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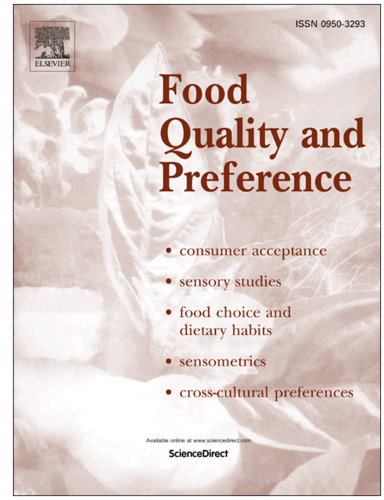

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We will eat disgusting foods together – evidence of the normative basis of Western entomophagy-disgust from an insect tasting

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Abstract

Insects are a highly sustainable and nutritious source of protein, and, thus, incorporating insects in to Western food culture is one way to address major global challenges like global warming and deforestation. Consumer studies show, however, that Westerners' willingness to eat insect-containing food is low. One formidable barrier is the perception that insects are disgusting, and it is generally believed that this insect-disgust is driven by a fear of contamination and disease. Another barrier is the lack of social norms related to entomophagy in the West. In the present study, we tested effects of fear of contamination and perceived social eating norm with a survey and a tasting session administered to a Danish college sample (*N* = 189). Correlation analyses and multivariate regression analyses revealed that selfreported trait-level Pathogen Disgust and Perceived

Infectability did not consistently predict insect eating disgust, willingness to eat insects, or actual insect tasting behavior in the tasting session. In contrast, perceived insect eating norm emerged as a significant predictor of insect tasting behavior. These findings suggest that perceived social norms play a substantial role in Westerners' (un)willingness to eat insects. The result gives reason for optimism for aspirations of introducing insects in Western food diet and point to avenues for harnessing social norms in marketing efforts.

Keywords: insects, entomophagy, food neophobia, disgust, social norms, willingness to eat

1. Introduction

Academic, commercial, and media interest in incorporating insects in to Western diets has increased dramatically in past years. Suggested benefits include that insect-based protein production is more environmentally friendly than animal farming, and, that insects are highly nutritional (Belluco et al., 2013; Van Huis et al., 2013). Thus, incorporating insects into Western food production would address major global challenges such as global warming, deforestation, species extinction, and depleted fresh water supplies (Martin, 2014; Looy, Dunkel, & Wood, 2014; Rumpold & Schlüter, 2013).

A range of studies show, however, that Westerners' willingness to eat (WTE) insect-containing food products is low (Hartmann, Shi, Giusto, & Siegrist, 2015; Vanhonacker, Van Loo, Gellyck, & Verbeke, 2013; Verbeke, 2015). A large driver of this aversion is thought to be the emotion disgust (Gmuer, Guth, Hartmann, & Siegrist, 2016; Hartman & Siegrist, 2016; Yen, 2009), and it is generally believed that insect-containing foods elicit disgust because Westerners falsely categorize insects as a pathogen risk, and, thus, as food contaminators (Looy et al., 2014; Lorenz, Libarkin, & Ording, 2014; Prokop & Fančovičová, 2010; 2013; Rozin, Millman, & Nemeroff, 1986). This follows the neurobiological conception of disgust as an evolved mechanism designed to protect the organism from contact with harmful pathogens. Disgust is triggered by various visual, tactile, and olfactory inputs (e.g. rotten meat, blood, mold on food), experienced or imagined, and it motivates behavioral avoidance, thus acting as a behavioral immune system (Rozin & Fallon, 1987; Curtis, de Barra, & Aunger, 2011). According to error management theory, disgust activation is biased towards emitting false alarms, thus making it oversensitive to potential threats (Haselton & Nettle, 2006).

Understanding the basis of Westerners' insect-disgust and how entrenched this perception is, is important as it may inform future marketing strategies, and, ultimately, point to the prospects of being successful with these strategies. Given that our hominid forefathers most likely consumed insects (Raubenheimer & Rothman, 2013; Van Itterbeck & van Huis, 2012), and, given widespread practices of entomophagy in South and East-Asia and central Africa (DeFoliart, 1999; Van Huis et al., 2013), Westerners' aversion to insects is generally considered a product of cultural transmission just as other cultural food aversions and taboos (DeFoliart, 1999; Fessler & Navarette, 2003; Haidt & Rozin, 2013). At present, there is no evidence for an evolutionary preparedness for human insect-disgust (see, e.g., Deroy, Reade, & Spence, 2015; Gerdes, Uhl & Alpers, 2009) akin to documented evolved human preparedness for reacting to spiders, snakes, and angry faces (Öhman, Lundqvist, & Esteves, 2001; Öhman & Mineka, 2003; Öhman, Flykt, & Esteves, 2001; New & German, 2015).

This raise the question of how entrenched insect-disgust is in Westerners. On the one hand, several studies clearly identify disgust as a core barrier to eating insects (cf. Gmuer, et al., 2016; Hartman & Siegrist, 2016; Yen, 2009). On the other hand, some studies suggest that perceived food appropriateness and expected sensory liking of insects is important for Westerners' WTE food containing insects (Deroy et al., 2015; Tan, Fischer, van Trijp, & Stieger, 2016). Following this argument, expressions of disgust toward insects may reflect a perceived social norm rather than a genuine concern of food contamination. These findings and arguments need not be mutually exclusive, however. A well-established finding is that the degree of insect processing, and thus, insect visibility, predicts negative emotional reactions such as disgust as well as ratings of perceived food appropriateness, perceived sensory liking, and WTE insects (Gmuer et al., 2016; Hartmann et al., 2015; Schosler, de Boer, & Boersema, 2012; Tan et al., 2016).

Given that disgust has been shown to be closely related to fear of contamination, theoretically and empirically (Olatunji, Adams, Ciesielski, David, Sarawgi, and Broman-Fulks, 2012; Tybur, Lieberman, and Griskevicius, 2009), one way to address the basis of Westerners' aversion to insects is to look at associations between individual differences in distal trait-level disgust sensitivity, and, then, disgust towards eating insects and WTE insect-containing food. If Westerners really do see insects as food contaminators, then individuals who are easily disgusted across behavioral domains should be comparably more disgusted by insect-containing food and be less willing to eat it. Here, a range of studies suggest that Western insect-disgust does reflect actual fear of contamination. Two studies (Björklund & Hursti, 2004; Nordin, Broman, Garvill, & Nyroos, 2004) found that individual differences in trait-level disgust sensitivity, as measured by the Disgust Scale (DS: Haidt, McCauley, & Rozin, 1994), positively predicted individual differences on the Food Neophobia Scale (FNS: Pliner & Hobden, 1992). Al-Shawaf, Lewis, Alley and Buss (2015) replicated this finding using the Pathogen Disgust Scale (PDS: Tybur et al., 2009). These are relevant findings, as food neophobia has consistently been identified as a strong predictor of WTE insects (Hartmann et al., 2015; Verbeke, 2015). More importantly, Lorenz et al. (2014) found that PDS correlated highly with disgust ratings of pictures of insects in an American college sample, a finding which is supported by Prokop and Jančovičová (2013). Finally, Hamerman (2016) found that individual differences in trait-level disgust, as measured by the revised version of the Disgust Scale (DS-R: Olatunji, Sawchuk, de Jong & Lohr, 2007), predicted willingness to attend a bug banquet.

The basis of Westerners' aversion to insects may also be addressed by looking to potential effects of beliefs about one's own susceptibility to infectious diseases on insect-disgust and WTE insects. Perceived vulnerability to disease has been found to correlate with contamination fear (Diaz, Soriano, & Belena, 2016), as well as with behavioral immune system responses such as health anxiety (Duncan, Schaller & Park, 2009), anti-immigration attitudes and ethnocentrism (Faulkner, Schaller, Park & Duncan, 2004; Navarette & Fessler, 2006), and pathogen disgust sensitivity (Duncan et al., 2009; Fessler, Eng & Navarette, 2005; Tybur et al., 2009). Thus, potential associations between an individual's self-perceived infectability, and, then, insect eating disgust, and WTE insect-containing food may provide insight to the potential link between insect aversion and fear of contamination. If Westerners really do see insects as food contaminators, then individuals who consider themselves susceptible to infectious diseases should be comparably more disgusted by insect-containing food and be less willing to eat it. There has not been conducted many studies on these associations, however. Fessler et al. (2005) found that women in their first trimester of pregnancy, a gestation period with vulnerability to disease, showed high disgust sensitivity in food domains. Prokop and Francovicová (2013) did, however, not find that individual differences in self-reported Perceived Infectability (PI: Duncan et al., 2009) predicted disgust ratings of pictures of insects.

In the present study, we investigated the assumption that Westerners' insect eating disgust reflects fear of contamination by testing the predictive power of PDS and PI on measures of insect eating disgust, self-reported WTE insects, and, actual insect eating behavior at a tasting session. From the general application of disgust theory, the expectation (Hypothesis 1) was that PDS and PI would emerge as significant predictors.

If fear of contamination is not the main obstacle to entomophagy in the West, then social food norms may be. Indeed, product availability is considered a large barrier to entomophagy in the West (Shelomi, 2015), and prior experience with eating insects has consistently been found to positively predict ratings of WTE insects in the future (Hartmann et al., 2015; Menozzi, Sogari, Veneziani, Simoni, & Mora, 2017). Hartmann and Siegrist (2016) have replicated this familiarity-effect experimentally, ruling out causality concerns. Lack of availability and familiarity points to an important barrier for Western entomophagy: Lack of social norms for eating insects. Many studies have documented the influence other peoples' eating behavior has on individuals' food choice and intake (Higgs & Thomas, 2016; Vartanian, Spanos, Herman, & Polivy, 2015). Social eating norms provide guides for appropriate eating behavior, and thus, we tend to eat what others eat, and eat the quantities others eat (Cruwyz, Bevelander & Herman, 2015; Herman, 2015; Higgs, 2015; Vartanian et al., 2015). Eating modeling tends to be amplified when we are uncertain about the eating norm (Leone, Pliner & Herman, 2007), when we strongly identify with models (Stok, Ridder, Vet & Wit, 2014; Stok, Verkooijen, Ridder, Wit, & Vet, 2014), and when we are concerned about "fitting in" (Bevelander, Anschütz, Creemers, Kleinjan & Engels, 2013; Spanos, Vartanian, Herman & Polivy, 2015).

The effect of social norms on WTE insect-containing food has, however, not been studied much. In an Italian student sample, Menozzi et al. (2017) found that subjective norms did not predict behavioral intentions to eat insect flour in the future. This result is, however, unsurprising, because there is no broad cultural impetus to eat insects, given that entomophagy is not practiced in Europe. Menozzi et al. (2017) also correlated subjective social norms with actual insect-eating behavior at a subsequent bug banquet, and, also did not find a significant effect. This result might, however, be caused by attendance to the bug banquet being a matter of individual choice, and not socially contextualized. In the present study, we thus tested for the effects of perceived social norms on insect-tasting behavior among peers during a surprise tasting session for a large group of college students. As the session was conducted in the students' auditorium, attendance was not biased by self-selection issues as might be the case in food fairs and bug banquets. Here, participants tasted insects in a social group they identified with, and were arguably concerned about fitting in with their peers. Given the large modeling-effects found amongst friends in food choice studies, we expected (Hypothesis 2) that perceived social norms would predict insect tasting behavior.

2. Methods

Participants, design and procedure

To test our hypotheses, we sent an online survey regarding insects as food to 251 Danish undergraduate students from Aarhus University. 203 participants completed the survey (response rate = 80.1 %). 4 days later, during an introductory lecture, students were given a surprise opportunity to taste roasted mealworms in a 10 minute tasting session. Plates with teaspoons containing 7 roasted mealworms were passed around the auditorium for all to try if willing. After the tasting session, students answered a short follow-up survey. 14 participants did not participate in the tasting session, leaving a final sample of 189 participants (159 women, age: M = 21.7, SD = .25).

Measures

We measured food neophobia with a Danish version of the 10-item Food Neophobia Scale (FNS) (Pliner & Hobden, 1992). The scale used a 7-point response scale with the two extreme categories anchored with "Strongly disagree" and "Strongly agree" (Cronbach's α = .83). We measured individual differences in trait-level disgust sensitivity with a Danish version of the 7-item Pathogen Disgust Scale (PDS), a subscale from the Three Domain Disgust Scale, that measures disgust sensitivity towards various sources of pathogens such as rotten food, others' body fluids, animal feces, and insects (Tybur et al., 2009). The scale includes items like "Please rate how disgusting you find…" "Stepping on dog poop", "Sitting next to someone who has red sores on their arm", and "Seeing some mold on old leftovers in your refrigerator". The scale used a 7-point response scale with the two extreme categories verbally anchored with "Not disgusting at all" and "Extremely disgusting" ($\alpha = .70$). We measured individual differences in perceived infectability with a Danish version of the 7-item Perceived Infectability scale (PI), a subscale from the Perceived Vulnerability to Disease scale (Duncan et al., 2009). The scale includes items such as "In general, I am very susceptible to colds, flus and other infectious diseases" and "If an illness is 'going around', I will get it.". The scale used a 7-point response scale from "Strongly disagree" to "Strongly agree" ($\alpha = .95$). The order of FNS, PI and PDS, and, then, questions related to insects as food were counterbalanced in order to mitigate possible order effects. Results of counterbalancing tests showed no significant differences between sequences on key variables, indicating no order effects.

We measured *if participants had eaten insects before* with the item "Have you tried eating cooked insects or foods with ingredients from insects?", measured on a 4-point scale from "No, never" to "Yes, many times". Self-reported *insect eating disgust* was measured with three items: "Eating food with insects is disgusting", "I am afraid of getting sick from eating food with insects", and "I get nauseous at the thought of eating food with insects", all items were measured on a 7-point scale from "Completely disagree" to "Completely agree". The three items correlated positively ($r = .44$ to $.70$, $p < .001$) and showed acceptable internal consistency ($\alpha = .78$).

Given that insect visibility affects disgust and willingness to eat (WTE) insect-containing food, we measured WTE insects with and without accompanying food pictures (cf. Tan et al., 2016). For comparability we selected roasted mealworms, *Tenebrio molitor* larvae, as representative of edible insects. This species is highly nutritional and suitable for human diets. It is also available in selected shops in Denmark, and has been studied in previous research (see, e.g. Tan et al., 2016). We measured *WTE mealworms* with the item: “Would you try to taste cooked insects, such as roasted mealworms, if they were offered to you?”, measured on a 7-point scale from “No, definitely not” to “Yes, definitely”. Accompanied by pictures (see Table 1), we also measured WTE Spring rolls and WTE Buttermilk soup, a spicy food originating from Asia, and a sweet local food, respectively. Both foods were presented and rated with and without visible mealworms. The WTE items were phrased “I could eat this [FOOD]” and agreement was measured on a 7-point scale from “Strongly disagree” to “Strongly agree”. In addition, we measured perceptions of food combination appropriateness with “It is inappropriate to use insects in [FOOD] in this way” and expected sensory liking with “This [FOOD] will taste worse than [FOOD] without insects” (cf. Tan et al., 2016. See Table 1 for details).

<< Insert Table 1 about here >>

After the tasting session, participants’ *insect tasting behavior* was measured with the item: “Did you taste the mealworms?”, measured on a no/yes response category. In addition, we measured *mealworms disgust* with “Do you think the mealworms looked disgusting?”, measured on a 7-point scale from “Not at all” to “Very much”.

Finally, we measured *perceived social norm* with two items: “How many of those sitting close to you (next to you, in front of you, and behind you), do you think tasted the mealworms?” and “How many in the auditorium, do you think tasted the mealworms?”. Both items were measured on a 100-point slider-scale from “0-100%”. The items correlated highly (r = .70, p < 001), and were combined to the variable “*perceived social norm*” (α = .82).

3. Results

Descriptive results and partial correlations among key variables are reported in Table 2. 101 (53.4%) participants indicated they would definitely or probably try mealworms if they were offered to them (i.e. answered 5-7 on a bipolar 1-7 response scale). In the tasting session, however, 153 (81.0%) actually tasted the mealworms (see Figure 1).

<< Insert Figure 1 about here >>

Participants' responses to the food pictures showed that insect visibility had a significant effect. Compared to spring rolls with invisible mealworms, spring rolls with visible mealworms were rated as significantly more inappropriate (M = 2.76 vs. 4.07, t(188) = 9.97, $p < .001$), significantly more distasteful (M = 3.12 vs. 4.38, $t(188) = 10.68$, $p < .001$), and significantly less edible (M = 4.72 vs. 2.70, $t(188) = -15.55$, $p < .001$). Ratings of the traditional Danish buttermilk soup followed the same pattern. The buttermilk soup with visible mealworms was rated as significantly more inappropriate (M = 3.46 vs. 4.78, $t(188) = 9.64$, $p < .001$), significantly more distasteful (M = 3.60 vs. 5.00, $t(188) = 11.38$, $p < .001$), and significantly less edible (M = 4.22 vs. 2.26, $t(188) = -15.12$, $p < .001$). Correlation analysis also showed a strong relationship between WTE ratings of the two foods with visible mealworms ($r = .71$, $p < .001$), and a strong relationship between the WTE two foods with hidden mealworm ingredients ($r = .72$, $p < .001$). Given these high intercorrelations, these variables were combined for the rest of the analyses (i.e. "*WTE food with visible mealworms*", $\alpha = .82$, and, "*WTE food with invisible mealworms*", $\alpha = .84$).

<< Insert Table 2 about here >>

To test hypothesis 1, we first correlated PDS and PI with insect eating disgust, WTE mealworms, WTE food with *in*visible mealworms, WTE food with visible mealworms, reported mealworms disgust, and, finally actual insect tasting behavior (see Table 2). Two out of these twelve analyses revealed significant correlations: PDS correlated negatively with WTE food with visible mealworms (r = -.25, $p < .001$), and, PDS correlated positively with mealworms disgust in the tasting session (r = .16, $p < .05$). We then ran multivariate linear regression analyses with PDS, PI, FNS, eaten insects before, and insect eating disgust entered as predictors and the three WTE variables as dependent variables. Effects of PDS and PI on tasting behavior was analyzed with multivariate logistic regression analyses. These analyses revealed a similar pattern (see Table 3). Here, PDS negatively predicted WTE food with visible mealworms (β = -.18, $p < .01$), and PI positively predicted WTE invisible mealworms (β = .14, $p < .05$). In the other analyses, PI and PDS did not significantly predict WTE mealworms or actual insect tasting behavior.

<< Insert Table 3 about here >>

Thus, the results predominately did not provide support for hypothesis 1. In contrast, FNS, having eaten insects before, and, in particular, insect eating disgust, significantly predicted all three WTE mealworms variables in multivariate regression analyses. Only insect eating disgust predicted insect tasting behavior, however (OR = .45, $p < .01$).

To test hypothesis 2, we ran a multivariate logistic regression analysis with perceived social norm and mealworms disgust entered as additional predictors and tasting behavior as dependent variable (cf. Table 3, model 2). This analysis revealed that mealworm disgust did not predict tasting behavior (OR = .79, $p > .05$), but this result may result from shared variance with insect eating disgust which remained a significant predictor of tasting behavior (OR = .49, $p < .05$). More importantly, perceived social norm emerged as a highly significant predictor of tasting behavior (OR = 1.85, $p < .01$). Thus, this analysis provides support for hypothesis 2: The more participants thought other participants ate the mealworms, the more likely they were themselves to eat the mealworms.

4. Discussion

Using a surprise tasting session at a Danish college, we found that 52 (27.5 %) students who initially said that they would not eat insects if they were offered to them, actually did so. Multivariate regression analyses revealed that perceived social norm in the tasting session predicted this change of heart, a finding that aligns with existing research on eating modeling (e.g. Bevelander et al., 2013; Spanos et al., 2015). The effect may, however, be somewhat inflated in the present study, given that the participants were new students placed in a college context that may have increased the salience of their new shared social identity. Thus, both the sample-demographics and the college context may have enhanced the importance of fitting in (Cruwys et al., 2012). Nonetheless, the result is good news for interventional aspirations as it suggests that Westerners' insect disgust may be mitigated by availability of insect-based food combined with availability of positive social models (Verneau et al., 2016). Promoting entomophagy in the West by harnessing social norms is, however, not straightforward given that the majority do not eat insects as part of day-to-day life. Indeed, while many have tried eating insects, this usually occurs in isolated situations such as in specialized restaurants, at parties, and during travels where interpretative frames and social norms are different from everyday shopping and dining. However, as argued by Higgs and Thomas (2016), rather than broadcasting the majority's lack of insect-eating behavior, social norm interventions may instead aim to broadcast absolute numbers of people eating insects, or broadcast entomophagy among influential role models.

The study also tested causes of entomophagy-disgust in the sample, by investigating associations between perceived infectability and pathogen disgust, and, then, insect eating disgust, WTE mealworms, and actual insect tasting behavior. Partial correlation analyses (cf. Table 2) revealed predominantly nonsignificant associations, but PDS did correlate negatively with WTE food with visible mealworms, and positively with reported mealworms disgust in the tasting session. In contrast, multivariate regression analyses revealed that FNS, having eaten insects before, and in particular, insect eating disgust significantly predicted WTE to mealworms. Also, insect eating disgust emerged as a significant predictor of actual tasting behavior. One interpretation of the predominantly non-significant associations between trait-level disgust sensitivity and perceived infectability, and, then, participants' insect eating disgust and WTE insects is that entomophagy disgust may not necessarily reflect a deep fear of contamination. Rather, as proposed by Deroy et al. (2015), insect eating disgust may be driven by social norms and the perception of insects being inappropriate in existing food dishes and/or distasteful (see also Tan et al., 2016). This interpretation is corroborated by the observed significant effect of perceived social norm on insect tasting behavior in our surprise tasting session. This interpretation should be treated with caution, however. First, the correlation analyses did reveal two significant effects of PDS, and, second, the interpretation rest on the tentative premise that individual differences in pathogen disgust sensitivity and perceived susceptibility to disease also reflect fear of food contamination in addition to fear of contamination in general. For instance, given that PDS possess a relatively large focus on fear of bodily contamination and only a small focus on fear of food contamination, this scale may not be ideal to test associations between entomophagy disgust and fear of food contamination. In order to rule out such validity concerns, future studies could include different measures of disgust sensitivity, e.g. the newly developed Food Disgust Scale (Hartmann & Siegrist, 2018), the contamination subscale from the DS-R (Olatunji et al., 2007), and/or different measures of perceived susceptibility to disease, such as the germ aversion subscale of the PVD (Duncan et al., 2009), or measuring different phases of pregnancy (Fessler et al., 2005). This would also enable future studies to replicate the result that PI did not correlate with PDS, a surprising finding given that other studies suggest that these scales should correlate, albeit weakly (Duncan et al., 2009;

Tybur et al., 2009). Finally, future studies could include measures of contamination fear, such as the Padua Inventory's Contamination Scale (Burns, Keortge, Formea, and Sternberger, 1996), to test associations between fear of contamination and insect aversion more directly.

One strength of our methodology and sample was the ability to serve all of our participants insects, thus overcoming a common problem with selection bias in other studies using participants attending bug banquets/festivals. Second, we believe the combination of using a surprise tasting session with ready-to-eat insects passed around to all participants, sets a low threshold for giving insects a try, thus making the methodological design sensitive to measuring influences on actual insect eating behavior. Our choice of methodology and sample does, however, also raise generalizability concerns. First, as argued above, future studies should test for effects of social norms using more representative samples from non-school contexts. This would also address generalizability concerns relating to potential demand effects from the college professor (Rosenthal, 1966), and, relating to the sample being predominantly young women. Age and gender has consistently been found to influence attitudes toward entomophagy, with older people and women being more skeptical (Hartmann et al., 2015; Verbeke, 2015). Even though we controlled for age and gender in the analyses, the limited generalizability from a college sample should be kept in mind. On the other hand, women are an important target group for insect consumer research, as they are often considered (future) gatekeepers of the food choices and habits of households (Wansink, 2005). Finally, while our study provides preliminary evidence of the importance of social norms in insect tasting behavior, future studies could test this with experimental between-groups designs. This could entail exposing one group to a surprise private tasting session and another group to a surprise social tasting session, or, alternatively, exposing groups to different manipulated social norms.

5. Conclusion

We believe that this study has two substantial implications. First, our combination of measures revealed a dissociation between trait-level disgust and perceived infectability, and, then insect eating disgust. This points to important future investigations of the ultimate causes of Westerners' insect disgust. Second, we found that perceived social norms significantly influenced individuals' willingness to eat fried mealworms in a collective tasting session. Thus, the result suggests that food culture and perceived social norms have substantial explanatory roles when it comes to eating strange and possibly disgusting foods such as insects. We conclude that perceived social norms may be harnessed in marketing efforts in order to surpass experienced insect disgust.

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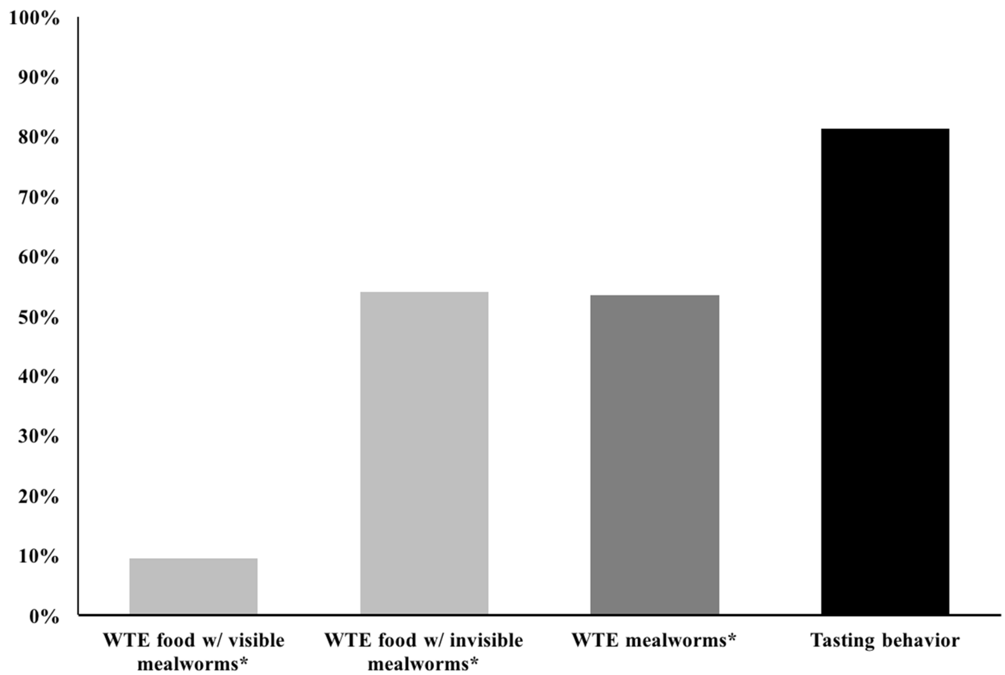
Figure 1. Comparison of participants' WTE mealworms and participants' tasting behavior



* Percent of participants indicating they would probably or definitely eat mealworms if they were offered to them (i.e. answered 5-7 on a bipolar 1-7 response scale).

Table 1. Food pictures and measures used in the study

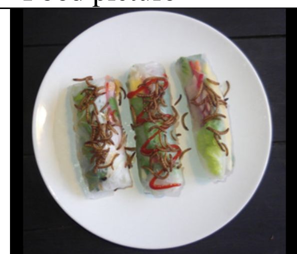
Food	Item description	Food picture	Questions and Response scales
Spring rolls with visible mealworms	"These spring rolls are sprinkled with roasted mealworms."		"Do you agree or disagree with the following" 1. "It is **inappropriate** to use insects in [FOOD] in this way" 2. "This [FOOD] will **taste worse** than [FOOD] without insects" 3. "I **could eat** this [FOOD]"
Spring rolls with invisible mealworms	"The dough of these spring rolls is added 15% mealworm-flour."		Agreement was measured on a 7-point scale, from "Strongly disagree" to "Strongly agree".
Buttermilk soup with visible mealworms	"This buttermilk soup is sprinkled with roasted mealworms."		
Buttermilk soup with invisible mealworms	"This buttermilk soup is added 15% processed mealworms."		

Table 2. Descriptive results and partial correlations among key variables.

	Mean (SD)	1	2	3	4	5	6	7
1. Pathogen Disgust Scale (PDS)	3.90 (.96)	1.0						
2. Perceived Infectability (PI)	3.37 (1.35)	.10	1.0					
3. Food Neophobia Scale (FNS)	27.21 (8.85)	.09	-.05	1.0				
4. Eaten insects before	1.54 (.75)	-.14	-.11	-.18*	1.0			
5. Insect eating disgust	3.58 (1.44)	.09	.01	.49**	-.36**	1.0		
6. WTE mealworms	4.47 (1.99)	-.11	.04	-.44**	.47**	-.62**	1.0	
7. WTE food w/ <u>in</u>visible mealworms	4.47 (1.73)	-.09	.14	-.42**	.25**	-.55**	.58**	1.0
8. WTE food w/ visible mealworms	2.48 (1.44)	-.25**	-.01	-.38**	.38**	-.55**	.58**	.52**
9. Tasting behavior[A]	1.81 (.39)	-.08	.06	-.29**	.17*	-.36*	.44**	.42**
10. Perceived social norm	68.67 (18.57)	-.05	-.02	.00	.01	.00	.10	.09
11. Mealworms disgust	4.37 (1.80)	.16*	.02	.30**	-.24**	.46**	-.45**	-.36**

N = 189. All analyses controlled for age, gender, and being vegetarian.

* *p < .05*, ** *p < .001*. [A] = 1 = did not taste mealworms, 2 = tasted mealworms

Table 3. Multivariate regression analyses

	WTE mealworms	WTE food with *in*visible mealworms	WTE food with visible mealworms	Tasting behavior	
	β (95% CI)	β (95% CI)	β (95% CI)	Model 1 OR (95% CI)	Model 2 OR (95
PDS	-.02 (-.13, .08)	-.04 (-.16, .08)	-.18** (-.29, -.06)	.88 (.58, 1.35)	.97 (.62,
PI	.07 (-.04, 17)	.14* (.02, .26)	.02 (-.09, .14)	1.24 (.80, 1.91)	1.21 (.79
FNS	-.17** (-.29, -.05)	-.19** (-.32, -.05)	-.13* (-.26, -.01)	.65 (.40, 1.05)	.62 (.38,
Eaten insects before	.29** (.17, .40)	.07 (-.06, .19)	.19** (.07, .32)	1.31 (.74, 2.32)	1.38 (.76
Insect eating disgust	-.43** (-.56, -.30)	-.43** (-.58, -.29)	-.40** (-.54, -.26)	.45** (.26, .79)	.49* (.27
Perceived social norm	-	-	-	-	1.85** (
Mealworms disgust	-	-	-	-	.79 (.46,
Adj. R^2	.49	.36	.40	.36 (R^2_{Nag})	.42 (R^2_{N}

N=189. All variables Z-scored. All analyses controlled for age, gender, and, being vegetarian.
** p < .05, ** p < .01, β = standardized regression coefficient. OR = odds ratio.*

Highlights

- Perceived infectability does not predict insect-disgust or WTE insects
- Trait-level pathogen disgust sensitivity does not predict insect-disgust or WTE insects
- Perceived social norms predict insect eating behavior