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Reasons for eating insects? Responses and reflections among Swedish consumers

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ABSTRACT

When studying perceptions of eating insects among new consumer groups, the focus is often on factors that make people avoid novel foods. In order to switch perspective and broaden the understanding of drivers for choosing insects as food, this pilot study aimed to explore the reasons for eating insects among Swedish adults with an interest in entomophagy. Data were collected via a questionnaire combined with workshop discussions. The study highlighted how concerns about *"the environment"* and *"health"*, and a willingness to try something *"exciting"* were the three main reasons for choosing insects as an alternative protein source.

Study

The world is facing numerous challenges in relation to the future of sustainable food consumption. A growing population, in combination with high-consumption lifestyles including a high consumption of meat, has resulted in intense discussions worldwide regarding sustainable supplies of food and protein in the future (Mancini et al., 2019; Raheem et al., 2019; van Huis et al., 2013). From this perspective, eating insects has been discussed as part of a possible solution (Dobermann et al., 2017; Hartmann and Siegrist, 2017; van Huis et al., 2013; Willett et al., 2019). Insects are not only highly nutritious and rich in protein *e.g.* (Elhassan et al., 2019), they also emit less greenhouse gases than other animals (Deroy et al., 2015; van Huis et al., 2013). In many parts of the world there is a long history of consuming insects for food by humans, especially in tropical and subtropical areas in Asia, Africa and South America (van Huis et al., 2013). However, in the Western world, insects are often regarded as "non-food" and substantial cultural barriers to integrating insects as part of the diet exist (Looy and Wood, 2006; Ruby et al., 2015). Until recently it was prohibited to produce and sell insects as human food in European countries (EU, 2015/2283). It is still not permitted in Sweden although a reinterpretation of this legislation is expected in the near future.

What is considered to be food (good/bad/healthy/unhealthy) is part of a socialization and adaptation process that starts early in life (*e.g.* Lafraire et al., 2016). Throughout life we choose food for several reasons, many of them distant from motives connected to physiological hunger or the need to be nourished. It is well known that our food choices are related to cultural and social aspects as well as individual beliefs, and health and environmental concerns (Sobal and Bisogni, 2009). Moreover, sensory properties (including taste), availability and price are crucial aspects for food choice in general and, more specifically, for insect-based food (Hartmann et al., 2015; House, 2016; Tan et al., 2015). Belasco (2008) demonstrates in his food choice model how identity, convenience and responsibility are negotiated when making food choices. In understanding the factors influencing food choice in general, and reasons for choosing certain foods in particular, identity (related to personal preferences, taste, ethnic background and personal memories), convenience (related to availability and affordability) and responsibility (involving awareness of the consequences of our food choice) must be integrated.

Being confronted with new or unfamiliar foods, or novel foods which are defined as foods that are rarely found or eaten in a specific country (Martins and Pliner, 2005), both rejection and curiosity are common reactions, expressing feelings of both neophobia and neophilia (Giordano et al., 2018). Previous studies have shown that eating insects in a Western context has been associated with disgust, even fear, but also repulsion (Looy and Wood, 2006; Ruby et al., 2015), indicating that there are central social and cultural aspects to consider in order to understand our relationship to food (Last, 2014; Looy et al., 2014; Pitt and Shockley, 2014). Studies of consumer perceptions of eating insects have often focused on factors that make us not want to eat insects (Hartmann et al., 2015; Verbeke, 2015). However, the willingness to try new and

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unfamiliar food has been shown to be guided both by beliefs regarding a food's disgusting properties and also by interest, where interest in trying new things has been defined as an important motivational aspect in food choice (Martins and Pliner, 2005; Sogari et al., 2017). This also indicates that there is great value in increasing our understanding of the factors that make us interested and make us choose certain foods (Mancini et al., 2019). What are the drivers and what options are important to include when investigating these drivers? In order to broaden the understanding of the choice of novel foods in general, and insects in particular, the aim of this pilot study was to explore reasons for eating insects among adults in Sweden.

The data collection was divided into two phases where an initial short questionnaire was followed by a workshop discussing the findings of the questionnaire, a research design inspired by a combination of a quantitative and a qualitative approach (*e.g.* Kelle, 2006). A short questionnaire was distributed between June and December 2018 to adults who had recently listened to a lecture by one of the authors regarding eating insects. The content of the lecture covered aspects of sustainability, nutrition, and consumer acceptance of insects as food. The audience was also offered to taste dried and whole mealworms and crickets. Further they had the opportunity to taste bread with added cricket flour. The lecture was given on three different conference and network occasions. The last slide of the lecture featured a QR-code leading directly to the questionnaire that was published by the data collection software Eye Question (version 3.9.7, Logic 8, The Netherlands). Participation was voluntary and performed anonymously. The statement presented in the questionnaire was *"I could (would like to) eat protein from insects for the following reasons",* where the response options were: Good for health; sustainable for the environment; taste good; crispy; trendy; exciting; for fun; famous chefs, bloggers and influencers advocate it; or the National Food Agency (Sweden) legitimizes and recommends it. The questionnaire could be answered regardless of if the participant had ever actually tasted insects and the reasons stated could thereby be hypothetical. Further, it was possible to write alternative response options and the participants could choose one or more response options. The ten response options regarding reasons for eating insect protein were chosen in an exploratory intent, inspired by relevant literature and, as such, considered a pilot formulation. The questionnaire also included questions concerning gender and age but was never as a whole validated.

The second phase consisted of a workshop arranged in September 2019 to discuss the findings of the questionnaire. The workshop was also part of a network meeting on insects as food to which members interested in this field of research and development were invited. In total, 15 persons (9 men and 6 women) participated in this network meeting and in the workshop. Thus, the participants could be regarded as experts in various aspects of the matter concerning insects as food. All participants were initially informed about the results of the questionnaire and thereafter divided into three groups with instructions to discuss the following questions:

- Reflections on the results?
- Are there any response options lacking in the questionnaire that could further motivate choosing insects as a protein source?
- Is there anything surprising in the results?
- Who are the future consumers of insects?
- How should insects be introduced into the retail market?

The participants were also instructed to briefly describe their experience of insects as food. The discussions lasted for approximately 45 min and each group wrote their answers on a sheet of paper and delivered them to the organizers of the workshop. Participation in the workshop was voluntary and the participants were informed beforehand that they could terminate participation whenever they wanted without explanation. The participants also signed their consent to take part under these conditions. The answers could not be traced back to an individual participant and the answers and transcripts are only being used in the present study.

Data from the first phase were statistically evaluated. Mean and standard deviations (Excel, Microsoft Office) were calculated for the whole group of participants as well as separately for men and women, and for age groups. Comparison between groups was performed using Chi2 analysis (SPSS Version 23, IBM, USA).

The questionnaire was answered by 82 respondents, 53 women and 29 men, all aged 18 years or older. *Environmental sustainability* followed by *health* and *exciting* were the three most frequent responses regarding reasons for choosing insects as a protein source (Fig. 1).

The analysis of the statements revealed some gender differences. When conducting a Chi2-test significant differences between men and women were found in the attributes tasty and crispy, where more men than women thought this was an important aspect (Fig. 2).

However, there was no significant difference between different age groups or between younger and older respondents with regard to reasons for eating insects. In the optional/open-ended field, participants added "if there is nothing else to eat", but also "would not even taste it" and "absolutely not".

In the second phase, consisting of a workshop, most participants described themselves as having some, although not a lot, of experience of and knowledge about insects as food. For example, some of the participants had tried insects as an ingredient in a wok when abroad and also during a previous research project and lectures about insects as food. However, all of them had a specific interest in the field. The participants found the main results of the questionnaire to be as expected; however, they were surprised that "tasty" and "trendy" were both considered minor factors for choosing insects as food. This is interesting since taste has been shown to be the most important driver for preference (Holmer et al., 2012; Wendin et al., 2019) and trendy has also emerged as an important driver in previous studies (Longin and Würschum, 2016). One group further emphasized the importance of distinguishing between trying insects as a one-time event and incorporating them into one's everyday diet (Mancini et al., 2019). In order to obtain a more permanent dietary change, other "drivers" or reasons for eating insects are probably needed, for example that they are considered tasty and convenient. Another group suggested that the main question in the questionnaire should be rephrased as "Would you like to try this?" also suggesting different answers may be given to the question depending on whether it is interpreted as just trying insects or eating them regularly. Based on this, it was hypothesized that the attribute "exciting" being one of the three main drivers is probably more relevant initially when trying something new rather than for the everyday consumption of insects.

Discussing the response options on the questionnaire during the workshop, the participants noted the lack of options related to health, where alternatives such as the possible positive effects on the gut flora and intake of vitamin B12 were suggested. Other options that were mentioned that may be important reasons for eating insects were price, safety and cultural heritage. This further stress the need for both diversification and development of relevant response options in future and more comprehensive survey studies in order to be able to capture the variety of reasons for eating insects.

Thinking about future consumption of insects as food, the participants also discussed how insects could be introduced into retail outlets. In all of the groups, price was mentioned and the advantages or disadvantages of having a high respectively low price. Whilst seemingly going against standard economic reasoning, the advantage of applying initial high-price strategies to drive demand for insects as food has been described by Berger et al. (2018). One of the groups talked about the status of certain food choices and the relationship between price and status. Another group highlighted the need for insect-based food to be cheaper than meat alternatives. An idea put forward was to not focus so much on insects as an ingredient, but instead on healthy and sustainable food in general.

Insects as food and eating insects are most often discussed in terms of

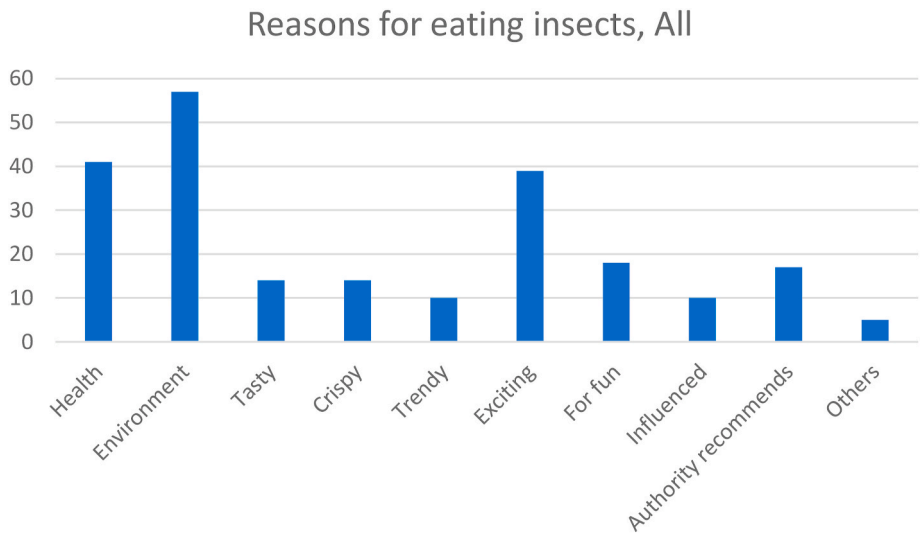

Fig. 1. Reasons for eating insects.

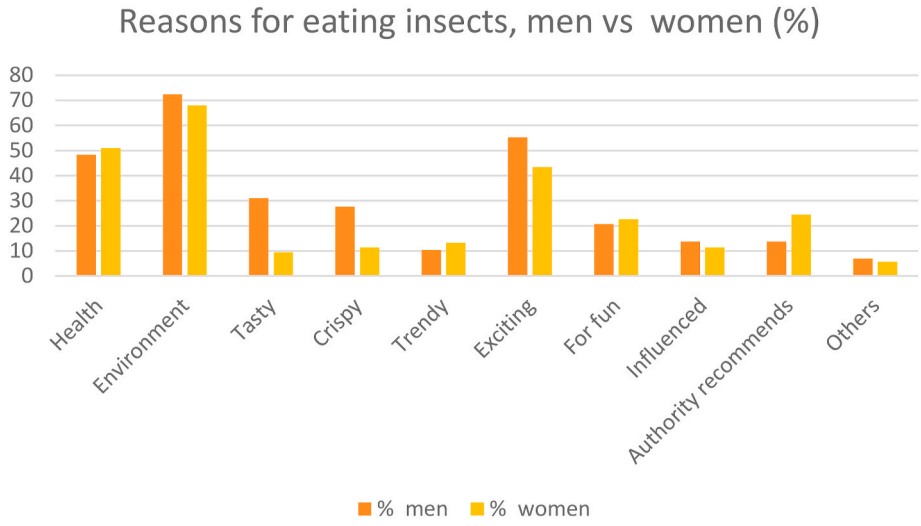

Fig. 2. Reasons for eating insects divided between men and women and shown as a percentage of each group. It was possible for participants to indicate several reasons.

the future consumer. During the workshop, the participants in one of the groups talked about the future consumer as *"younger women who do not care about taste, but regard health and environment as important*" and *"younger men who think insects are exciting, brave and new"*. This is both in contrast and in line with an earlier study, where taste and flavor were considered to be the most important factors, while environmental factors such as naturalness were shown to be very important, especially among younger women (Wendin et al., 2019). This points out some noteworthy gender aspects in relation to reasons for choosing insects as food, where men seemed to find it more important that the insects were tasty and crispy compared to the women, who were perceived to consider health and environmental aspects to a larger degree. An earlier study by Wendin et al. (2017) showed that men were significantly more willing than women to eat and buy whole insects, while women preferred them ground into flour. However, gender differences in relation to interest in trying new and unknown foods are still unclear, especially regarding insects as food. Some studies have found that, in general, men tend to be more neophobic than women (Siegrist et al., 2013; Tuorila et al., 2001), while other research has found that women are more neophobic and men more ready to eat insects (Gere et al., 2017). In the study by Caparros Megido et al. (2016), different kinds of burgers were tested, including burgers made from insects. The results showed that women were on the one hand perceived as more neophobic than men, but on the other hand showed more acceptance towards vegetable products. In order to understand the reasons for eating insects, it might be of importance to dig deeper into possible gender differences as well as their implications for understanding and promoting insects as human food.

Food choice in general, and choice of novel foods in particular, needs to be understood in relation to cultural ideas as well as societal challenges. Following previous research and the main arguments for eating insects (see *e.g.* Brunner and Nuttavuthisit, 2019; Sogari, 2015; van Huis et al., 2013; Verbeke, 2015), this pilot study highlighted how concerns about the *environment* and *health* as well as a willingness to try something *"exciting"* were the three main reasons for choosing to eat insects as an alternative protein source. Previous research has also indicated that a belief that insect-based products are healthy and environmentally sustainable also increases the willingness to try them (Menozzi et al., 2017). Both health and sustainability relate to what Belasco (2008) defines as "responsibility", understood as taking into account the consequences of one's food choices. However, they can also be linked to identity and status related to food choice. Moreover, eating insects

because they evoke sensations of excitement relates to feelings of both curiosity and interest. Studies focusing on acceptability and willingness to try novel foods in general, and insects in particular, have recurrently stated the importance of interest and curiosity as motivational aspects (Martins and Pliner, 2005; Sogari, 2015; Sogari et al., 2017). Therefore, the balance between neophobia and neophilia in understanding drivers as well as barriers for eating insects are important, where the latter points to our evolutionary drive to test new things and curiosity in relation to new foods. In future studies, it would be interesting to monitor the long-term efficacy of neophilic reasons/motives for driving sustainable dietary changes.

This pilot study calls for the need to further increase knowledge about reasons for choosing insects as food. The participants in this study had a previous interest in insects as food, thereby taking more of an "expert perspective". It might be argued that the lecture prior to filling out the questionnaire had an impact on the results; however, it was important to use this familiarity and prior knowledge to explore the reasons and relevant response options. In the workshop, the response options used in the questionnaire were further elaborated on by the participants, who were also familiar with and had an interest in insects as food. These provided important insights into what might be important to consider in order to understand the reasons for choosing insects as a protein source instead of the explanations for not eating insects. Clearly, there might be arguments both for and against including people in a study who already advocate insects as food. However, earlier studies have highlighted the benefits of focusing not only on early adopters (House, 2016), but also on "the early majority" (Brunner and Nuttavuthisit, 2019), which might increase understanding of not only the question *why* but also *how* insects as food can be integrated into the diet. Although Sweden as a nation has been late in adopting insects as food for both cultural and regulatory reasons, an earlier study by Ritchey et al. (2003) has shown an enhanced willingness among Swedes to try different types of novel foods. The authors, therefore, regard Sweden as a potential test bed for the development of programs aimed at facilitating dietary change. To conclude, this combined knowledge will be of great importance in increasing overall acceptance of insects as food among different consumer groups as well as for commercial development.

Statement for conflict of interest

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CRediT authorship contribution statement

M. Nyberg: Writing - original draft, Writing - review & editing, was responsible for original draft preparation while all authors have been actively involved in writing, editing, and critically reviewing the manuscript. All authors have given their approval of publishing this version and have agreed to be accountable for all aspects in the work. **V. Olsson:** Formal analysis, Data curation, participated in the workshop. All authors participated in the analysis of the data and the interpretation of the results. **K. Wendin:** Formal analysis, Data curation, conducted the questionnaire study, participated in the workshop. All authors participated in the analysis of the data and the interpretation of the results.

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