



Consumer perceptions raised by the food safety inspection report: Does the smiley communicate a food safety risk?

Annukka Vainio^{a,*}, Jenni Kaskela^b, Eerika Finell^c, Sari Ollila^d, Janne Lundén^b

^a Natural Resources Institute Finland (Luke), Finland

^b The Department of Food Hygiene and Environmental Health, Faculty of Veterinary Medicine, University of Helsinki, Finland

^c Faculty of Social Sciences, Tampere University, Finland

^d The Department of Food and Nutrition, Faculty of Agriculture and Forestry, University of Helsinki, Finland

ARTICLE INFO

Keywords:

Food safety
Perceived risk
Disclosure
Inspection
Grading scheme
Restaurant
Mediation

ABSTRACT

The publication of inspection grades at food establishments has been introduced as a way to inform consumers about restaurants' food safety levels. This two-part study explored consumers' perceptions and behavioural intentions raised by the Finnish food safety inspection report Oiva. The first part of the study explored university students' (n = 98) spontaneous perceptions raised by the inspection grade, communicated with a smiley face. Perceptions related to food safety risk and one's own behaviour were most frequent. In the second part, these perceptions were used in testing the full food safety inspection report on a nationally representative sample of the 18–65 years old Finnish population (n = 1513) with a survey-experiment approach. Binary logistic and linear regressions revealed that lower inspection grades were directly associated with increased perceived food safety risk and a behavioural intention not to eat at the restaurant when the effect of perceived food safety risk was taken into account. Information about the risk type moderated the effect of lower inspection grades on perceived risk and behavioural intention. These results underline the importance of providing additional information to consumers about the type of food safety risk.

1. Introduction

Many occurrences of foodborne illnesses by consumers are associated with eating at restaurants (Finnish Food Authority, 2016). The assessment of personal food safety risk of a restaurant is challenging for consumers because they cannot observe many aspects of restaurants' food safety level. The publication of inspection scores at food establishments has been introduced as means for conveying food safety inspectors' assessment of the food safety level to consumers. A public food safety information disclosure system is effective if consumers use it to avoid eating at restaurants that practice poor hygiene standards (Aik, Newall, Ng, Kirk, & Heywood, 2018). The provision of food safety inspection results has been found to shift consumer demand toward restaurants with higher hygiene standards (Choi, Nelson, & Almanza, 2011; Henson et al., 2006; Knight, Worosz, & Todd, 2007). There is also evidence that public disclosure improves compliance (Kaskela, Vainio, Ollila, & Lundén, 2019) and restaurant hygiene (Wong et al., 2015). At the same time, there is great variation in consumers' use of the restaurant inspection reports. For example, the majority of Singaporean

respondents used the letter based grading system to determine the restaurant choice (Aik et al., 2018) whereas only about half of the UK respondents used the reports for deciding whether to eat in a restaurant or not even though majority had seen them (Food Standard Agency, 2017). In order to improve the effectiveness of food safety inspection reports as a form of risk communication it is important to understand how consumers interpret and use them.

The ways consumers search for, and respond to information about food safety are associated with their risk perceptions. Perceived risk is an important determinant of food-related choices of consumers affecting the frequency of eating at restaurant (Knight, Worosz, & Todd, 2009), as well as the choice of a restaurant (Danelon & Salay, 2012; Knight et al., 2007). Consumers are more likely to search for information about food safety if they are concerned about the potential risks (Knight & Warland, 2005). Consumers' concerns, in turn, are associated with behaviours that they do in order to alleviate the risk (Frewer, 2004; Shaw, 2004).

Therefore, a successful food inspection report is the one that is able to convey information about risk to the consumer (Dundes & Rajapaksa,

* Corresponding author. Helsinki Institute of Sustainability Science (HELSUS), Faculty of Agriculture and Forestry, P.O. Box 27, 00014, University of Helsinki, Finland

E-mail address: annukka.vainio@helsinki.fi (A. Vainio).

<https://doi.org/10.1016/j.foodcont.2019.106976>

Received 2 September 2019; Received in revised form 12 October 2019; Accepted 30 October 2019

Available online 02 November 2019

0956-7135/ © 2019 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

2001). In order to accomplish that objective, risk communication needs to address concerns that are relevant to consumers (Frewer, 2004). Experts' and consumers' perceptions of risks vary (Hansen, Holm, Frewer, Robinson, & Sandøe, 2003), and therefore risk communication should be based on consumer risk perceptions, concerns, information needs and preferences, rather than expert-focused technical risk assessments alone (Charlebois & Summan, 2015; Cope et al., 2010).





Currently, food safety inspection results are presented to consumers in multiple formats in different countries. The format of food safety inspection report has an effect on the persuasiveness of the inspection result and consumer response (Choi, Miao, Almanza, & Nelson, 2013). A verbal format may have a stronger effect on consumer behaviour (Kim, Ma, & Almanza, 2017) whereas a numeric or letter grade format may be easier for consumers to comprehend (Dundes & Rajapaksa, 2001). Numeric grading formats are used in the UK (Food Standards Agency, 2017) and Australia (New South Wales Food Authority, 2017), and the letter grading system in New York City, US (McKelvey, Wong, & Matis, 2015). Face symbols are used in many countries such as Denmark (DVFA, 2019), Finland (Finnish Food Authority, 2018), Norway (Norwegian Food safety Authority, 2017), France (Ministère de l'agriculture et de l'alimentation, 2019) and China (Bai, Wang, Yang, & Gong, 2019), but the consumers' perceptions of face symbols in the context of food safety have not yet been investigated.

The public disclosure system Oiva was implemented in food service sectors in 2013 in Finland (Finnish Food Authority, 2018). Since then, publication of the inspection result has been mandatory and restaurants are obliged to display the latest Oiva report in a visible place, such as the entrance (Finnish Food Authority, 2016). The Oiva report includes both symbolic, as well as verbal elements. The Oiva report provides information about the compliance with food safety regulations, which is communicated to consumers using four different types of smiley faces, accompanied with the date of the inspection result (Fig. 1). The highest grading "Excellent", represented with the widest smile, indicates that every inspected subsection was in compliance with food safety regulations. All other gradings indicate some level of non-compliance in operations. Second highest grading "Good", represented with smiling face, indicates that minor noncompliance which are not considered as misleading, or as a risk to consumer were detected. Gradings

"To be corrected" (straight smiley face) and "Poor" (unhappy smiley face) indicate that non-compliance is impairing food safety (Finnish Food Authority, 2019.).

In addition, the Oiva report provides verbal information about the level of compliance with specific subsections of food safety regulations, and each of them is graded using the four-point scale. The lowest grade of inspected subsections determines the final inspection result. The number and the quality of assessed subsections can vary, and from the consumer perspective, some of the subsections, (e.g., cleanliness of facilities, surfaces and equipment) may convey a more direct food safety risk than others (e.g., own-control plan). Many public disclosure systems do not provide such verbal information about the risk type, and it is not known whether consumers use this information in their behavioural intention to eat at a restaurant or not. Previous research suggests that an effective risk communication would be associated with consumers' risk perceptions (Charlebois & Summan, 2015; Cope et al., 2010; Dundes & Rajapaksa, 2001; Frewer, 2004; Shaw, 2004). However, many currently used inspection report formats do not provide information about the relevance of hygiene violations to consumers. Previous research suggests that public hygiene information schemes do change consumers' intentions to eat at the restaurant (Aik et al., 2018). However, it is not known if these schemes change behavioural intentions because consumers interpret information as conveying risk, or because of some other reasons. More specifically, it is not known how consumers perceive food safety inspection results, and to what extent these perceptions are related to food safety risk.

In order to fill these research gaps a two-part study was conducted. The objective of the first part was to capture consumers' spontaneous perceptions raised by the overall inspection grade communicated with a smiley symbol alone without more specific information of non-compliance. An understanding of spontaneous perceptions raised by the smiley symbol was needed to formulate the questions to measure perceived food safety risk in the second part of the study. In addition, the associations between the inspection grade, perceptions related to food safety risk and behavioural intention to eat at the restaurant were tested in the first study part. The objective of the second part of the study was to test whether the Oiva food safety inspection report affected behavioural intention directly, or through perceived food safety risk using a

Subsection evaluation		
<ul style="list-style-type: none"> compliance with food safety regulations 	excellent	
<ul style="list-style-type: none"> minor noncompliance not considered as food safety risk or misleading 	good	
<ul style="list-style-type: none"> noncompliance is impairing food safety or misleads consumer 	to be corrected	
<ul style="list-style-type: none"> noncompliance is jeopardising food safety or considerably misleads consumers 	poor	



 Lowest grade of the subsections determines the overall grade

Fig. 1. The inspection grading system used in the Oiva report (Finnish Food Authority, 2019).

Table 1
The experimental design in the second part of the study.

Group	Overall Oiva grade		Subsection in the Oiva-report		Verbal description of hygiene violation
	Directly associated with food safety risk	Indirectly associated with food safety risk	Directly associated with food safety risk	Indirectly associated with food safety risk	
Group 1 (reference group) (n = 217)	excellent	excellent	excellent	excellent	–
Group 2 (n = 213)	good	good	good	excellent	“Some minor defects in cleaning the food premises.”
Group 3 (n = 220)	to be corrected	to be corrected	to be corrected	excellent	“Cleaning of the food premises has been neglected.”
Group 4 (n = 225)	poor	poor	poor	excellent	“Cleaning of the food premises has clearly been neglected.”
Group 5 (n = 214)	good	good	excellent	good	“Small minor defects in the own-control plan.”
Group 6 (n = 204)	to be corrected	to be corrected	excellent	to be corrected	“Defects in the own-control plan.”
Group 7 (n = 220)	poor	poor	excellent	poor	“Serious defects in the own-control plan.”

nationally representative sample of the adult population living in Finland.

2. Materials and methods

2.1. Participants

2.1.1. Study 1

The participants were recruited from the ongoing courses at the Universities of Helsinki and Tampere. In order to maximize the range of perceptions, two types of respondents were included. The students of alimentary sciences at the University of Helsinki represented individuals who were knowledgeable about the Oiva system through their studies. The students of social sciences at the Tampere University represented individuals who were potentially unaware of the Oiva system. Participation was voluntary and respondents did not receive any reward from participation.

2.1.2. Study 2

The data were collected using an online questionnaire, directed to the members of a consumer panel by a commercial marketing research company, representative of 18–65 years old Internet users living in Finland in terms of age, gender and region. Of the contacted consumers, 14% completed the questionnaire, yielding 1513 complete answers. Such a response rate is fairly common in internet surveys (Dillman, Smyth, & Christian, 2009).

2.2. Methods

2.2.1. Study 1

The purpose of the first part of the study was to gather free perceptions of the smiley symbol used in the Oiva report. The participants were requested to imagine that they were going to eat at a restaurant in Finland when they noticed the Oiva report. The respondents were given the overall inspection result (Appendix A). It included a smiley face, which had an orange colour, and the date of the latest inspection, which was recent. Each participant randomly received one of the four different types of smiley face that communicated one of the four different levels of the food inspection result: “excellent” (29% of the participants), “good” (25%), “to be corrected” (22%) and “poor” (24%). The interpretation key of the smiley faces included in the actual Oiva report was not given to the respondents because it potentially would have influenced their spontaneous perceptions. The respondents were requested to write their immediate perceptions of the food inspection result to a space provided below the smiley.

2.2.2. Study 2

The purpose of the second part of the study was to test how perceived food safety risk and the intention to eat at the restaurant varied between consumers who had seen different versions of full Oiva reports, which included also the interpretation key for smileys, the list of inspected subsections and a written description of non-compliance. The spontaneous perceptions related to food safety risk identified in the first part of the study were used in formulating the survey items.

We tested the hypothesis that risk perception mediates the effect of inspection grade on behavioural intention. The mediation would mean that four conditions are met (Hayes, 2018). First, a low inspection grade would increase the perceived food safety risk (H1a). Second, a low inspection grade would be associated with a change in the intention to eat at the restaurant (H1b). Third, the increased perceived risk (the mediator) would be associated with a change in the intention to eat at the restaurant (H1c). Fourth, a full mediation would mean that the effect of the inspection grade on the intention is indirect via perceived food safety risk, and therefore the direct effect of the inspection grade should disappear if the effect of perceived risk is taken into account (H1d). In order to assess the level food safety risk the consumer needs to

assess the seriousness of food safety violation together with the type of violation. Previous research suggests that the higher is the perceived risk the higher is the likelihood that an individual engages in behaviour that aims to alleviate that risk (Frewer, 2004; Shaw, 2004; Vainio, Mäkinen, & Paloniemi, 2013). Therefore we also tested a hypothesis that information about a hygiene violation that involves a more direct safety risk has a stronger impact on consumers' risk perception and behavioural intention to eat at the restaurant than a violation that has received the same Oiva grade but involves only an indirect risk to the consumer (H2).

We tested the research hypotheses using a population-based survey experiment approach with a between-subjects design to test the effects of the Oiva report on risk perception and behavioural intentions to eat at the restaurant (Mutz, 2011). The Oiva report consists of two types of information: the overall inspection grade in the form of smileys, and the specific verbal information about the type of food safety violation that has been inspected. Therefore, we tested the influence of these two types of information on perceived risk and behavioural intention. We distributed seven different versions of the report and the participants were randomly assigned to read one of them (Table 1). Apart from the various Oiva reports the questionnaire was same for all.

First, the participants read a following scenario: "We ask you to imagine that you are going to eat in a restaurant in Finland. There are several restaurants in the area. You are alone. You notice a cozy-looking restaurant where you have not been before. You stand at the front of the restaurant and read a menu that looks tempting and affordable. There are other customers in the restaurant. You decide to go to eat at the restaurant. At the front door, you notice the Oiva report and read it carefully."

Below the scenario was shown a full Oiva report without restaurant identifiers (see Appendix B). The report included the date of the latest inspection, and names of the grades of the smiley grading system. Following parts of the report varied:

- The inspection grade was either "excellent", "good", "to be corrected", or "poor", indicated with a smiley. The inspection grade was the lowest grade of the subsections. In subsequent analyses, the grades were coded as 1 = "excellent" – 4 = "poor".
- The inspection of the two subsections were indicated with a smiley. The first subsection was "own-control plan", and it was less directly related to the food safety risk. The second subsection was "cleanliness of facilities, surfaces and equipment", and it was more directly related to the food safety risk. In subsequent analyses, the risk type was coded as 0 = "no direct risk" and 1 = "direct risk".
- At the bottom of the report a written description of the non-compliance was included only if one of the subsections was evaluated as "good", "to be corrected" or "poor".

In order to control the effect of reading the report correctly, the respondents were then requested to answer two questions: "What grade did the restaurant receive in the own-control plan?" and "What grade did the restaurant receive in the cleanliness of facilities, surfaces and equipment?"

The respondents were then asked what they had decided to do based on the report. The report was shown to the respondents while they answered the question. The response options were 0 = "I eat in the restaurant" and 1 = "I do not eat in the restaurant".

The respondents were then requested to evaluate the perception about the food safety risk related to eating at the restaurant. The four items were derived from the food safety risk perceptions identified in the first part of the study: 1) hygiene level at the restaurant, 2) meeting the requirements of the law, 3) risk of contracting a food-borne illness, and 4) food safety (Table 1) (the "quality of food" item was left out because it referred also to the non-risk aspects of food quality). Each item was evaluated using a thermometer ranging from low (1) to high (100). The values the risk of contracting a food-borne illness were

converted so that high values of all items indicated a high level of perceived food safety risk. The mean score of the responses was used in subsequent analyses ($\alpha = 0.90$).

2.3. Analysis

2.3.1. Study 1

The written responses were analysed with content analysis which is a commonly used method to code textual data and convert it into quantitative data (Schreier, 2014). The analysis identified categories in the participants' responses and then use these categories in the quantitative analysis (see e.g., Pacheco et al., 2018; Pinto et al., 2018). The unit of content analysis was defined as a statement that expressed one idea or concept. A statement was coded into one subcategory and the same subcategory was assigned to a respondent only once. One researcher prepared the first version of the coding, and the coding was jointly revised with the research team to ensure the reliability of the coding. The identified categories were further grouped into four main categories: 1) perceptions about the food safety risk, 2) perceptions about one's own behaviour, 3) perceptions about the Oiva system (not related to risk), and 4) perceptions about the restaurant (not related to risk).

The associations between the inspection grade, perceived food safety risk and intention to eat at the restaurant were further tested with ANOVA. The planned simple contrasts method was used for treating the highest inspection as a reference group and comparing it to other groups (Field, 2018). For this purpose, the perceived food safety risk statements were also coded as indicating either low risk or increased risk, and the behavioural intention statements were coded as indicating either a change or no change in the intention. In order to ensure the reliability of these two binary variables, the statements were coded by two persons separately. Disagreements were resolved with discussion so that full agreement was achieved. Respondents who had mentioned increased food safety risk at least once, were coded as 1 whereas other respondents were coded as 0. The respondents who had mentioned change in their behavioural intention to eat at the restaurant at least once were coded as 1 whereas other respondents were coded as 0. Further, we assessed the difference in perceived risk and behavioural intentions between the participants from both universities using Pearson's Chi-Square test and analysed them as one group if there was no difference.

2.3.2. Study 2

The model illustrated in Fig. 2 was tested with linear regression and logistic regression using IBM SPSS Statistics version 25.0. The two tested inspection report characteristics – the symbolic overall inspection grade and the verbal description of the risk type – were used in the regression models as follows. The inspection grade was used as an independent variable and the risk type was used as a moderator variable that moderated the effect of inspection grade on perceived food safety risk and behavioural intention (Hayes, 2018; Vainio, Irz, & Hartikainen,

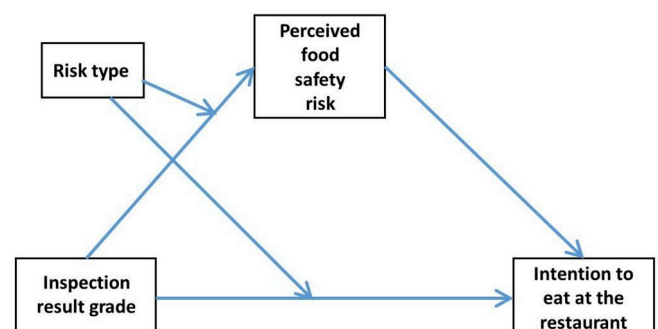


Fig. 2. The model tested in the second part of the study.

2018). The participants having been randomly assigned to groups, socio-demographic variables were not included in the models as control variables when testing the hypothesized effects (Mutz, 2011). The variable indicating that the respondent had read both subsections correctly was used as a control variable in regression models. The moderation (i.e., a violation involving a direct safety risk should have a stronger impact on perceived risk and behavioural intention than a violation involving an indirect risk) was tested including an interaction term *inspection grade * risk type* to regression models.

The indirect effect of the inspection result grade on the intention to eat at the restaurant through perceived food safety risk were estimated with PROCESS v3.3 package (Hayes, 2018). The conditional indirect effects dependent on the risk type were estimated using the 95% confidence intervals and 5000 bootstrap samples.

3. Results

3.1. Study 1

A total of 98 respondents participated in the study, 56 at the University of Helsinki and 42 at the University of Tampere. The mean age of the participants was 24.0 years (SD = 4.07). Of the respondents 78.6% were females.

Pearson Chi-Square test suggested that there were no differences in the perceived risk between the students of the two universities: increased food safety risk 43% (Helsinki) vs. 61% (Tampere), $\chi^2(1) = 2.86$, $p = .091$. In addition, no difference in the behavioural intention between were found, change in behavioural intention 34% (Helsinki) vs. 37% (Tampere), $\chi^2(1) = 0.07$, $p = .792$, and therefore the respondents were analysed as one group in subsequent analyses.

Altogether 302 statements were identified. *Perceptions about food safety risk* ($n = 177$) received largest number of occurrences, followed by *Perceptions related to own behaviour* ($n = 71$), suggesting that these were the two main types of perceptions raised by the face symbol. Other main categories were *Perceptions about Oiva system* (not related to risk) ($n = 44$) and *Perceptions about the restaurant* (not related to risk) ($n = 23$).

Perceptions about food safety risk included six subcategories, as well as two cross-cutting subcategories: low risk vs. increased risk (Table 2). *Perceptions about one's own behaviour* was another main category. The biggest subcategory was *Behavioural intention to eat at the restaurant*, which included two sub-categories: *Intention does not change* and *Intention changes* (Table 3). This main category also included references related to looking for more information.

According to the results of ANOVA, perceived food safety risk among study participants increased as inspection grades became poorer. Their propensity to eat at the restaurant decreased when the inspection grades were at the lower half of the 4-point scale ("To be corrected" and "Poor") (Table 4).

3.2. Study 2

Of the online survey respondents 52.3% were women, and the mean age was 44.89 years (S.D. = 12.75). Compared to the Finnish

population, the sample was more highly educated and slightly older (Table 5).

The results of the first tested regression model (Table 6) shows that the two lowest inspection grades ("poor" and "to be corrected"), as well as the fault involving a direct risk were associated with an increased perceived food safety risk, as expected (H1a). Increased perceived food safety risk was associated with the intention to not eat at the restaurant, as expected (H1c; Model 2). Further, the two lowest inspection grades were also associated with the intention to not eat at the restaurant, as expected (H1b; Model 3).

The effect of the inspection grade on behavioural intention remained statistically significant even when the effect of perceived risk was taken into account (Model 4), suggesting that the perceived food safety risk still had a direct effect on behavioural intention. However, the indirect effects of the two lowest inspection grades on the intention to eat at the restaurant via perceived food safety risk were statistically significant (Table 7), suggesting that the effect was partly mediated by perceived food safety risk. Therefore H1d was only partly confirmed.

The interaction terms between the two lowest inspection grades and the risk type were statistically significant, as expected (H2) (Table 6), suggesting that information about the risk type moderated the effect of the two lowest inspection grades on behavioural intention. More specifically, a low inspection grade that came from non-compliance associated with direct risk increased perceived food safety risk more, and resulted in the behavioural intention to not eat at the restaurant more likely than the same inspection grade that came from non-compliance associated with an indirect food safety risk.

In addition, about 72.4% of the respondents had read the food safety inspection report correctly. Correct reading was associated with a reduced perceived food safety risk and an intention to eat at the restaurant (Table 6).

4. Discussion

This two-part study explored how Finnish consumers interpret food safety information disclosed in the food safety inspection report Oiva. The first part of the study explored the spontaneous perceptions elicited by the smiley face representing the grade of Oiva inspection result. According to the results, the most common spontaneous perceptions elicited by the smiley were related to food safety risk and one's own behaviour related to eating at the restaurant, which suggests that the respondents perceived the inspection grade to convey risk information, which also evoked a need to react.

The results of the survey experiment revealed that the overall inspection grades "to be corrected" and "poor" had a direct effect on perceived risk, and that the inspection grades "to be corrected" and "poor", as well as perceived risk were associated with a behavioural intention to not eat at the restaurant. This finding is in line with previous risk communication research suggesting that risk information is associated with consumers' risk perceptions and behavioural intentions (Frewer, 2004; Shaw, 2004).

The effect of the inspection grade on behavioural intention was partly mediated by perceived food safety risk. The finding suggests that while the respondents associated the inspection grades "to be

Table 2
Perceptions about food safety risk raised by the Oiva food safety inspection result among the respondents. Subcategories with frequencies (n).

Subcategories	Low perceived risk	n	Increased perceived risk	n	Total n
Hygiene level	Level is adequate	39	Level is inadequate	35	74
Confidence	Result raises confidence	20	Result raises concern	16	36
Requirements of law	Requirements are met	17	Requirements are not met	6	23
Quality of food	Adequate	5	Inadequate	15	20
Risk of contracting a food-borne illness	There is no risk	4	There is a risk	9	13
Unspecific perceptions related to risk	Positive perceptions	8	Negative perceptions	3	11
Total n		93		84	177

Table 3

Perceptions about behavioural intention to eat at the restaurant raised by the Oiva food safety inspection result among the respondents. Subcategories with frequencies (n).

Behavioural intention does not change	n	Behavioural intention changes	n	Total n
I can eat at this restaurant.	17	I hesitate going to this restaurant.	26	
		I do not go to this restaurant	9	
		I go to this restaurant but select only safe foods and/or drinks	4	
Total n	17		39	56

Table 4

Percentages of respondents who perceived an increased food safety risk and change in behavioural intention to eat at the restaurant, and comparisons between perceptions raised by the grade “Excellent” vs. other inspection grades (ANOVA, planned contrasts, p-values).

Inspection grade (n)	Increased perceived food safety risk		Change in behavioural intention to eat at the restaurant	
	%	Inspection grade vs. “Excellent” p-value	%	Inspection grade vs. “Excellent” p-value
Excellent (27)	0.0		0.0	
Good (25)	32.0	.000	0.0	.082
To be corrected (22)	90.9	.000	68.2	.000
Poor (24)	91.7	.000	83.3	.000

Table 5

Comparison of the distribution of age, gender, highest education level, and area of residence between the Finnish population and the data sample.

Characteristic	Finnish population ^a (%)	Data sample (%)
Gender		
women	49.3	52.3
men	50.7	47.7
Age groups		
18–30	26.0	17.2
31–40	21.1	20.2
41–50	19.9	25.4
51–65	33.0	37.3
Highest education (among 20–65 years of age)		
basic level	15.8	5.5
secondary level	57.1	53.1
academic	27.1	41.4
Region (among 20–65 years of age)		
Helsinki-Uusimaa	32.2	31.7
Southern Finland	20.6	19.7
Western Finland	24.6	24.6
Northern and Eastern Finland	22.6	24.0

^a Source: [Statistics Finland \(2017\)](#).

corrected” and “poor” with risk, their decision to not eat at the restaurant was only partly guided by perceived food safety risk related to eating at the restaurant. In other words, the inspection grade elicited other perceptions that were not related to risk, which may have contributed to a decision to eat or not to eat at the restaurant. The perceptions elicited by the smiley face in the first part of the study were multifaceted and included perceptions related to the functioning and the quality of the restaurant. One potential pathway, which could explain these findings, and which were not measured in the study, may be via emotional reactions. In the context of advertising, positive emojis have been found to raise positive affect among consumers, and lead to higher purchase intentions (Das, Wiener, & Kareklas, 2019). In the context of health message intervention, written messages without emojis resulted in increased message elaboration and credibility among consumers (Willoughby & Liu, 2018). The findings of the current study, as well as previous studies suggest that smileys are effective in eliciting behavioural intentions. However, these behavioural intentions may at least partly be based on an emotional reaction and not a thorough

cognitive elaboration of the verbal risk message. This finding requires further research. In general, this finding suggests that risk communicators need to be aware of the pros and cons of the visual elements conveying emotions in the public risk communication. Oiva inspection report itself does not include a detailed description of the grades and thus it was interesting that only the grades “to be corrected and” “poor” represented with non-smiling face symbol were associated with perceived food safety risk and behavioural intention. Oiva grade “good” indicates that the noncompliance is small and does not affect food safety. Thus, this result means that face symbols meaningfully influence consumers’ risk perception and behaviour intention.

The information about risk type moderated the effect of inspection result on perceived risk and behavioural intention, as expected. More specifically, when the non-compliance involved a direct food safety risk, the intention to not to eat at the restaurant was stronger than when the flaw was not directly associated with food safety risk. This finding means that respondents interpreted information about specific hygiene violations as indicating the level of personal risk of eating at a restaurant. This finding is in line with previous studies suggesting that a verbal format has a stronger effect on consumer behaviour (Dunlop et al., 2010; Kim et al., 2017), which in the Oiva report is used for providing information about the inspected subsections. In addition, this finding complements previous research indicating that consumers may misinterpret the food safety inspection reports that provide only the overall score of hygiene level (Dundes & Rajapaksa, 2001; Henson et al., 2006). In other words, the overall score alone is not sufficient and consumers need information about the type of risk in order to be able to make an assessment of personal risk.

From the risk communication perspective, the partial mediation between the overall inspection grade and behavioural intention through perceived food safety risk suggests that while the inspection grade raises perceptions about food-related risks, the food safety risk message could be made clearer. Furthermore, consumers’ food safety knowledge may not be sufficient (Lange, Göransson, & Marklinder, 2016; Nesbit et al., 2014; Wilcock, Pun, Khanona, & Aung, 2004) to comprehend the food safety risks associated with some of the non-compliances. Therefore, consumers need be informed what that result means in terms of their own personal risk, such as the potential consequences of non-compliance, and what they need do in practice in order to avoid that risk. This is an issue that needs to be examined in future studies.

The two-part study involved two hypothetical experiments where the respondents had to make a behavioural choice based on the food safety report and not any other information cues which are present in real-life situations when individuals have to make a decision whether to eat at a restaurant or not. Previous research suggests that consumers use a wide range of information cues to assess the safety of eating at a restaurant (Danelon & Salay, 2012; Fatimah, Boo, Sambasivan, & Salleh, 2011; Gregory & Kim, 2004), and the results of the qualitative analysis suggested that many respondents would have liked to get more information about the restaurant. Therefore it is possible that the impact of the Oiva result on eating at the restaurant may have been different in a real-life setting where more information cues that are usually present in real-life eating environments would have been present. Moreover, in the study setting only the grades of two subsections were

Table 6

Associations between the inspection grade, risk type, perceived food safety risk and behavioural intention to eat at the restaurant. Results of linear regression (Model 1) and binary logistic regression (Models 2–4): unstandardized regression coefficients and standard errors.

	Perceived food safety risk				Intention to eat at the restaurant			
	Model 1		Model 2		Model 3		Model 4	
	B	S.E.	B	S.E.	B	S.E.	B	S.E.
Read report subsections correctly [ref: wrong]	−5.62***	1.08	.27	.18	.54***	.16	.29	.19
Perceived risk			−.10***	.00			−.08***	.01
Inspection grade [ref: excellent]:								
“poor”	29.91***	1.73			−3.73***	.52	−2.6***	.62
“to be corrected”	18.18***	1.76			−2.33***	.54	−1.58*	.64
“good”	−.65	1.74			−.86	.60	−1.27	.72
Subsection “direct risk” [ref: “no direct risk”]	11.65***	1.75			−1.05**	.38	−.30	.47
Inspection grade “poor” * subsection “direct risk”	17.77***	2.44			−.94*	.45	.18	.55
Inspection grade “to be corrected” * subsection “direct risk”	16.22***	2.47			−1.33**	.45	−.66	.54
Intercept	19.32***	1.59	4.81***	.29	3.48***	.52	6.21***	.66
Adjusted R ²	.60***							
Nagelkerke R ²			.69***		.54***		.71***	

Note. ***p < .001; **p < .01; *p < .05.

Table 7

The relative conditional indirect effects of the inspection grade on the intention to eat at the restaurant. Bootstrapped unstandardized coefficients, standard errors and 95% confidence intervals.

Risk type	Inspection grade							
	“To be corrected”				“Poor”			
	Coefficient	S.E.	Lower CI	Upper CI	Coefficient	S.E.	Lower CI	Upper CI
“no direct risk”	−1.50	.18	−1.89	−1.18	−2.44	.24	−2.97	−2.03
“direct risk”	−2.80	.26	−3.37	−2.34	−3.86	.34	−4.61	−3.28

Note. The result is significant at 95% level if the confidence interval does not contain zero.

given for respondents, though in reality most Oiva reports include information of many more subsections. Several varied subsection grades might have different impact on consumers' behaviour intentions than just these two subsections investigated in this study. For example, several “good” grades might affect consumers' perceived risk and behaviour intention, and just one “to be corrected” grade among several “excellent” grades might not affect perceived risk and behaviour intention contrary the results of this study based on grades of just two subsections. Moreover, we studied behavioural intentions and not actual behaviour. While intentions do often influence behaviour, the correlation between these two if often just moderate and is dependent on multiple different moderators (Ajzen, 2011). At the same time, the experimental approach allowed us to draw causal conclusions from the findings: the inspection results influenced both risk perceptions, as well as behavioural intentions. It also allowed us to eliminate the influence of non-controlled variables, which are unavoidable in real-life contexts.

Moreover, there is evidence that there is cultural variation in consumers' information needs related to food risks, and therefore the interpretation of the results of this study need to take into account specific concerns and information needs of the cultural context (van Dijk et al., 2008). Finnish consumers are relatively highly educated which means that they are likely to be accept relatively complex risk communication. Another limitation associated with hypothetical experiment is that we do not know if the respondents would have paid attention to food safety reports in real-life contexts. In Finland, the concern about food risks is relatively low as compared to many other countries (EFSA, 2019) and therefore the respondents may not search for information about food safety when they visit real restaurants. Therefore, future studies need to analyse how individuals pay attention to food safety inspection reports in real life.

In conclusion, these results can be used to develop food safety inspection reports so that they communicate risk to consumers more

effectively. Currently, most food safety inspection reports do not explain the potential consequences of noncompliance to consumers. As such, they may not represent sufficient risk communication to consumers who need to make behavioural intentions based on those reports (Charlebois & Summan, 2015; Cope et al., 2010; Frewer, 2004). The results of this study show that consumers utilize specific information of compliance to form their risk perception of a restaurant and their behavioural intentions. Therefore, the authorities developing food safety inspection systems need to understand concerns and information needs of the consumers, and develop food safety inspection result formats to better communicate the relevance of risks to consumers.

Acknowledgements

We are grateful to the Ministry of Agriculture and Forestry of Finland (Makera grant number 1455/312/2015) for funding this research.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.foodcont.2019.106976>.

References

- Aik, J., Newall, A. T., Ng, L.-C., Kirk, M. D., & Heywood, A. E. (2018). Use of the letter-based grading information disclosure system and its influence on dining establishment choice in Singapore: A cross-sectional study. *Food Control*, *90*, 105–112.
- Ajzen, I. (2011). The theory of planned behaviour: Reactions and reflections. *Psychology and Health*, *26*, 1113–1127.
- Bai, L., Wang, M., Yang, Y., & Gong, S. (2019). Food safety in restaurants: The consumer perspective. *International Journal of Hospitality Management*, *77*, 139–146.
- Charlebois, S., & Summan, A. (2015). A risk communication model for food regulatory agencies in modern society. *Trends in Food Science & Technology*, *45*, 153–165.

- Choi, J., Miao, L., Almanza, B., & Nelson, C. D. (2013). Consumers' responses to restaurant inspection reports: The effects of information source and message style. *Journal of Foodservice Business Research*, 16, 255–275.
- Choi, J., Nelson, D. C., & Almanza, B. (2011). The impact of inspection reports on consumer behavior: A pilot study. *Food Control*, 22, 862–868.
- Cope, S., Frewer, L. J., Houghton, J., Rowe, G., Fischer, A. R. H., & de Jonge, S. (2010). Consumer perceptions of best practice in food risk communication and management: Implications for risk analysis policy. *Food Policy*, 35, 349–357.
- Danelon, M. S., & Salay, E. (2012). Perceived physical risk and risk-reducing strategies in the consumption of raw vegetable salads in restaurants. *Food Control*, 28, 412–419.
- Das, G., Wiener, H. J. D., & Kareklas, I. (2019). To emoji or not to emoji? Examining the influence of emoji on consumer reactions to advertising. *Journal of Business Research*, 96, 147–156.
- Dillman, D. A., Smyth, J. D., & Christian, L. M. (2009). *Internet, mail, and mixed-mode surveys: The tailored design method* (3rd ed.). New York, NY: John Wiley & Sons.
- Dundes, L., & Rajapaksa, S. (2001). Scores and grades: A sampling of how college students and food safety professionals interpret restaurant inspection results. *Journal of Environmental Health*, 64, 14–19.
- DVFA (Danish Veterinary and Food Administration). (2019). *About the Danish smiley scheme. Ministry of environment and food of Denmark*. Available at: <https://www.findsmiley.dk/english/Pages/About.aspx>.
- Fatimah, U. S. A. U., Boo, H. C., Sambasivan, M., & Salleh, R. (2011). Foodservice hygiene factors—the consumer perspective. *International Journal of Hospitality Management*, 30, 38–45.
- Field, A. (2018). *Discovering Statistics using IBM SPSS Statistics* (5th ed.). SAGE.
- Finnish Food Authority. (2016). *Ruokamykytyspidemiat vuonna 2016*. Available at: <https://www.ruokavirasto.fi/teemat/zoonoosikeskus/ruokamykytysket/ruokamykytyspidemiat-suomessa/ruokamykytyspidemiat-vuonna-2016/>.
- Finnish Food Authority. (2018). *Food safety in Finland 2017. Evira publications, 4/2018*. Available at: https://www.ruokavirasto.fi/globalassets/tietoa-meista/julkaisut/julkaisusarjat/julkaisuja/en/eviran_julkaisuja_4_2018_uk_310818.pdf.
- Finnish Food Authority. (2019). *Oiva evaluation guidelines for registered food premises*. Available at: <https://www.oivahymy.fi/wp-content/uploads/2017/06/oiva-arviointiohjeet-ilmoitetuille-elintarviketuoneistoille-en-03072017.pdf>.
- Food Standards Agency (2017). *Food hygiene rating scheme (FHRS) biannual public attitudes tracker*. UK: Food Standards Agency. Available at: https://www.food.gov.uk/sites/default/files/media/document/fhrstrackerwave5report_1_0.pdf.
- Frewer, L. (2004). The public and effective risk communication. *Toxicology Letters*, 149, 391–397.
- Gregory, S., & Kim, J. (2004). Restaurant choice: The role of information. *Journal of Foodservice Business Research*, 7, 81–95.
- Hansen, J., Holm, L., Frewer, L., Robinson, P., & Sandøe, P. (2003). Beyond the knowledge deficit: Recent research into lay and expert attitudes to food risks. *Appetite*, 41, 111–121.
- Hayes, A. F. (2018). *Introduction to mediation, moderation and conditional process analysis. A regression-based approach* (2nd ed.). The Guilford Press.
- Henson, S., Majowicz, S., Masakure, O., Sockett, P., Jones, A., Hart, R., et al. (2006). Consumer assessment of the safety of restaurants: The role of inspection notices and other information cues. *Journal of Food Safety*, 26, 275–301.
- Kaskela, J., Vainio, A., Ollilla, S., & Lundén, J. (2019). Food business operators' opinions on disclosed food safety inspections and occurrence of disagreements with inspector grading. *Food Control*, 105, 248–255.
- Kim, J., Ma, J., & Almanza, B. (2017). Consumer perception of the food and drug administration's newest recommended food facility inspection format: Words matter. *Journal of Environmental Health*, 79, 20–25.
- Knight, A. J., & Warland, R. (2005). Determinants of food safety risks: A multi-disciplinary approach. *Rural Sociology*, 70, 253–275.
- Knight, A. J., Worosz, M. R., & Todd, E. C. D. (2007). Serving food safety: Consumer perceptions of food safety at restaurants. *International Journal of Contemporary Hospitality Management*, 19, 476–484.
- Knight, A. J., Worosz, M. R., & Todd, E. C. (2009). Dining for safety: Consumer perceptions of food safety and eating out. *Journal of Hospitality & Tourism Research*, 33, 471–486.
- Lange, M., Göransson, H., & Marklinder, I. (2016). Self-reported food safety knowledge and behaviour among home and consumer studies students. *Food Control*, 67, 265–272.
- McKelvey, W., Wong, M., & Matis, B. (2015). Letter grading and transparency promote restaurant food safety in New York City. *Journal of Environmental Health*, 78(2), 46–48.
- Ministère de l'agriculture et de l'alimentation (2019). *Les résultats des contrôles sanitaires accessibles à tous*. Available at: <https://www.alim-confiance.gouv.fr/Mentions-legales>.
- Mutz, D. C. (2011). *Population-based survey experiments*. Princeton University Press.
- Nesbitt, A., Thomas, M. K., Marshall, B., Snedeker, K., Meleta, K., Watson, B., et al. (2014). Baseline for consumer food safety knowledge and behaviour in Canada. *Food Control*, 38, 157–173.
- Norwegian Food safety Authority. (2017). *2017 annual report*. Available at: https://www.mattilsynet.no/om_mattilsynet/annual_report_the_norwegian_food_safety_authority_2017.34799/binary/Annual%20report%20The%20Norwegian%20Food%20Safety%20Authority%202017.
- Pacheco, M. H. S., Kuriya, S. P., Capobiango, C. S. C., Pimentel, T. C., Cruz, A. G., Esmerino, E. A., et al. (2018). Exploration of gender differences in bottled mineral water consumption: A projective study of consumer's perception in Brazil. *Journal of Sensory Studies*, 33, e12434.
- Pinto, L. de P. F., Silva, H. L. A., Kuriya, S. P., Maçaira, P. M., Oliveira, F. L. C., Cruz, A. G., et al. (2018). Understanding perceptions and beliefs about different types of fermented milks through the application of projective techniques: A case study using hair's shopping list and free word association. *Journal of Sensory Studies*, 33, e12326.
- Schreier, M. (2014). Qualitative content analysis. In U. Flick (Ed.). *The SAGE handbook of qualitative data analysis* (pp. 170–183). SAGE Publications Ltd.
- Shaw, A. (2004). Discourse of risk in lay accounts of microbiological safety and BSE: A qualitative study. *Health, Risk & Society*, 6, 151–171.
- Statistics Finland (2017). *Official Statistics of Finland: Population structure*.
- Vainio, A., Irz, X., & Hartikainen, H. (2018). How effective are messages and their characteristics in changing behavioural intentions to substitute plant-based foods for red meat? The mediating role of prior beliefs. *Appetite*, 125, 217–224.
- Vainio, A., Mäkinen, J.-P., & Paloniemi (2013). System justification and the perception of food risks. *Group Processes & Intergroup Relations*, 17, 510–524.
- Van Dijk, H., Houghton, J., Van Kleef, E., Van der Lans, I., Rowe, G., & Frewer, L. (2008). Consumer responses to communication about food risk management. *Appetite*, 50, 340–352.
- Wilcock, A., Pun, M., Khanona, J., & Aung, M. (2004). Consumer attitudes, knowledge and behaviour: A review of food safety issues. *Trends in Food Science & Technology*, 15(2), 56–66.
- Willoughby, J. F., & Liu, S. (2018). Do pictures help tell the story? An experimental test of narrative and emojis in a health text message intervention. *Computers in Human Behavior*, 79, 75–82.
- Wong, M. R., McKelvey, W., Ito, K., Schiff, C., Jacobson, B., & Kass, D. (2015). Impact of a letter-grade program on restaurant sanitary conditions and diner behavior in New York City. *American Journal of Public Health*, 105, e81–e87.