Situated food safety risk and the influence of social norms

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ABSTRACT

Previous studies of risk behaviour observed weak or inconsistent relationships between risk perception and risk-taking. One aspect that has often been neglected in such studies is the situational context in which risk behaviour is embedded: even though a person may perceive a behaviour as risky, the social norms governing the situation may work as a counteracting force, overriding the influence of risk perception. Three food context studies are reported. In Study 1 ($N = 200$), we assess how norm strength varies across different social situations, relate the variation in norm strength to the social characteristics of the situation, and identify situations with consistently low and high levels of pressure to comply with the social norm. In Study 2 ($N = 502$), we investigate how willingness to accept 15 different foods that vary in terms of objective risk relates to perceived risk in situations with low and high pressure to comply with a social norm. In Study 3 ($N = 1200$), we test how risk-taking is jointly influenced by the perceived risk associated with the products and the social norms governing the situations in which the products are served. The results indicate that the effects of risk perception and social norm are additive, influencing risk-taking simultaneously but as counteracting forces. Social norm had a slightly stronger absolute effect, leading to a net effect of increased risk-taking. The relationships were stable over different social situations and food safety risks and did not disappear when detailed risk information was presented.

Key words: Risk perception, risk-taking, situation, social norm, food safety

1. INTRODUCTION

Situations influence what we do. Not only personal preferences for products but also place, time and the presence of others affect consumption (Belk, 1974; Belk, 1975; Jaeger, Bava, Worch, Dawson, & Marshall; Scholderer, Kügler, Olsen, & Verbeke, 2013). Early discussions of risk-taking emphasised the importance of situational context. Kroger and Briedis (1970, p. 189), for example, conclude that "a theory of group decision making under risk is incomplete until it is possible to specify in advance which social situations will produce an increase in riskiness". However, few studies have actually investigated how risk-taking varies across situational contexts (Schoemaker, 1990). To our knowledge, none have identified which aspects of situational context are responsible for trans-situational inconsistencies in risk-taking. Although, food choices often are the result of social processes, few studies have investigated how social norms influence risk-taking (Cohen & Knopman 2018; Hilverda & Kuttschreuter 2018; Trumbo 2018). Among the few are Hilverda and Kuttschreuter (2018), who found the social environment to influence information sharing about the risk of eating organic food, and Trumbo (2018) that found social cues to influence acceptability of public e-cigarettes. The latter claims that risk perception and social norms both play a role. While perception of addictiveness had a suppressing effect on perceived acceptability, greater exposure to social cues exerted a countervailing effect. The aim of the research reported here is to investigate this joint influence of risk perception and social norms within a food context.

1.1. Risk perception and behaviour

Numerous theories of health behaviour accord risk perception a central role in determining risk behaviour (Sheeran, Harris, & Epton, 2014). The health belief model (Rosenstock, 1974), one of the oldest health behaviour models, explains risk-mitigating behaviour as the combined

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outcome of several implicit trade-offs. Its risk perception component consists of two constructs: perceived severity, capturing systematic differences in the perception of hazards, and perceived vulnerability, capturing the salience of the threat to the individual. Its motivation component consists of another two constructs: the perceived benefits of engaging in risk-mitigating behaviour minus the perceived barriers towards taking action. Finally, the model contains a volitional component: cues to action that prompt an individual to engage in the risk-mitigating behaviour in a relevant situation.

Protection motivation theory (Rogers, 1983) is based on similar constructs but assumes slightly different trade-offs. In a "threat appraisal", perceived risk (again operationalised in terms of perceived severity and perceived vulnerability) is traded off against the rewards offered by the risk behaviour. In a "coping appraisal", motivational and volitional resources (response efficacy and self-efficacy) are traded off against response costs. The intention to engage in a particular form of risk-mitigating behaviour, as opposed to continue with an existing routine, is the joint outcome of these appraisals.

Both theories and their various extensions have been applied in many health behaviour domains, such as smoking, sexual behaviours, vaccination, sun protection, dietary behaviours, and exercises (Sheeran et al., 2014). One issue repeatedly discussed in the literature is whether risk perception influences behaviour as a main effect or in interaction with the motivational and volitional model components. Whilst some meta-analyses conclude that increases in perceived risk are sufficient to make people engage in risk-mitigating behaviour (Brewer et al. 2007; Floyd, Prentice-Dunn, & Rogers, 2000), others suggest that the mechanism may be more complex. In a meta-analysis of experimental studies, Sheeran et al. (2014) found only a small main effect of increases in perceived risk on intentions and behaviour. However, interventions that increased perceived risk had substantially higher effects on risk-mitigating behaviour when

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they also triggered anticipatory emotions (fear, worry, regret, guilt), led to increased response efficacy or self-efficacy, or decreased response costs.

These results suggest that risk perception does not operate in isolation from motivational and volitional aspects of the relevant risk behaviours. Furthermore, the relative influence of perceived risk varies considerably across behavioural domains. In the meta-analysis by Sheeran et al., the average effect size of perceived risk ranged from Cohen's $d = -.17$ for behaviours in the domain of diagnostic medical testing to $d = .52$ for behaviours in the domain of driving safety. And in both cases, the average effect sizes were subject to significant effect heterogeneity.

We believe that the variability of the effect of risk perception can be linked to at least two aspects. The first of these are "qualitative" differences between risks. This is not a new point: research in the tradition of the psychometric model of perceived risk has consistently found that people do not only distinguish risks in terms of probability of occurrence and severity of consequences but that issues like familiarity with a hazard, control over exposure and the trustworthiness of risk management practices have additional influence (Slovic, 1987; Slovic, 1992; Sjøberg, 2000). The second aspect is the variability of counteracting forces. Theories of health behaviour subsume these under the generic motivational labels of rewards linked to a risk behaviour and response costs associated with a risk-mitigating behaviour. In practice, these rewards and response costs will differ markedly between behaviours and between the situations in which these behaviours are embedded.

1.2. Social norms and social dilemmas

Social norms are expectations of what constitutes appropriate behaviour in given social situation. A social norm exists when people (a) expect most people, especially in their reference group, to behave in a particular way and (b) believe that the majority would expect them to

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behave accordingly (Bicchieri, 2006; Cialdini, Reno, & Kallgren, 2006). When food is offered in a social setting, the social norm for a person in the "guest" role is to accept the food. However, when a person in this role perceives the offered food to be unsafe (e.g., when poultry is undercooked, carrying a risk of salmonella infection), she or he faces a dilemma:

- One course of action would be to accept the offered food. The person would comply with the social norm governing the situation but, at the same time, accept a food safety risk.
- The other course of action would be to reject the offered food. The person would mitigate the food safety risk but, at the same time, violate the social norm.

In the context of protection motivation theory, the norm-compliant course of action (accept the offered food) would be regarded as the existing but problematic behaviour. Complying with the social norm carries extrinsic and intrinsic rewards (social inclusion, fulfilment of affiliation motives) that would directly counteract the perceived food safety risk, weakening the threat appraisal. The risk-mitigating course of action (reject the offered food) would necessitate a violation of the same social norm. Anticipated sanctions (social exclusion) would operate as expected response costs, directly counteracting self- and coping efficacy and thereby weakening the coping appraisal. Simultaneously weakening the threat appraisal and the coping appraisal, the social norm would put the risk-mitigating behaviour in "double jeopardy". As a result, social norm may have a higher total influence on behaviour than perceived risk. Even if the social norm is only moderately strong, people are likely to follow the norm-compliant course of action even though they might perceive it as risky.

1.3. Previous research on social norms

The influence of social norms has been investigated in the context of various health behaviours. Most studies used relatively simple operationalisations guided by the theory of

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planned behaviour (for systematic reviews, see McEachan, Conner, Taylor, & Lawton, 2011; Rivis & Sheeran, 2003) where subjective norms—the perceived expectations of relevant others—are measured by items such as "my friends and family think I should do X". In addition, some studies include descriptive norms, measured by items such as "how many people do you know who do X". Among the studies in the meta-analysis by McEachan et al. (2011), the weighted average correlations between subjective norm and behavioural intentions ranged from $\rho = .34$ (for abstinence behaviours) to .56 (for safer sex behaviours) whilst the weighted average correlations between subjective norm and actual behaviour ranged from .17 (for dietary behaviours) to .29 (for risk-taking behaviours such as speeding, drinking, smoking and drug use).

Only few studies have quantitatively investigated the effect of social norms in the context of food safety. Young et al. (2017) include eight primary studies in their systematic review. Although the correlations with behavioural intentions related to hygiene, cross-contamination, time-temperature control and adequate cooking behaviours were not very strong (ranging from $\rho = .34$ to .40), subjective norm—together with existing habits—showed the most consistent relationship to behavioural intentions among the various predictors included in the studies. Unfortunately, all primary studies included in this part of the systematic review by Young et al. (2017) were based on small samples of undergraduate psychology students and did not include objective measures of behaviour. Hence, the external validity of the results may be somewhat limited.

However, more crucial with regard to the topic of the present paper is that existing research in the food safety domain has exclusively addressed the influence of social norms in the context of food handling and preparation where people act in their role as providers of food for themselves or others (See Young et a. 2017). There are no detailed studies that address the

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influence of social norms in the context of food acceptance, that is, when people act in their role as guests. The aim of the research presented here is to fill this gap.

1.4. Hypotheses

We see risk-taking as the result of a complex trade-off of cost and rewards related to social norms and perceived risk. We propose that different food consumption situations will trigger social norms of different strength, while the perception of risks related to the offered food will be stable across situations. In the absence of strong social norms, we predict that differences in risk-taking will mirror differences in risk perception. In situations that are characterised by strong social norms, food risk-taking will diverge from food risk perception and be significantly elevated. The hypotheses are:

H1: Norm strength varies with the social characteristics of a situation.

H2: Risk-taking mirrors risk perception in situations with low norm strength.

H3: In situations with high norm strength, risk-taking will diverge from risk perception and be significantly elevated.

Three studies are conducted to investigate how risk-taking in specific social situations relates to (a) the perceived risk associated with the products that are served and (b) the social norms governing the situations in which the products are served.

2. STUDY 1: THE SITUATIONAL VARIABILITY OF NORM STRENGTH

In Study 1, we investigate how norm strength varies across different social food consumption situations, relate the variation in norm strength to the social characteristics of the situation, and identify situations with consistently low and high levels of pressure to comply with the social norm. The aim of this study is to test if norm strength varies with the social characteristics of a situation (H1).

2.1. Method

2.1.1. Participants

200 Norwegian consumers were recruited from an existing consumer panel operated by Norstat AS, Oslo. A stratified random sampling procedure, with age (below 30 years: 18%, 30-39 years: 16%, 40-49 years: 18%, 50 years or above: 48%), gender (women: 52%, men: 48%) and region (North: 9%, Mid: 13%, West: 18%, East: 38%, South: 10%, Oslo: 12%), as stratification variables were applied to make sure the sample covered the variation in food safety behaviour previously observed for gender and age, and the regional differences in Norway (Olsen, Røssvoll, Langsrud, & Scholderer, 2014; Brennan, McCarthy, & Ritson, 2007; Røssvoll et al., 2013). The study was approved by NSD - Norwegian Centre for Research Data, which on behalf of the Norwegian Ministry of Education and Research has the operational responsibility for ethical approvals in Norway. Participants were compensated by the bonus point offered by Norstat, the survey provider.

2.1.2. Procedure

The study was conducted online in February 2016. Before the actual survey began, participants were instructed to imagine a food they really did not like and told to keep thinking

of the disliked food as they completed the task. Then, they were presented with 17 vignettes that described social situations in which they were offered the disliked food (Table I). The vignettes had been constructed by the research team and refined in two qualitative pilot tests, ensuring that the descriptions were not ambiguous, that the situations were sufficiently easy to imagine, and that the situations represented a broad range of variation in terms of the number of people present in the situation, the relationship to the person offering the food, and the strength of the norm to accept the food.

In the first part of the survey, participants were shown all vignettes on the same screen (in a scrollable format) and were asked to indicate, for each of the described situations, how much pressure they would feel to accept and eat the offered food although they disliked it (using a five-point semantic differential item with end points labelled "very low pressure" vs. "very high pressure"). In the second part of the survey, participants were shown the same vignettes again but one at a time, and were asked to rate the social situation described in the vignette in terms of six characteristics: familiarity (using a five-point semantic differential item with end points labelled "very unfamiliar situation" vs. "very familiar situation"), social character ("very private situation" vs. "very social situation"), formality ("very informal situation" vs. "very formal situation"), emotional valence ("very unpleasant situation" vs. "very pleasant situation"), empathy with the imagined person offering the food ("low empathy" vs. "high empathy") and the seriousness of consequences if they were to violate the social norm and reject the offered food ("minor consequences" vs. "major consequences"). In both parts of the survey, the 17 vignettes describing the situations were presented in randomised order. The six semantic differential items used in the second part of the survey were also presented in randomised order. Means and standard deviations are shown in Table II.

2.2. Results

2.2.1. Manipulation checks

A linear mixed model was estimated in order to confirm that participants sufficiently discriminated between the situations described in the vignettes and did not use the seven semantic-differential dimensions in a uniform manner. Dimension and situation (nested under dimension) were specified as fixed factors, participant as a random factor. The grand means of participants' ratings on the seven semantic-differential dimensions differed significantly from each other ($F[6, 23482] = 136.93$, $p < .001$). The mean ratings of the 17 situations on the different dimensions differed significantly as well ($F[112, 23482] = 24.85$, $p < .001$). The random effect of participant contributed 6% to the total variance of the ratings ($p < .001$). Taken together, the manipulation checks indicate that participants did indeed discriminate between the situations described in the vignettes and that they used the seven semantic-differential scales in an appropriately non-uniform manner.

2.2.2. Situational variability of norm strength

The subjective pressure to comply with a social norm—here, the norm to accept the food offered by another person—that individuals experience on average can be regarded as the closest indicator of the strength of a social norm. On average, participants felt the strongest pressure to comply with the norm in a situation where their imagined self was invited to their future parents in law. Participants felt the weakest pressure to comply with the norm in a situation where their imagined self was home alone but their partner had prepared a meal for them in advance. The standardised difference between these two situations was Cohen's $d = 2.35$; a very large effect. A variance component analysis conducted over all 17 situations and all 200 participants indicated that the situational differences were approximately equally strong

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(24% of the total variance in pressure to comply with the social norm) as the individual differences (26% of the total variance when uncorrected for scale-use bias, 20% of the variance when corrected for scale-use bias).

2.2.3. Underlying characteristics of the social situations

To assess the effects of the characteristics of the social situations, pressure to comply was regressed on the six semantic-differential dimensions on which participants had evaluated the 17 situations (with participant specified as a random effect). The results are reported in Table III. The best predictors of pressure to comply with the social norm in a particular situation were the expected consequences of non-compliance (reflecting the theoretical notion of sanctions) and the average empathy participants felt with the imagined other (reflecting the theoretical notion of reciprocity). In addition, pressure to comply with the social norm was stronger in situations that had a more formal character (reflecting the salience of the norm) and were perceived to be less social. The emotional valence of the situation, the familiarity with the situation and the social character of the situation did not have significant additional effects on pressure to comply.

2.2.4. Conclusion Study 1

The results from Study 1 support our hypothesis that norm strength varies with the social characteristics of a situation (H1). Both the expected consequences of non-compliance, the average empathy participants felt with the imagined other, the formal character, the emotional valence, the familiarity and the social character of the situation influenced the likelihood of consuming a disliked food. In the next study, we will investigate the role of risk perception on food acceptance in a weak and a strong norm strength situations.

3. STUDY 2: RELATIONSHIP BETWEEN RISK PERCEPTION AND BEHAVIOUR IN SITUATIONS WITH HIGH AND LOW PRESSURE TO COMPLY WITH A SOCIAL NORM

In Study 2, we investigate how behaviour, measured as willingness to accept 15 different foods that vary in terms of objective food safety risk, relates to perceived risk in situations characterised by low and high pressure to comply. The aim of this study is to test if risk-taking mirrors risk perception in situations with low norm strength (H2).

3.1. Method

3.1.1. Participants

502 Norwegian consumers were recruited from the same consumer panel as the participants in Study 1. There was no overlap between the participants in the two studies. Again, the stratified random sample was stratified in terms of age (below 30 years: 20%, 30-39 years: 17%, 40-49 years: 19%, 50 years or above: 44%), gender (women: 51%, men: 49%) and region (North: 10%, Mid: 13%, West: 20%, East: 25%, South: 9%, Oslo: 13%).

3.1.2. Procedure

The study was conducted online in April 2016. The stimuli were the names of 15 foods that varied in terms of food safety risk. The foods had been selected by the research team, based on considerations of variation in hazard and exposure (Table IV). Participants were asked to rate each food on altogether 15 dimensions (Table V). The first two dimensions referred to willingness to accept the food product. We used the same item stem, once contextualised to the situation for which we had found the lowest norm strength in Study 1 ("How likely is it that you would eat the following products when you are home alone," answered on a five-point

scale ranging from "not likely at all" to "very likely") and once contextualised to the situation for which we had found the highest norm strength ("How likely is it that you would eat the following products if they were served to you by your future parents in law when you meet them for the first time"). The other 13 dimensions were the semantic differential items that had been used by Fife-Schaw and Rowe (1996) in their classic study of food safety risk perception. The survey was structured by dimension: on each screen, participants were presented with the list of 15 foods and were instructed to rate them on the one dimension. The order of the two contexts, the order of the 13 risk perception dimensions, and the order of the 15 foods on each page were randomised between participants. Means and standard deviations are shown in Table VI.

3.2. Results

3.2.1. Manipulation checks

A linear mixed model was estimated in order to ensure that participants sufficiently discriminated between the 15 products and did not use the 15 dimensions in a uniform manner. Dimension and product (nested under dimension) were specified as fixed factors, participant as a random factor. The grand means of participants' ratings on the 15 dimensions differed significantly from each other ($F[14, 112224] = 1074.11$, $p < .001$). The mean ratings of the 15 products on the different dimensions differed significantly as well ($F[210, 112224] = 170.28$, $p < .001$). The random effect of participant contributed 3% to the total variance of the ratings ($p < .001$). The manipulation checks indicate that participants did indeed discriminate between the products and used the 15 dimensions in a non-uniform manner. Since the random effect of participant was significant as well (indicating individual differences in scale use), subsequent

analyses on the product level were performed on the least-squares means of the products on the dimensions, adjusted for the random effects of the participants.

3.2.2. Increased willingness to accept, induced by situational variation in norm strength

Averaged across products, willingness to accept was significantly elevated in the situation that was subject to a strong social norm ($F[1, 7529] = 847.60$, $p < .001$, Cohen's $d = .24$). Figure 1 shows the size of the shift separately for each product. Apart from fresh bread, there was a significant upward shift for all products included in the study.

3.2.3. Relationship to risk perception

To explore whether willingness to accept the products in situations with weak and strong social norms was differentially related to the risk perceptions associated with the products, we regressed willingness to accept the products on the 15 risk perception dimensions, separately for each situation (with participant specified as a random effect). The results are reported in Table VII. In both situations that had been included here—one subject to a strong social norm (FutureInLaws), one subject to a weak social norm (HomeAlone)—willingness to accept a potentially risky food was best predicted by the pleasure participants associated with eating the respective food, followed by their perception how frequently the food was eaten by others. The next-best predictors were two dimensions operationalising the "dread risk" factor known from risk perception research (probability of harm and seriousness of consequences; see [15]), followed by two dimensions operationalising the "unknown risk" factor (that a risk is easily identified and that many people are aware of it).

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3.2.4. Conclusion Study 2

  The results from Study 2 support our hypothesis that risk-taking mirrors risk perception in situations with low norm strength (H2). The results indicate that the relative degree to which the average consumer is willing to accept different food products is related to the probability of harm and the seriousness of the consequences (in other words: hazard and exposure). More "qualitative" differences between the products, for example whether they were perceived to be natural or man-made, appeared to play a negligible role, at least in the contexts we included in this study. The strength of the social norms governing the situation in which the products were offered had a somewhat different effect. Although the analysis in the previous section showed a general upwards shift in intention to consume when social norms were strong, the ordering of the risks (within the situations) remained unaffected. In the next study, we will investigate the interrelation between perceived risk and social norms for food acceptance.

4. STUDY 3: COUNTERACTING INFLUENCE OF SOCIAL NORM AND RISK PERCEPTION ON RISK-TAKING

In Study 3, we test how risk-taking, measured as willingness to accept objectively risky foods, is jointly influenced by the perceived risk associated with the foods and the social norms governing the situations in which the foods are served. The aim of this study is to test if risk-taking will diverge from risk perception and be significantly elevated in situations with high norm strength (H3).

4.1. Method

4.1.1. Participants

1200 Norwegian consumers were recruited from the same consumer panel as the participants in Studies 1 and 2. There was no overlap with the participants in the previous two studies. Again, a stratified random sampling procedure, with age (below 30 years: 19%, 30-39 years: 15%, 40-49 years: 20%, 50 years or above: 46%), gender (women: 52%, men: 48%) and region (North: 10%, Mid: 13%, West: 21%, East: 34%, South: 9%, Oslo: 13%) as stratification criteria, were applied. The study was approved by NSD and the respondents compensated according to Norstat, the survey providers, bonus system. All participants had been pre-screened for being regular consumers of the product categories to which the study referred.

4.1.2. Procedure

The experiment was conducted online in April 2016. We used a 2 (information) × 3 (product) × 4 (situation) design. Information (either high: rich in information about food safety risk, or low: minimum information) and product (either hamburger, sugar peas, or chicken) were varied between subjects. The situations had been selected based on the results of Study 1.

The products had been selected based on the results of Study 2. Situation (either HomeAlone, BossDinner, DaughterDinner, or ParentsInLaw) was varied within subjects.

Before the beginning of the study, participants were assigned at random to one out of three products (either hamburger, sugar peas, or chicken). On the welcome screen, participants were informed that they would be confronted with four different situations. On the next screen, the vignette describing the first situation was shown (see Table VIII). Participants were asked to imagine the situation in as much detail as possible. Then, participants answered 12 items measuring risk-taking, social norm and perceived risk. All items were formulated in a product and situation-specific manner. After participants had completed all items referring to the first situation, the vignette describing the second situation was shown. Then, participants answered twelve items (see Table IX) measuring risk-taking, social norm and perceived risk in the second situation. The same was done for the third and the fourth situation. The order in which the situations were shown to participants and the order of the items participants answered for each situations were randomised between participants.

4.1.3. Measures

The three risk-taking items used in this study had been developed based on qualitative pilot research. Each item asked participants to report their intentions to engage in risk-taking ("How likely is it that you will eat [product] when [situation]"; note that this item had already been used as a measure of willingness to accept in Study 2) or risk mitigation behaviour ("How likely is it that you will suggest to heat up [product] when [situation]", "How likely is it that you will come up with a good excuse to avoid eating [product] when [situation]", all answered on a five-point scale with end points labelled "not likely at all" versus "very likely". The scoring of the latter two items was reversed before the analysis. The average of the three items was then calculated as an index for risk-taking.

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The items measuring perceived risk were a subset of the items originally introduced by Fife-Schaw and Rowe (1996), which we had already used in Study 2. For this study, we selected six items based on the results of a factor analysis of the data from Study 2: we included the three items that showed the highest loadings on the "dread" factor (ManyAffected, SeriousConsequences, EffortToAvoid) and the three items that showed the highest loadings on the "unknown" factor (DelayedEffect, ManMadeRisk, EasilyIdentified; see Table IX). The scoring of the last item was reversed before the analysis. The average of the six items was then calculated as an index for perceived risk.

Social norm was measured by three items. The first item was adapted from Study 1 and measured the strength of a participant's personal norm ("How much pressure will you feel to eat [product] when [situation] (e.g. Imagine you are invited home to your future parents in law for dinner. It is the first time you meet them and your future father-in-law brings you proud his home made dish with a not well done hamburger)", answered on a five-point scale ranging from "very low pressure" to "very high pressure"). The second item was similar but measured the perceived strength of the descriptive norm ("How much pressure do you think most people will feel to eat [product] when [situation]", also answered on a five-point scale ranging from "very low pressure" to "very high pressure"). The third item measured the perceived consequences of non-compliance ("How large will the consequences be if you do not eat [product] when [situation], answered on a five-point scale ranging from "very few consequences" to "very large consequences"). The average of the three items was calculated as an index for social norm.

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4.2. Results

4.2.1. Manipulation checks

A linear mixed model was estimated to ensure that the measured predictors and the factors that had been varied in the experimental design had the expected effects on risk-taking. Product and information were specified as fixed factors, social norm and perceived risk (both nested under product and information) as fixed continuous predictors, and participant as a random effect. The model was estimated by residual maximum likelihood and showed an excellent fit ($R^2 = .75$, adjusted $R^2 = .75$, RMSE = .59).

The group means for the three product-hazard combinations differed significantly from each other ($F[2, 1202] = 161.60$, $p < .001$): participants were most willing to take risks when confronted with sugar peas as a product (where *E. coli* was the salient hazard; $M = 3.38$, $SE = .04$), less so when confronted with hamburgers (again with *E. coli* as the salient hazard; $M = 2.74$, $SE = .04$), and least when confronted with chicken (where antibiotic resistance was the salient hazard; $M = 2.42$, $SE = .04$). Information had a significant but much weaker effect ($F(1, 1202 = 31.37$, $p < .001$): participants were slightly more willing to take risks when information about the risk had been minimal ($M = 2.97$, $SE = .03$) than when information had been extended ($M = 2.72$, $SE = .03$).

4.2.2. Perceived risk and social norm as counteracting forces

The effects of perceived risk ($F[6, 4151] = 13.47$, $p < .001$) as well as social norm ($F[6, 4277] = 134.29$, $p < .001$) were significant. Crucially, however, they had opposite directions. Figure 2 shows the within-condition regressions of risk-taking on perceived risk (red regression lines) and social norm (blue regression lines). Across the six conditions, perceived risk had an average negative effect of $M(b) = -.26$ on risk-taking (with between-condition $SD = .12$)

whereas social norm had a positive effect of similar but slightly stronger size, $M(b) = .31$, and higher consistency across conditions (between-condition $SD = .05$). The significant but weak interaction between perceived risk and social norm ($F[6, 4353] = 2.67$, $p < .05$) indicated that the effects of perceived risk and social norm were near-additive.

4.2.3. Conclusion Study 3

The results from Study 3 support our hypothesis that risk-taking will diverge from risk perception and be significantly elevated in situations with high norm strength (H3). As expected, perceived risk and social norm acted as counteracting forces on participants' willingness to take risks. Social norm exerted a slightly higher average influence than perceived risk, inducing a "net effect" of increased risk-taking across the situations investigated here.

5. GENERAL DISCUSSION AND CONCLUSION

The aim of the research presented here was to investigate how food risk-taking in specific social situations relates to (a) the perceived risk associated with the products that are served and (b) the social norms governing the situations in which the products are served. Overall, our findings support the hypothesis that risk-taking in relation to food safety risks is the result of a trade-off involving rewards and response cost, consistent with protection motivation theory[9]. We find support for our proposition that different situations trigger social norms of different strength whereas risk perception is stable across situations. Specifically, we hypothesised that, in the absence of strong social norms, differences in risk taking would mirror differences in risk perception. In situations characterised by strong social norms, however, risk-taking would diverge from risk perception and be significantly elevated. Our findings support these hypotheses.

5.1. Norm strength, effect heterogeneity and the characteristics of situations

In Study 1, we investigated how norm strength, measured in terms of perceived pressure to comply with a particular social norm (here: the norm that a person in the "guest" role in a social situation should accept food that is offered by the host) varies between social situations. The results indicate that the variation is strong: the variability attributable to systematic differences between situations was approximately equal to the variability attributable to individual differences between participants. The finding that norm strength varies with the social characteristics of a situation supports H1. Among the 17 situations included in the study, the largest pairwise difference in norm strength was no less than Cohen's $d = 2.35$, a very large effect. We believe that the importance of this result should not be underestimated: unless the situational variability of norm strength is explicitly taken into account in the designs of primary

studies, effect heterogeneity will only become apparent once sufficient numbers of primary studies are integrated in a meta-analysis. The heterogeneity of subjective norm effects identified in the meta-analyses by McEachan et al. (2011), Rivis and Sheeran (2003) and Young et al.(2017) supports our argument. Future investigations of socially embedded risk behaviours should, whenever possible, take the strength of the social norms governing different situations into account by *varying* the situational context, as opposed to keeping it constant or conducting the study in a de-contextualised manner. The external validity of such studies would considerably be improved.

Equally important is to understand *why* the effects of social norms are heterogeneous across situations. In Study 1, norm strength depended on a set of situational characteristics. Among these, expected sanctions in cases of non-compliance and empathy with the person(s) in the "host" role of the social situation had the strongest effects. Interpreted in terms of protection motivation theory, empathy with the person in the "host" role can be understood as an affective reward mechanism that makes norm-compliant behaviour more likely, whilst expected sanctions can be understood as response costs that would make norm-violating behaviour less likely. Both effects together are consistent with the "double jeopardy" interpretation we suggested in Section 1.2 (see above): a risk-mitigating but norm-violating behaviour is doubly disadvantaged vis-à-vis its risk-accepting but norm-compliant alternative.

Of all the 17 situations evaluated, being invited to one's future parents-in-law for the first time was the situation with the highest perceived pressure to comply with the social norm. Our participants judged the consequences of noncompliance as severe and the situation in general as unfamiliar and unpleasant. We might imagine that in this situation the anticipated cost of eating something disliked was weighed against the anticipated cost of being judged impolite, rude or—in the worst case—an unsuitable son or daughter-in-law. Another situation with very high pressure to comply was the scenario of a 13-year old daughter smilingly serving a dish she

had made herself. In this situation, feelings of empathy with the young girl were the decisive aspect. At the other end of the scale, we find being home alone, a situation participants perceived as pleasant and familiar, with no one to witness non-compliant behaviour and no serious consequences.

5.2. No interaction with perceived risk

In Study 2, we investigated how behaviour, measured as willingness to accept 15 different products that vary in terms of objective food safety risk, relates to perceived risk in situations characterised by low and high pressure to comply with a social norm. The key result was that a situation with high pressure to comply with the social norm triggered an upward shift in willingness to accept the offered products. The shift was general, leaving the rank order of the food products (in terms of willingness to accept) and the correlation structure with the risk perception dimensions unaffected, suggesting that perceived risk of food and social norm do not actually interact, as was hypothesised by authors such as McEachan et al. (2011) or Rivis and Sheeran (2003) but should be understood as simultaneous counteracting influences.

5.3. Risk-taking: the counteracting forces of risk perception and social norms

In Study 3, we tested the simultaneous effects of social norms and risk perception on risk-taking, measured as willingness to accept objectively risky food products, on the basis of unaggregated individual data. The results clearly corroborate our preliminary conclusions from Study 2: perceived risk and social norms exert simultaneous counteracting influences on risk-taking for food. While perceived risk had a negative effect on risk-taking, social norm had a counteracting positive effect of slightly stronger size. These findings support H3 and show that

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in situations with high norm strength, risk-taking diverge from risk perception and becomes significantly elevated.

We believe that these findings, which were robust across six conditions (three different food risks, with two levels of information), may explain the often-observed gap between food risk perception and food risk behaviour (Sheeran et al., 2014; Wachinger, Renn, Begg, & Kuhlicke, 2013). Social norms that govern "appropriate behaviour" in situations where people make risky food choices, appear to be a prominent example for the attenuating factors which Sheeran et al. (2014) called for future research to identify. In Study 3, social norm exerted a slightly higher average influence than perceived risk, creating a net effect of increased risk-taking across the four situations we investigated.

5.4. Implications for future research

The research presented here has certain implications for the design of food safety interventions targeting consumers. If risk-taking—in our context, accepting microbiologically hazardous foods in a social eating situation—is a joint function of the perceived risk related to the food and the strength of the social norm to accept the offered food, two intervention strategies are possible. The first one is to increase perceived risk. This is the classic approach, usually implemented in the form of consumer information disseminated via the media, websites and public health channels. The effectiveness of such interventions tends to be limited (e.g., see the meta-analysis by Young et al., 2017). In Study 3 of the present paper, we even included an information manipulation in the experimental design that mimicked such an intervention but, as can be seen in Figure 5, it had no substantial effects.

The alternative approach would be to weaken the social norms governing the situation in which the risk-taking behaviour is embedded. Interventions to change norm strength and/or reduce norm compliance have been intensely researched in other risk domains. Particularly

relevant are interventions to weaken the effects of peer pressure in the context of alcohol and drug abuse (Hansen & Graham, 1991; Perkins & Wechsler, 1996; Borsari & Carey, 2001; Petraitis, Flay, & Miller, 1995; Onrust, Otten, Lammers, & Smit, 2016). Comparable to the approach we took in the present research, the design of the various intervention strategies was informed by detailed research on the characteristics of the situations into which the undesirable behaviour is embedded. Future research on food safety interventions that target consumers in their role as guests (as opposed to hosts) will find many useful analogies here. Both alcohol use and smoking has been found to decline dramatically when prohibition fosters social norms (Cohen & Knopman, 2018; Hilverda & Kuttschreuter, 2018). When drinking alcohol at business lunches and smoking are viewed as unacceptable, fewer drink and smoke. Not only alcohol and cigarettes, but also food has addictive qualities. We cannot live without food, and to restrain from consumption can be hard. Policy interventions that reduce the demand of self-control, such as social norms, effect on dietary choices are accordingly an interesting avenue for future research.

Another question to be addressed in future research is the extent to which the present findings generalise to other risk domains than food safety. Theoretically, the mechanisms investigated here should apply to all risk mitigation behaviours that carry response costs in terms of expected social sanctions or vicariously experienced negative affect (empathy). The weighted average correlations between subjective norms, behavioural intentions and actual behaviour reported in the meta-analysis by McEachan et al. (2011) for different types of health behaviours are certainly consistent with our mechanisms. But also outside the health domain, there are many types of risk and risk mitigation behaviours that may be subject to the same or closely related mechanisms. In the financial risk domain, for example, one may think about lending to persons or investments into businesses run by persons one feels an obligation to (for example because they are family, friends or previous business partners) above the level or

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without the analyses and hedges one would otherwise regard as appropriate (Drexler & Schoar, 2014). In the governance domain, one may think about nepotism: the assignment of managerial or political responsibilities to persons not on the merit of their competence but due to a felt obligation to them (Jones & Stout, 2015). A cross-domain comparison of the specific social norms governing these phenomena, identifying their commonalities and differences, would be particularly interesting.

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Table I. Vignettes describing the 17 social situations used in Study 1

Label	Vignette
HomeAlone	You are home alone. Your partner has made you dinner. He/she has to go and leaves you alone to eat a dish you really do not like.
WeddingBanquet	You are served food you really do not like at your best friends' wedding.
HomeWithPartner	Your partner has made a dinner dish that you really do not like. The table is nicely done and you sit down to eat together.
BestFriendsPlace	You are invited home to your best friend for dinner. Your friend has made his/her favourite food, a dish you really do not like. Only you two are present.
NewFriendsPlace	A person you want to become friend with has invited you home for dinner. You really do not like the dish that is served.
ColleguesPlace	A colleague has invited you home for a family dinner. You are placed between his wife, which has made the dinner, and his 12-year old son. You really do not like the food that is served.
BossRestaurant	Your boss has invited you to a restaurant to discuss your work tasks. Here you are served a dish that you really do not like.
RomanticFirstDate	You have fallen in love and are invited to a romantic first-date dinner. Your "love heart" brings proud her/his home made favourite dish out from the kitchen, a dish you really do not like.
FutureInLaws	You are invited home to your future parents in law for dinner. It is the first time you meet them and your future father-in-law brings you proud his home made dish, a dish you really do not like.
FriendsFamiliar Surroundings	You have a nice evening with good friends in familiar surroundings. Here you are served a dish you really do not like.
GroupTravelAbroad	You travel with a group of people you do not know to China. The first evening here, you are served a meal that you really do not like from a local market.
BeachPartyGame	You are invited to a friends' beach party together with 100 unknown people. Here you are invited to participate in a game where the looser has to eat something that you really do not like.
DirtyTavernAbroad	You are on holiday in Romania. Here your travel partner has booked you a table at a suspicious tavern, with a dirty tablecloth and a smell of mould. The served dish is something that you really do not like.
BusinessLunchAbroad	You are on a business travel in Budapest. The person you want to do business with have invited you to a local restaurant, a place that you would not have entered if you were alone. You really do not like the served dish.
InvitedByPoorFriend	Imagine that a low-income friend has invited you to a high-end restaurant. Here you are served a dish that you really do not like.
NewColleguesPlace	You have moved into a new city and do not know anyone. After three weeks, a colleague invites you home for dinner. He/she serves his/her countries national dish, a dish it took a whole day to prepare. You really do not like the dish.
DaughterMadeDinner	Your 13-year old daughter surprises you with dinner. She has set the table and, smiling, serves you her self-made dish, a dish you really do not like.

Table II. Means (standard deviations) of situational characteristics measured in Study 1

Situation	Characteristic						
	Pressure	Formality	Familiarity	Emotional valence	Social character	Seriousness of consequences	Empathy
HomeAlone	1.69 (0.87)	3.91 (1.44)	2.49 (1.33)	3.11 (1.21)	3.70 (1.41)	3.72 (1.40)	3.16 (1.28)
DirtyTavernAbroad	1.97 (1.17)	3.54 (1.37)	2.40 (1.34)	2.48 (1.24)	2.99 (1.07)	3.60 (1.38)	3.32 (1.22)
GroupTravelAbroad	2.15 (1.11)	3.05 (1.28)	2.35 (1.28)	2.78 (1.02)	2.62 (1.04)	3.44 (1.28)	3.28 (1.16)
FriendsFamiliar Surroundings	2.33 (0.92)	3.80 (1.20)	2.86 (1.28)	3.00 (0.93)	2.75 (1.19)	3.59 (1.16)	3.24 (1.01)
BeachPartyGame	2.42 (1.15)	3.69 (1.33)	2.37 (1.27)	2.66 (1.09)	2.30 (1.17)	3.43 (1.34)	3.32 (1.19)
BestFriendsPlace	2.67 (1.12)	3.81 (1.28)	2.68 (1.28)	2.83 (1.04)	3.17 (1.22)	3.33 (1.16)	2.75 (1.10)
HomeWithPartner	2.80 (1.11)	3.65 (1.26)	2.69 (1.34)	2.82 (1.05)	3.36 (1.19)	3.28 (1.24)	2.82 (1.19)
WeddingBanquet	2.88 (1.09)	2.32 (1.23)	2.44 (1.14)	2.59 (1.00)	2.45 (1.06)	3.27 (1.20)	3.01 (1.03)
NewFriendsPlace	3.05 (1.00)	3.18 (1.06)	2.38 (1.02)	2.65 (1.02)	3.01 (1.03)	3.01 (0.92)	2.84 (0.99)
BossRestaurant	3.13 (1.18)	2.44 (1.24)	2.28 (1.11)	2.47 (1.09)	2.87 (0.90)	2.94 (1.06)	3.10 (1.01)
BusinessLunchAbroad	3.14 (1.10)	2.36 (1.21)	2.15 (1.20)	2.41 (1.16)	2.84 (0.88)	2.68 (0.99)	3.02 (0.96)
InvitedByPoorFriend	3.15 (1.16)	3.30 (1.09)	2.37 (1.14)	2.51 (1.06)	3.03 (1.06)	2.98 (1.06)	2.63 (1.16)
RomanticFirstDate	3.45 (1.12)	3.30 (1.19)	2.49 (1.11)	2.59 (1.07)	3.28 (1.19)	2.94 (1.04)	2.71 (1.10)
NewcolleguesPlace	3.47 (1.10)	2.86 (1.00)	2.25 (1.12)	2.49 (1.10)	2.87 (1.00)	2.88 (1.01)	2.72 (1.09)
ColleguesPlace	3.53 (1.02)	2.73 (1.07)	2.21 (1.11)	2.39 (1.03)	2.71 (1.00)	2.81 (0.98)	2.77 (0.99)
DaughterMadeDinner	3.59 (1.15)	3.70 (1.34)	2.65 (1.36)	2.86 (1.11)	3.44 (1.32)	2.80 (1.27)	2.37 (1.27)
FutureInLaws	3.76 (1.06)	2.59 (1.14)	2.40 (1.16)	2.40 (1.16)	2.92 (1.10)	2.78 (1.09)	2.74 (1.13)

Note. The scale anchors for pressure were "very low pressure" (1) vs. "very high pressure (5), for formality "very informal situation" (1) vs. "very formal situation" (5), for familiarity "very unfamiliar situation" (1) vs. "very familiar situation" (5), for emotional valence "very unpleasant situation" (1) vs. "very pleasant situation" (5), for social character "very private situation" (1) vs. "very social situation" (5), for seriousness of

consequences "minor consequences" (1) vs. "major consequences" (5), and for empathy "low empathy" (1) vs. "high empathy" (5).

Table III. Mixed-effects regression of pressure to comply with social norms on the characteristics of social situations (standardised coefficients and 95% confidence intervals) in Study 1

Independent variable	Standardised coefficient	95% confidence interval	
		Lower bound	Upper bound
Seriousness of consequences	.20***	.16	.24
Empathy	.10***	.06	.13
Formality	.08***	.05	.12
Social character	-.06***	-.09	-.03
Emotional valence	-.04	-.08	.00
Familiarity	.02	-.01	.06
Variance component: participant	.26	.20	.32
Variance component: residual	.68	.64	.71
R^2	.36		
R^2 (adjusted)	.36		

Note. *** $p < .001$. $N = 200$ participants $\times$ 17 vignettes per participant.

Table IV. Overview of scientific risk assessments of products used in Study 2 (based on EFSA and ECDC, 2015 and WHO, 2015)

Product	Condition	Hazard	Consequences	Probability	Severity
Hamburger	Rare	Pathogenic E. coli (EHEC/STEC)	Bloody diarrhoea, kidney failure, death	Low	Medium/high
	Well done	None	Safe	-	-
Spices	Not irradiated	Salmonella	Fever, diarrhoea, death	Low	Medium/high
	Irradiated	None	Safe	-	-
Beansprouts	Untreated	Pathogenic E. coli (EHEC/STEC)	Bloody diarrhoea, kidney failure, death	Low	Medium/high
	Blanched	None	Safe	-	-
Chicken	Rare	Campylobacter	Bloody diarrhoea, fever, chronical diseases	Medium	Medium/high
	Well done	Antibiotic resistance	Safe	-	-
	Chlorine-washed and well done	None	Safe	-	-
Sugar peas	Imported	Pathogenic E. coli (EHEC/STEC)	Bloody diarrhoea, kidney failure, death	Low	Medium/high
	Domestic	None	Safe	-	-
Bread	Mouldy	Mould toxins	Cancer	Uncertain	High
	Fresh	None	Safe	-	-
Smoked fish		Listeria monocytogenes	Blood infection, encephalitis, death, abortion	Low	High
Raisins		Mould toxins	Cancer	Uncertain	High

Table V. Measures used in Study 2

Label	Item	Response scale
WillingnessToAccept @HomeAlone	How likely is it that you will eat the following products if you are home alone?	Not likely at all (1) – Extremely likely (5)
WillingnessToAccept @FutureInLaws	How likely is it that you will eat the following products if served by your future parents in law first time you meet them?	Not likely at all (1) – Extremely likely (5)
ProbabilityOfHarm	How likely is it that your health will be damaged by eating the following products?	Not likely at all (1) – Extremely likely (5)
ManyAffected	How many people are likely to have their health harmed by eating the following products?	No people (1) – Very many people (5)
RiskAwareness	How aware are people who eat the following products of any potential risks to their health?	Not aware at all (1) – Fully aware (5)
InsufficientRegulation	How adequate are government laws and regulations in protecting people from any health risks associated with the following products?	Perfectly adequate (1) – Totally inadequate (5)
DoseResponse Relationship	Is the potential harm to your health from the following products dependent upon how much of them you eat?	Harmful in very small quantities (1) – Not harmful at all (5)
ControlOverExposure	How much control do people have over whether they eat the following products?	No control (1) – Total control (5)
DelayedEffect	Would any damage to your health from the following things be immediately apparent, or would it only become apparent at a later date?	Immediately apparent (1) – Apparent after a long time (5)
ManMadeRisk	To what extent are the risks to your health from the following products natural or the fault of mankind?	They are natural risks (1) – Man is entirely to blame (5)
SeriousConsequences	How seriously do you think the following things may harm your health?	Not seriously at all (1) – Extremely seriously (5)
EffortToAvoid	How costly in terms of time, effort, and money, would it be for people to avoid potential health risks associated with the following products	Not costly at all (1) – Extremely costly (5)
PleasureEating	How great is the pleasure associated with eating the following products to you personally?	No pleasure (1) – Very great pleasure (5)
EatenByMany	How many people in Norway eat the following products?	Nobody (1) – Everybody (5)
EasilyIdentified	How easy is it for you to tell if foods like those listed below contain a risk to your health?	Never (1) – You can always tell (5)

Table VI. Means (standard deviations in parentheses) of risk perceptions measured in Study 2

Product	Condition	ProbabilityOfHarm	ManyAffected	Risk Awareness	Insufficient Regulation	DoseResponse Relationship	ControlOver Exposure	DelayedEffect	ManMadeRisk	Serious Consequences	EffortToAvoid	PleasureEating	EatenByMany	EasilyIdentified
						Risk perception dimension								
Hamburger	Rare	3.08 (1.17)	2.77 (1.06)	3.21 (1.19)	3.06 (1.08)	2.81 (1.05)	3.57 (1.13)	2.63 (1.15)	3.66 (1.46)	3.11 (1.16)	2.22 (1.19)	1.97 (1.23)	2.72 (0.87)	2.97 (1.40)
	Well done	1.54 (0.82)	1.63 (0.81)	2.50 (1.32)	2.87 (1.14)	4.17 (0.98)	3.85 (1.20)	3.67 (1.17)	3.58 (1.46)	1.63 (0.97)	2.21 (1.25)	3.84 (1.17)	4.29 (0.76)	2.58 (1.50)
Spices	Not irradiated	2.13 (1.03)	2.12 (0.95)	2.32 (1.12)	3.04 (1.10)	3.49 (1.11)	2.29 (1.21)	3.36 (1.13)	2.56 (1.48)	2.15 (1.04)	2.71 (1.29)	3.03 (1.22)	3.49 (1.00)	1.77 (1.04)
	Irradiated	2.29 (1.14)	2.13 (1.01)	2.33 (1.13)	3.08 (1.14)	3.50 (1.07)	2.26 (1.24)	3.65 (1.07)	4.07 (1.19)	2.36 (1.17)	2.92 (1.35)	2.71 (1.29)	3.57 (1.08)	1.76 (1.03)
Beansprouts	Untreated	2.31 (1.04)	2.27 (0.94)	2.34 (1.12)	3.09 (1.03)	3.34 (1.04)	3.00 (1.23)	3.07 (1.09)	2.59 (1.46)	2.37 (1.03)	2.39 (1.18)	2.27 (1.20)	3.06 (0.87)	2.06 (1.11)
	Blanched	2.06 (0.95)	2.05 (0.89)	2.26 (1.06)	3.06 (1.03)	3.63 (0.98)	3.07 (1.25)	3.24 (1.06)	3.28 (1.42)	2.10 (0.98)	2.38 (1.14)	2.24 (1.19)	3.14 (0.91)	2.09 (1.09)
Chicken	Rare	3.56 (1.13)	3.22 (1.10)	3.49 (1.24)	2.98 (1.15)	2.39 (1.09)	3.59 (1.15)	2.46 (1.14)	3.63 (1.50)	3.74 (1.12)	2.27 (1.24)	1.53 (0.90)	2.32 (0.90)	3.25 (1.40)
	Well done	3.08 (1.25)	2.86 (1.18)	2.95 (1.27)	3.12 (1.16)	2.78 (1.15)	2.39 (1.19)	3.42 (1.19)	4.32 (1.07)	3.20 (1.26)	3.04 (1.34)	2.00 (1.21)	3.06 (1.05)	2.02 (1.18)
	Chlorine washed and well done	3.08 (1.18)	2.77 (1.17)	2.77 (1.23)	3.15 (1.15)	2.82 (1.09)	2.41 (1.22)	3.24 (1.14)	4.32 (1.05)	3.21 (1.20)	2.88 (1.31)	1.81 (1.04)	2.70 (1.06)	2.13 (1.21)

Sugar peas	Imported	2.56 (1.11)	2.35 (0.95)	2.45 (1.14)	3.15 (1.05)	3.18 (1.05)	2.90 (1.22)	3.05 (1.11)	2.69 (1.44)	2.61 (1.12)	2.44 (1.20)	2.30 (1.23)	2.93 (0.93)	1.20 (1.09)
	Domestic	1.62 (0.867	1.73 (0.82)	2.26 (1.21)	2.86 (1.11)	4.05 (0.96)	3.38 (1.25)	3.43 (1.16)	2.55 (1.48)	1.58 (0.84)	2.24 (1.20)	3.41 (1.37)	3.88 (0.95)	2.17 (1.27)
Bread	Mouldy	3.34 (1.19)	2.97 (1.13)	3.71 (1.26)	2.83 (1.16)	2.61 (1.05)	4.00 (1.09)	2.84 (1.17)	2.66 (1.63)	3.42 (1.15)	1.81 (1.11)	1.26 (0.68)	1.86 (0.74)	3.75 (1.38)
	Fresh	1.30 (0.67)	1.49 (0.74)	2.28 (1.36)	2.75 (1.21)	4.42 (0.88)	3.99 (1.22)	3.68 (1.20)	3.10 (1.57)	1.30 (0.73)	2.22 (1.31)	4.38 (0.96)	4.60 (0.70)	2.55 (1.57)
Smoked fish		1.67 (0.92)	1.85 (0.85)	2.39 (1.18)	2.87 (1.11)	3.91 (1.00)	3.79 (1.19)	3.49 (1.17)	3.62 (1.37)	1.71 (0.92)	2.30 (1.20)	3.39 (1.40)	3.81 (0.79)	2.38 (1.31)
Raisins		1.62 (0.88)	1.71 (0.79)	2.26 (1.23)	2.93 (1.12)	4.09 (0.94)	3.69 (1.30)	3.61 (1.09)	2.70 (1.49)	1.64 (0.93)	2.26 (1.22)	3.27 (1.30)	4.14 (0.81)	2.15 (1.31)

Note. For scale anchors see Table V.

Table VII. Mixed-effect regressions of willingness to accept products in situations with strong and weak social norms on risk perception dimensions (standardised coefficients and 95% confidence intervals) in Study 2

Independent variable	Dependent variable: WillingnessToAccept@FutureInLaws			Dependent variable: WillingnessToAccept@HomeAlone		
	Standardised coefficient	95% confidence interval		Standardised coefficient	95% confidence interval	
		Lower bound	Upper bound		Lower bound	Upper bound
PleasureEating	.32***	.30	.34	.43***	.41	.45
EatenByMany	.21***	.19	.23	.20***	.18	.22
SeriousConsequences	-.16***	-.18	-.13	-.18***	-.21	-.16
ProbabilityOfHarm	-.16***	-.19	-.14	-.13***	-.16	-.11
EasilyIdentified	-.07***	-.09	-.05	-.04***	-.05	-.02
RiskAwareness	-.02	-.03	.00	-.03***	-.05	-.01
EffortToAvoid	.02*	.00	.04	.02*	.00	.04
DelayedEffect	.00	-.02	.01	-.02**	-.04	-.01
ManyAffected	.02	.00	.04	.01	-.01	.04
ManMadeRisk	.01	.00	.03	.00	-.02	.01
ControlOverExposure	-.01	-.03	.01	-.01	-.02	.01
InsuffientRegulation	.00	-.02	.02	-.01	-.03	.01
DoseResponseRelationship	.00	-.02	.03	-.01	-.03	.01
Variance component: participant	.18	.15	.20	.07	.06	.08
Variance component: residual	.31	.30	.32	.32	.31	.33
R^2	.71			.70		
R^2 (adjusted)	.71			.70		

Note. *** $p < .001$, ** $p < .01$, * $p < .05$. $N = 502$ participants × 15 products.

Table VIII. Information manipulation used in Study 3

Condition	Vignette
Hamburger: minimal information	Imagine that you are served a pink, not well-done hamburger [+ *situation vignette: either HomeAlone, BossDinner, DaughterDinner, ParentInLaw; see Table I*]
Hamburger: extended information	Imagine that you are served a pink, not well-done hamburger [+ *situation vignette: either HomeAlone, BossDinner, DaughterDinner, ParentInLaw; see Table I*]. Not well-done hamburgers expose you to a risk of *E.coli*, which can result in terrible stomach pain, bloody diarrhoea, and in rare situations kidney failure. A well-done hamburger is not risky. When cutting in the hamburger, you can see that it is pink in the middle.
Sugar peas: minimal information	Imagine that you are served a dish with raw sugar peas from Kenya (in a specific situation).
Sugar peas: extended information	Imagine that you are served a dish with raw sugar peas [+ *situation vignette: either HomeAlone, BossDinner, DaughterDinner, ParentInLaw; see Table I*]. Sugar peas are often produced in countries with higher infection risk than Norway, and can contain bacteria's, such as *E.coli*, that might give food poisoning. An *E.coli* infection can give terrible stomach pain, bloody diarrhoea and in rare situations kidney failure. Sugar peas from Norway are safe, but foreign sugar peas, not heated up or dipped in boiling water, are risky. You are served raw sugar peas from Kenya.
Chicken: minimal information	Imagine that you are served a dish with pink, not well-done chicken [+ *situation vignette: either HomeAlone, BossDinner, DaughterDinner, ParentInLaw; see Table I*].
Chicken: extended information	Imagine that you are served a dish with pink, not well-done chicken [+ *situation vignette: either HomeAlone, BossDinner, DaughterDinner, ParentInLaw; see Table I*]. Chicken can contribute to dissemination of antibiotic resistance, which it is important to avoid to be able to treat illness. It is a very low risk that anyone can be ill from antibiotic resistant bacteria's in chicken. If you fry or boil chicken properly, and have good kitchen hygiene there will be no risk of dissemination. When you cut in the chicken, you can see that it is pink in the middle.

Table IX. Measures used in Study 3

| Construct	Label	Item	Response scale
Risk-taking	RT1	How likely is it that you will eat (not well-done hamburger/ raw sugar peas from Kenya/ not well-done chicken) in (specific situation)?	Not likely at all (1) – Extremely likely (5)
	RT2	How likely is it that you will suggest to heat up (not well-done hamburger/ raw sugar peas from Kenya/ not well-done chicken) in (specific situation)?	Not likely at all (1) – Extremely likely (5)
	RT3	How likely is it that you will come up with a good excuse to avoid eating (not well-done hamburger/ raw sugar peas from Kenya/ not well-done chicken) (specific situation)?	Not likely at all (1) – Extremely likely (5)
Social norm	SN1	How much pressure will you feel to eat (not well-done hamburger/ raw sugar peas from Kenya/ not well-done chicken) in (specific situation)?	Very low pressure (1) – Very high pressure (5)
	SN2	How much pressure do you think most people will feel to eat (not well-done hamburger/ raw sugar peas from Kenya/ not well-done chicken) in (specific situation)?	Very low pressure (1) – Very high pressure (5)
	SN3	How large will the consequences be if you do not eat (not well-done hamburger/ raw sugar peas from Kenya/ not well-done chicken) in (specific situation)?	Minor consequences (1) – Major consequences (5)
Risk perception	RP1	How many people are likely to have their health harmed by eating (not well-done hamburger/ raw sugar peas from Kenya/ not well-done chicken) in (specific situation)?	None (1) – Very many people (5)
	RP2	Would any damage to your health from eating (not well-done hamburger/ raw sugar peas from Kenya/ not well-done chicken) in (specific situation) be immediately apparent, or would it only become apparent at a later date?	Immediately apparent (1) – Apparent after a long time (5)
	RP3	To what extent are the risks to your health from eating (not well-done hamburger/ raw sugar peas from Kenya/ not well-done chicken) in (specific situation) natural or the fault of mankind?	They are natural risks (1) – Man is entirely to blame (5)
	RP4	How seriously do you think eating (not well-done hamburger/ raw sugar peas from Kenya/ not well-done chicken) in (specific situation) may harm your health?	Not seriously at all (1) – Extremely seriously (5)
	RP5	How costly in terms of time, effort, and money, would it be for people to avoid potential health risks associated with eating (not well-done hamburger/ raw sugar peas from Kenya/ not well-done chicken) in (specific situation)?	Not costly at all (1) – Extremely costly (5)
	RP6	How easy is it for you to tell if eating (not well-done hamburger/ raw sugar peas from Kenya/ not well-done chicken) in (specific situation) contain a risk to your health?	Never (1) – You can always tell (5)
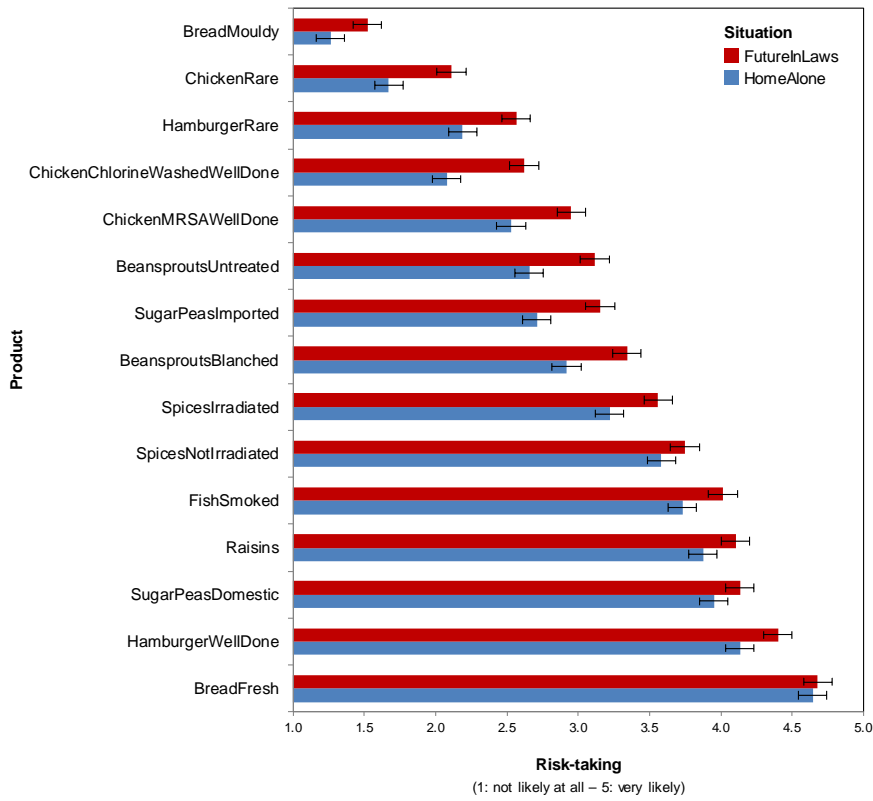
Figure 1. Willingness to accept risky and safe products in situations with strong social norms (red bars) and weak social norms (blue bars) in Study 2 (least-squares means; error bars represent 95% confidence intervals)
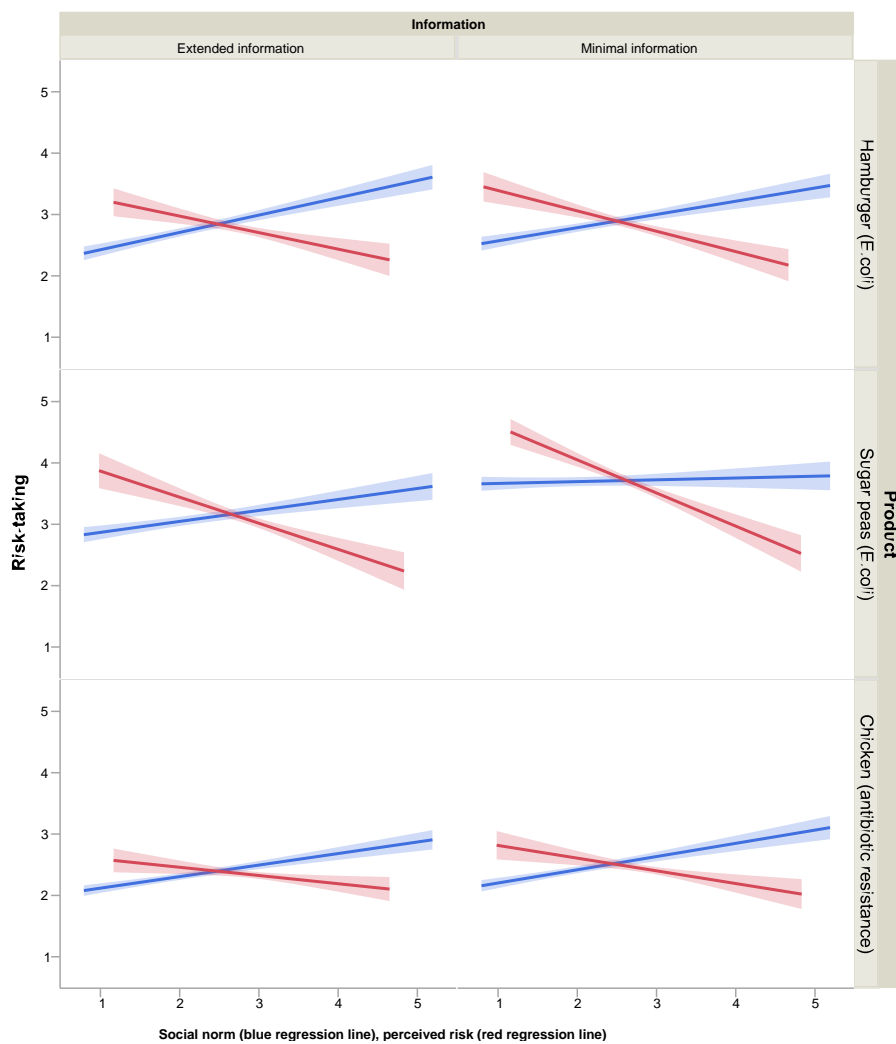
Figure 2. Within-condition regressions of risk-taking on perceived risk (red regression lines with 95% confidence bands) and social norm (blue regression lines with 95% confidence bands) for three product/hazard combinations and two levels of information in Study 3

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