman, 2003). To achieve a balance between positive and negative emotions, we included the positive emotion interest in this paper. Interest, sometimes called an eccentric and curious emotion – included in few emotion classifications and sometimes even rejected as an emotion – contains typical emotional components; as a stable pattern of cognitive appraisals, facial and vocal expressions, a subjective feeling, and adaptive functions (Silvia, 2008). Interest motivates learning and exploration and attracts people to new, unfamiliar things, like new types of food. Previous studies found that interest play an important role in risk perception and that interest in a hazard correlates with perceived risk (Sjöberg, 2007). When consumers find a hazard interesting they may act upon it even though they perceive it as a threat. Risky food may, accordingly, trigger interest, and thereby increase the likelihood of eating. We predict that the redness of a hamburger increases the likelihood of experiencing interest (H6), and that interest increases the likelihood of eating a hamburger (H7).

### Surprise

The briefest of all emotions, lasting for only a few seconds can be both pleasant and unpleasant (Desmet & Schifferstein, 2008; Ekman, 2003). As we figure out what happens, another emotion (fear, amusement, relief, anger, disgust, and so forth) substitutes surprise. The emotion that follows the feeling of surprise depends upon what surprised us. Accordingly, we do not expect the feeling of surprise, an emotion that can be both positive and negative, to influence the likelihood of eating, but we do expect a rare hamburger to be more surprising than a well-done hamburger, and hypothesize that the redness of a hamburger increases the likelihood of experiencing surprise (H8).

## Materials and methods

### Stimuli

Hamburgers were made from vacuum-packed ground meat and cooked to four different core temperatures of 55°C (rare), 65°C (medium rare), 73°C (medium well-done) and 80°C (well-done). Immediately after reaching the predefined core temperature, the hamburgers were sliced perpendicularly across the center of the flat surface of the patty to reveal the internal color and were arranged together with hamburger buns, salads and French fries. Pictures of each of the four different hamburgers were taken (Fig. 1). See Røssvoll, Sørheim, Heir, Mørretrø, Olsen, Langsrud (2014)<sup>1</sup> for a more detailed description of how the hamburgers were made.

### Participants

A representative sample of 1046 Norwegian consumers was randomly selected from a consumer panel maintained by TNS Gallup, a professional market research company. The consumer panel consists of 49,000 people living in Norway (about 1% of the Norwe-

<sup>1</sup> The aim of this study was to investigate if premature browning of 75% O<sup>2</sup> MAP hamburgers represents a risk of food-borne illness when considering consumers' food handling practices.

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