Increasing the Effectiveness of Ecological Food Signaling: Comparing Sustainability Tags with Eco-labels

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Abstract

The effectiveness of eco-labels has dominated research on ecological food signaling. Building on signaling theory, we investigate the impact of sustainability tags (i.e., unverified sustainability claims) compared to eco-labels (i.e., actual awarded eco-certificates) on consumers' choices and willingness to pay (WTP). We add to the underdeveloped "non eco-labels" literature on sustainability signaling by documenting that a green sustainability tag had a higher importance score and utility compared to an eco-label. The tag led to larger "green segments" valuing sustainability as the most important attribute when buying salmon fillets. Furthermore, consumers were willing to pay 23.1% more for fillets with sustainability tags. This was significantly higher than the additional value ascribed to fillets with MSC eco-labels. This increase in WTP was mediated by perceived familiarity, where tags were rated higher in familiarity compared to eco-labels. The majority of consumers were unfamiliar with frequently used seafood eco-labels (ASC/MSC).

Keywords: Sustainability signaling, sustainability tags, eco-labels, active retailing, environmental sustainability, multi-attribute decision making

1 Introduction

Along with vegetables, fruit, legumes, whole grain, and nuts, fish can replace unhealthy protein sources in consumers' diets such as beef. It is among the emphasized foods in the planetary health diet recommended by the Lancet Commission (Willett et al., 2019). The seafood industry abounds with environmental sustainability issues such as over-exploitation in marine fishing (The Food and Agriculture Organization, 2020), the negative impact of aquaculture on the surrounding flora and fauna (King et al., 2010; Holmer, et al., 2008), and the disruption of ecosystems through interbreeding (McGinnity et al., 2003).

From an environmental perspective, retailers should assist sustainable food selection through improved communication (Sigurdsson et al., 2020). Consumers have increased their value on time and effort in low involvement shopping situations (Larsen, Sigurdsson, Breivik, & Orquin, 2020; Nielsen, 2014; Sorensen, 2016). Online grocery sales are increasing and physical stores are responding, reflecting time-pressured consumers (Larsen, Sigurdsson, Breivik, Fagerstrøm, & Foxall, 2020). Certified eco-labels have traditionally been used as sustainability signaling to facilitate trust benefits and lower search costs. Still, they have received their share of criticism (see e.g. Hadjimichael & Hegland, 2016). Past studies have shown that consumers have limited knowledge of seafood eco-labels (Feucht & Zander, 2014), have difficulties in understanding what eco-labels are communicating (Thøgersen et al., 2010), and cannot distinguish between eco-labels that are used for wild and farmed seafood (Feucht & Zander, 2014). This prevents many consumers from utilizing eco-labels in a meaningful way, even those who are motivated to use sustainability information (Grunert et al., 2014; Taufique et al., 2017).

As a response to these drawbacks to eco-labels we draw on signaling theory (Spence, 1973), viewing eco-labels as signals - to examine and compare another type of sustainability signaling, as sustainability is primarily an unobservable seafood product attribute that cannot

be assessed objectively by consumers and must therefore be signaled (Johnston & Roheim, 2006). Signals evolve because they modify consumer behavior (the receiver) to benefit the retailer and the rest of the value chain (the signaler) and it is therefore of value to explore the uses of different signals appearing in the retail industry. Eco-labels are one such sustainability signal. Consumers are, however, increasingly concerned about sustainable consumption and production (White et al., 2019) and despite decades of academic research and practice using eco-labels as a form of sustainability signaling (see e.g,. a thorough discussion by Ward and Phillips, 2008), over 60% of consumers still find sustainable food choices difficult to identify (International Food Information Council, 2020). There is, however, a new type of sustainability signaling evolving, especially in e-commerce. This new type relies on guided choices through sustainability tagging. In sectors such as online clothing, some retailers have, for instance, adopted a simple (in the sense of being familiar and requiring limited cognitive processes. One example is Europe's leading fashion platform Zalando (www.zalando.de), which has a practice of putting a simple green text box with the word "sustainability" next to fashion items promoted as sustainable on their e-commerce platform. To examine this trend further, using a small informal observation, we looked at 13 online retailers in food and clothing to see if they use sustainability tags and/or eco-labels. These retailers did not promote eco-labels. Three (23%) of them used clear sustainability tags on the product images, one (8%) tagged sustainable products with the name of their sustainable product line, while the others (69%) did not use any kind of sustainability tag. This suggests a problem in that decades of academic research on sustainability signaling is almost entirely based on research on the usefulness of eco-labels, but the comparisons of the effectiveness of eco-labels and other sustainability signals, such as traceability (see Lee, Bae, et al., 2020) or tagging are seriously underdeveloped. The literature on sustainability marketing, therefore,

lacks information on the effectiveness of other signals that have evolved, as the retail industry is constantly innovating and testing new ways to guide consumer choice.

We define sustainability tagging (such as "sustainable," "support local," "eco friendly") as the act of placing a word, a short sentence or a simple picture next to the promoted product or on the product. These tags can have different positioning (e.g., left or right, above or below) and colors (e.g., green or blue). In online retail this can be done on, or next to, the product image in the results page and in physical retailing this can be a tag on a shelf. Sustainability tagging is not the same as a third-party certification (eco-label), as it is more direct and guiding than eco-labels; it does not require much knowledge, as it should be easily understandable. Tags are more of a tool used by retailers and might therefore rely more on their image and credibility to direct, inform and promote sustainability and products to the consumer. In this way, grocery retailers can assist consumers in making sustainable food choices as part of their increased service and personal selling (see Sorensen, 2017). As a third-party sustainability label, an eco-label can back up these endeavors when retailers overtly claim sustainability (e.g., with tags). This type of sustainability signal at the point-of-sales allows consumers to consider sustainability when making food choices, lowering information asymmetry without the assumption of eco-label familiarity and knowledge, as their influence depends on whether consumers know them, understand what they mean, and the motivation for using sustainability information (e.g. Lee, Bae, et al., 2020; Grunert et al., 2014; Taufique et al., 2017).

The main research question guiding this research is: Do sustainability tags next to product images have more impact (such as in terms of utility, choice and willingness to pay) on consumer choices than certified eco-labels? In the current research, we compared the importance and effects of these two sustainability signaling techniques against each other in an experiment and also against several salient product attributes (price, product origin,

procurement method, and purchase state) in conjoint studies. In the current research, we therefore contribute to the literature on sustainability marketing in retailing by:

- Examining both the relative impact (through conjoint studies) and the direct impact (through an experiment) of two different types of sustainability signal (sustainability tag and eco-label) on consumers' preferences and willingness to pay for fish fillets, and finding that both were an important attribute in fish purchase situations when compared to other salient product attributes (such as pricing).

- Introducing sustainability tagging into the literature on sustainability signaling, giving a formal definition and testing other forms of signals than only eco-labels, thus better linking academia and practice.

- The signal's value altering effect (in terms of utility and importance) was stronger when sustainability tagging was used.

- Showing that sustainability tagging increases willingness to pay for fish fillets more than eco-labeling.

- Revealing that sustainability tags is leading to larger "green segments" of customers valuing sustainability as the most important attribute when buying salmon fillets.

- The current research also reveals that green consumption values were positively related to willingness to pay for fish fillets with sustainable tags, but, surprisingly, not for those with eco-labels (i.e., MSC).

- Replicating previous findings documenting consumers' overall lack of knowledge of and familiarity with eco-labels.

- Showing that willingness to pay for fish fillets was mediated by perceived familiarity with a sustainability signal, thus pointing at the importance of familiarizing consumers with eco-labels.

● Documenting that brand attitudes, perceived brand integrity, and brand trustworthiness were indifferent across sustainability signals (a sustainability tag vs. the MSC eco-label).

In the following sections, we begin with a theoretical framework presenting the main literature on which this research is built. Then we report the methods and results of the three studies conducted. We conclude with a more general discussion of the results with some limitations of the paper and suggestions for further research.

2 Theoretical framework and hypotheses

2.1 Signaling theory and multi-attribute decision-making

Signaling theory is concerned with information asymmetry between two parties in a market exchange (Spence, 1973) and how that asymmetry can be reduced by signaling (Connelly et al., 2011). Signaling theory has its roots in information economics in relation to hiring situations. Spence (1973) specifically discussed how job applicants can create different signals, such as acquiring an education, to signal productive capability (e.g., the ability to learn). Buyers often tend to be at a disadvantage as they possess less information about products than sellers do. As products can contain many unobservable attributes that cannot be assessed objectively by consumers (Boulding & Kirmani, 1993; Rao, Qu & Ruekert, 1999), even after their consumption or experience, signaling theory has been used extensively in marketing. The most prevalent signals in marketing traditionally include price, brand names, brand advertising, retail reputation, and warranties (Dawar & Parker, 1994). Signaling theory has also been used to assist sustainable food consumption (Sigurdsson et al., 2020), testing the effects of environmental cues on the purchase intention or selection of sustainable products (Lee, Bae & Kim, 2020). In a similar vein, brands can use eco-labels to convey information about the sustainable attributes of their products (White et al., 2019). Here, the

eco-label signals otherwise unobservable information to consumers on environmental impact, which makes consumers able to distinguish eco-friendly products from less eco-friendly alternatives (Johnston & Roheim, 2006). Similarly, retailers can use sustainability tags to drive attention to environmental aspects connected to a product that consumers cannot observe directly from the product or experience through consumption or use.

Consumer fish choice reflects multi-attribute decision making. When faced with a choice, consumers compare products, assess them based on their attributes, and base their choice on what maximizes their utility (Lancaster, 1966). The product attributes (*product origin, procurement method, purchase state, price)* tested against the specialized sustainability signals (tag and eco-labels) in the current research were identified based on the literature (see Table 1 for key references) and a pre-study survey.

2.2 The effects of sustainability signaling on consumer choice and willingness to pay

Research shows that eco-labels can have a positive influence on consumer choice for seafood products (Uchida et al., 2014; Roheim et al., 2012; Jaffry et al., 2004). The Marine Stewardship Council (MSC) and the Aquaculture Stewardship Council (ASC) are independent, non-profit organizations with a shared mission to promote and reward sustainable practices in seafood production. The blue MSC label is meant to communicate to consumers that a seafood product came from a sustainable wild stock that was caught by a well-managed fishery while inflicting minimal environmental harm (MSC, 2021). Similarly, the green ASC label represents a labelling program for responsible aquaculture (ASC, 2021).

A primary objective of eco-labels is to create market-based incentives for more environmentally sustainable practices in the seafood industry (Asche et al., 2015). For eco-labels to act as an incentive for the producer, they must create added value so that consumers are willing to pay a premium price for eco-labeled seafood covering the costs associated with

environmentally sustainable production. There is an established literature on consumers'
willingness to pay a premium price for eco-labeled seafood. Choice experiments show that
consumers in many countries, including the US, Germany, the UK, France and Japan are
willing to pay a significant price premium for eco-labeled salmon (e.g., Bronnmann & Asche,
2017; Chen et al., 2015; Johnston & Roheim, 2006).

The size of the price premium that consumers are willing to pay for eco-labeled
salmon varies significantly between the studies (from only a few percent to more than 20%).
Significant and positive effects of the presence of an eco-label on willingness to pay have
also been detected in studies focusing on species other than salmon (see e.g., Bronnmann &
Asche, 2016; Sogn-Grundvåg et al., 2013; Roheim et al., 2011; Goyert et al., 2010).
Furthermore, studies examining actual prices in retail stores find that eco-labeled salmon
receive higher prices than non-labeled salmon, but not necessarily in high-end supermarket
chains (see e.g., Asche et al., 2015).

2.2.1 The effects of sustainability signaling are mediated by knowledge and familiarity

The literature shows that environmental knowledge is positively linked to environmental
behavior (Levine & Strube, 2012; Frick et al., 2004) and that consumers are unlikely to make
more deliberate sustainable choices if they lack specific knowledge of the environmental
problem, behavioral options and possible courses of action (Gifford & Nilsson, 2014). Thus,
consumers' awareness and acceptance of eco-labels rest on knowledge of the environmental
issues that make eco-labels necessary and how eco-labeled products connect with these issues
(see e.g., Uchida et al., 2013). In this respect, knowledge enables the more motivated
consumers to actually utilize the labels in a meaningful way (Grunert et al., 2014).

Studies suggest that consumers have difficulties in understanding what eco-labels are
communicating (Thøgersen et al., 2010), but also that they respond positively to information

treatments. For instance, treatments where participants are provided negative information on the status of fish stocks (Uchida et al., 2013), a decline in the natural fish stock due to overfishing (Uchida et al., 2014), or negative sides of salmon farming (e.g., Chen et al., 2015; Whitmarsh & Wattage, 2006), have shown to positively affect the premium consumers are willing to pay for eco-labeled salmon. The effects of information treatments on willingness to pay have also been significant when providing participants with more positive information, such as the benefits associated with the MSC-labelling program (Uchida et al., 2013) and production practices and the certification systems (Bronnmann & Asche, 2017). This suggests that the effectiveness of eco-labels is contingent on the knowledge level of the consumers.

The literature also suggests that consumers are relatively unfamiliar with seafood eco-labels. For instance, in focus interviews with German consumers, Feucht and Zander (2014) found that consumers could not distinguish between the eco-labels that are used for wild and farmed seafood. Their results also reveal that sustainability was considered a vague term with an unclear definition for most of the consumers, and that many had never previously consciously looked for a sustainability label on fish products, or that they trusted their retailer and therefore did not look for labels. Similarly, only a small proportion of the French participants in the study by Chen et al. (2015) claimed to have seen the certified label for wild seafood "often" or "sometimes".

2.3 Customer efficiency and the potential of sustainability tagging

Most grocery shoppers do not have the time or interest to think deeply about what to buy. Therefore, any little cue that helps shoppers to make their selection quickly is particularly valuable to them (Sorensen, 2017). For instance, there is established evidence in the literature on the effects of signaling popularity on consumer choice in online choice

situations (e.g., Wu & Lee, 2016; Cheung et al., 2014; Jeong & Kwon, 2012) as well as in physical retail environments (e.g., Sigurdsson et al., 2020). Sustainability cues do not always have the intended effect on consumer purchase behavior, as there are various factors that can affect how consumers react to these cues (Lee, Bae et al., 2020). Research in related areas (such as health and nutrition) suggests that in order for information to affect consumer choice, it must be available at the point-of-sale and easily processable (see e.g., Nikolova & Inman, 2015). Eco-labels are, first and foremost, sustainability cues on product packages. Their effectiveness in physical stores is therefore contingent on consumers picking up the product, examining the eco-label, and understanding the information on the label. Similarly, for online customers it is contingent on consumers accessing (clicking), examining and understanding the more detailed product description. However, shoppers are rarely willing to spend time acquiring all relevant information when shopping for groceries. They tend to use strategies (heuristics) that simplify their decision-making by ignoring part of the information (Gigerenzer & Gaissmaier, 2011). Consumers tend to partially automate their behavior by relying on more simple rules (Martin & Morich, 2011), which then act as mental shortcuts (see also Kahneman, 2003). A consequence is that sustainability information must be more readily available at the point-of-sale in order to have any impact on the purchase decision, most preferably as visible signs or tags which are easy to understand and placed in close vicinity to the product on the shelf or on/next to the online product image. Grandi et al. (2021) provide some evidence that reducing the effort to acquire information (collection costs) and understand the information (comprehension costs) presented at the point of sale would increase the probability that consumers rely on the information when making food choices. In particular, they show that a simplified single color shelf label (based on an overall nutrition profile) is more effective at encouraging people to choose healthier products compared to front-of-package information.

2.4 Research foundations and hypotheses

The literature shows that retailers can assist sustainable food selection through improved signals and that consumers have increased their value on sustainability, but also on time and effort in the low involvement shopping situations. Certified eco-labels have traditionally been used as sustainability signaling to facilitate trust benefits and lower search costs. These labels are, however, competing with other product attributes as consumer fish choice tends to reflect multi-attribute decision making. Eco-labels have also received their share of criticism as consumers tend to have limited knowledge and understanding of them. This prevents many consumers from utilizing eco-labels in a meaningful way, especially those showing lower environmental or green consumer engagement. There is a new type of sustainability signaling evolving, especially in e-commerce, that needs to be explored academically. This relies on guided choices through sustainability tagging. Based on this we expected to replicate the following empirical generalizations (EGs) in marketing (see e.g., Bass, 1995 for a discussion) in the first two studies using conjoint analysis and a latent class segmentation analysis:

- EG1: Consumers do not know eco-labels in general

- EG2: Consumers tend to be unfamiliar with eco-labels

- EG3: Consumer fish choice tends to reflect multi-attribute decision making

- EG4: Eco-labels tend to increase relative customer value (utility)

The increasing motivation towards sustainability in general, the use of tagging in practice, and the limitations of eco-labels (e.g. in terms of familiarity) led to the following research expectations (REs):

- RE1: The eco-label signals' relative value altering effects will mainly depend on a segment of consumers relying on eco-labels as the most important attribute when choosing fish fillets, but will have limited impact in other segments

- RE2: Considerable relative customer value (utility and importance) will be attached to the use of simple green sustainability tagging
- RE3: Customer heterogeneity leading to a valuable customer segment relying on sustainability tagging as the most important product attribute, but also notable importance for other segments

Once we finished the first two studies, we formulated the following hypotheses drawing from the literature (section 2.3) and the results from the first two studies:

- H1: Consumers will have a higher WTP for fillets with sustainability tags than the ones with MSC eco-label
- H2: Consumers will be more familiar with sustainability tags than MSC eco-labels
- H3: Familiarity with sustainability tags will mediate the effects of sustainability signaling on WTP
- H4: Green consumption values will be positively related to WTP for fillets with MSC eco-labels but not for fillets with simple sustainability tags

3 Studies 1 and 2 – Eco-labels as a sustainability signal and sustainability tags

The purpose of Study 1 was to find out if eco-labels could be an effective sustainability signal for consumers shopping for fish products online as well as determining the value placed by consumers on this product attribute relative to other traditional attributes. Study 2 replicated Study 1, except it sought to find out how much value online consumers place on a sustainability tag, instead of eco-labels as in Study 1. Study 2 also differed in relation to other more traditional product attributes that have been shown to affect consumers' choice of fish.

3.1 Methodology

3.1.1 Participants

A total of 1201 participants from the US participated in Studies 1 and 2, which were distributed using the Amazon Mechanical Turk (Mturk) crowdsourcing service. Of these, 601 participated in Study 1 and 600 participated in Study 2. Crowdsourcing platforms such as Mturk are highly efficient, valid and reliable (Buhrmester et al., 2011; Hauser & Schwartz, 2016; Holden et al., 2013; Ramsey et al., 2016; Thomas & Clifford, 2017), providing researchers with demographically diverse and easily accessible participants at a lower cost compared to traditional participants (Goodman & Paolacci, 2017; Paolacci & Chandler, 2014). Each participant received a reward of $0.50 for completing the study. The ratio of males, females and non-binary/other participating in both studies was very similar; 48.1% (Study 1) / 48.2% (Study 2) were males and 51.1% (Study 1) / 51% (Study 2) females, while 0.8% of both studies either identified as other non-binary gender or did not wish to disclose their gender. The age distribution between studies was also similar. Only 3.2% (Study 1) / 3.3% (Study 2) of respondents were aged 18-24; 31.3% (Study 1) / 36.8% (Study 2) were 25-34 years old; 26.3% (Study 1) / 25.8% (Study 2) were 35-44 years; 17.3% (Study 1) / 15.5% (Study 2) were 45-54 years old; 13.3% (Study 1) / 10.7% (Study 2) were 55-64 years old; and 6.8 (Study 1) / 5.5% (Study 2) were 65 years or older. A few respondents did not wish to disclose their age; 1.8% (Study 1) and 2.3% (Study 2).

3.1.2 Attributes

Both studies were designed to simulate an online grocery store and respondents were asked to imagine that they were choosing between salmon fillet options in an online grocery store. All product attributes and their levels were described in the study's introduction to ensure that respondents understood and were aware of them when working on the choice tasks. The following target attributes were included in Studies 1 and 2 as the focus of the research: eco-label (only in Study 1: MSC/ASC labels), sustainability tag (only in Study 2: A green sustainability tag stating that the product was environmentally sustainable). The only

difference between Studies 1 and 2 was the signal used for environmental sustainability. Study 1 showed MSC/ASC labels. For the pictures signaling sustainability, salmon fillets were pictured with eco-labels in the upper-left corner of the pictures. Since the same eco-labels are not generally used for wild caught and farmed fish, two eco-labels were used for this study; the MSC label for wild caught salmon and the ASC label for farmed salmon. Study 2, on the other hand, showed a sustainability tag, stating that the product was environmentally sustainable. Because of the connection of green to nature and the precedence set by other studies using green to signal eco-friendliness (Guyader et al., 2017; Pancer et al., 2017), the sustainability tag used for this study was green. The tag was placed in the top-left corner of the product pictures. This placement was chosen since eye movements have a strong tendency to go from left to right (Shi et al., 2013) and from top to bottom (Glaholt et al., 2010). The attributes tested for comparisons were product origin, procurement method, purchase statement and price. Table 1 shows and describes the attributes used for Studies 1 and 2 (*product origin, procurement method, purchase state, price, eco-label* [Study 1] and *sustainability tag* [Study 2]) and gives examples of key references for each attribute.

3.1.3 Design and Procedure

A choice-based conjoint experiment was designed using Sawtooth Software's Lighthouse Studio 9.8.1. Each study consisted of 14 choice tasks including two holdout tasks, each displaying six product options. Table 1 shows and describes the attributes used for the studies as well as the corresponding levels of each attribute. This constituted a 5x3x2x2x2 design. A total of 300 unique design versions of the questionnaire were generated, and a specific questionnaire was repeated once for every 300 participants. In constructing and displaying choice tasks, a random task generation method that implemented a balanced overlap design was used, where some degree of level overlap (repeating levels within a choice task) was

permitted. Such a design increased the precision of both main and interaction effects. After completing all the choice tasks, respondents were asked additional questions about their fish consumption behavior, demographics and psychographics. Since wild salmon is generally more expensive than farmed salmon, a conditional pricing approach was adopted to reflect the real-life price difference between the two and to increase the study's external validity. The three price levels-low, medium, and high-were operationalized at $18, $24 and $30 for the wild salmon, and $8, $14 and $20 for the farmed salmon. For each choice task, the participants had the option to choose the 'none' option, which reflects a real-world scenario where consumers do not choose a product that is not attractive to them (Orme, 2010). Figure 1 shows an example of a choice task from the studies. The participants were asked to select the most attractive concept for each task.

(Insert Table 1 here)

(Insert Figure 1 here)

3.2 Results and discussion

The results from the studies are displayed in Table 2. In order to calculate the estimated utilities a Hierarchical Bayes (HB) estimation model was used (see e.g., Allenby & Ginter, 1995). In Study 1, eco-labels (15.28%) were found to be the fourth (out of five) most important attributes for consumer choice. but in Study 2 sustainability tagging was (20.14%), was the third most important attribute, out of the same five attributes. In Study 2, it is especially interesting to see that the tag scored higher in importance than both product origin and purchase state, especially since product origin has been shown to be one of the most important attributes for consumers' choice of fish (Carlucci et al., 2015). The tag was therefore an effective quality cue and utility estimates show that respondents preferred salmon with the tag to salmon with no tag. After the respondents had finished the choice tasks, they were asked if they had noticed the eco-labels (Study 1) or green sustainability tags

(Study 2), as the objective of the studies was to see if these attributes were effective. A total of 89% of respondents in Study 1 claimed they had noticed eco-labels on product pictures, and 95% of the respondents of Study 2 noticed the sustainability tags.

(Insert Table 2 here)

3.2.1 Consumer segments and profiling

In order to gain a deeper understanding of consumer preferences, Latent Class Segmentation was conducted using data from Studies 1 and 2. Five distinct consumer segments were identified, with the results displayed in Table 3. Each segment was given a descriptive name based on overall preferences or fish consumption frequency. The first consumer segment ("The green consumers") showed a clear preference for the environmental attribute in both studies, with eco-labels being the most important attribute for this segment in Study 1 (45.77%) and sustainability tags the most important attribute for the segment in Study 2 (40.86%). A more detailed analysis of the attribute importance scores by consumer segments is given in Table 3. It reveals that sustainability tagging was always one of the three highest attributes in terms of importance score.

(Insert Table 3 here)

Appendix A shows part-worth utility scores by consumer segments that have been rescaled to allow for comparability. While all segments showed higher utility from salmon with the sustainability tag than without it, the strength of utility differed between segments.

4 Study 3 - Sustainability tagging and the MSC eco-label

Studies 1 and 2 suggest that consumers deem both the MSC label and the sustainability tag as important when evaluating fish fillets. However, it is not known whether they are willing to pay more for fillets with either an eco-label or a sustainability tag attached next to the product. Although eco-labels give consumers the opportunity to consider sustainability when

making food choices, their influence depends on whether consumers are aware of them and understand their meaning (Grunert et al., 2014). Research also shows that consumers rely more on easy-to-process information at the point-of-sales, such as simple heuristics or cues (see e.g., Nikolova & Inman, 2015). Additionally, we performed a pilot study showing that only a few consumers could identify any certified eco-labels. Therefore, we performed Study 3 to examine if people are willing to pay more for fillets with a sustainability tag compared to fillets with an eco-label and whether they feel more familiar with a sustainability tag than with an eco-label. Further, consumers who exhibit stronger green shopping values should value eco-labels more than their peers who are less interested in such consumption. We also investigated the potential interaction between the signal type (eco-label vs. sustainability tag) and perceived familiarity on willingness to pay for products.

4.1 Methodology

4.1.1 Sample, design, and procedure

Sample. We performed a stochastic power simulation in R (Bolker, 2007) to estimate the sample size needed to achieve a power of .95 to detect differences of a small magnitude corresponding to Cohen's $d = 0.20$, with alpha set to .05. This procedure suggested that 400 participants were necessary. Thus, we recruited 399 US participants (226 women, $M_{age} = 35.9$ years, $SD = 11.8$) through Prolific, an online platform primarily designed for academic purposes. All participants had a submission approval rate of 95% or higher.

Design and procedure. Study 3 used a between-within subjects design. After accepting a consent form, participants were assigned to either of the two conditions (MSC label vs. sustainability tag). We instructed them that the study consisted of several tasks. They had to state how much they would pay for a pound of a presented fish fillet in the first task. In order to avoid suspicion, they indicated a willingness to pay for four fillets

accompanied by either a sustainability signal (eco-label or sustainability tag) and four fillets

without any sustainability signal. Following this, they evaluated either the MSC label or the

sustainability tag on several scales, as described below. Next, participants stated how familiar

they were with the eco-label and the sustainability tag and how much extra they would pay

for seafood with their assigned label/tag. Additionally, they filled out the GREEN scale

(Haws et al., 2014). Finally, they filled out one attention check question and provided

demographic data. To mitigate the order effects, we divided the study into three blocks and

randomized the order of tasks within each of them.

4.1.2 Materials and measures

Materials. Studies were designed in PsyToolkit (Stoet, 2010, 2017). We used salmon fillet

images with the MSC label or the sustainability tag from conjoint Studies 1 and 2. To

increase the choice's realism and minimize the risk of participants guessing the hypothesis

concerning the effects of signal type on WTP they saw three attributes under each fillet:

country of origin, whether the fish was wild caught or farmed, and whether it was fresh or

frozen. The only difference between the two conditions (fillets with MSC label vs.

sustainability tag) was the sustainability signal that participants evaluated.

      Measures. Participants stated a willingness to pay for a fillet with either the MSC

label or the sustainability tag or with no sustainability signal on a sliding scale ranging from

$0 to $25, with $0.1 intervals. They filled out several scales measuring how they perceived a

brand selling products with either signal. Specifically, they stated an attitude toward a brand

selling products with either signal on a 4-item scale (Nan & Heo, 2007), anchored

dislike/like, *unfavorable/favorable*, *negative/positive* and *socially irresponsible/socially

responsible*. Brand integrity was measured on a 5-item scale (Venable et al., 2005), anchored

at 1 = *not at all descriptive*, and 5 = *very descriptive*. Here, we removed one item that was not

suitable for our study as it measured past experiences with the brand. Brand trustworthiness was measured on a 15-item scale (Erdem & Swait, 2004), anchored at 1 = *disagree*, and 9 = *agree*. Green consumption values were measured on a 6-item GREEN scale (Haws et al., 2014), anchored at 1 = *strongly disagree*, and 7 = *strongly agree*. Additionally, participants stated how much (if anything) extra in percentages they would pay for seafood with the MSC label and the simple sustainability tag on a sliding scale ranging from 0% to 100%, with 1% intervals. They stated familiarity with the MSC label or the sustainability tag on a sliding scale anchored at 0 = *Not at all familiar*, and 100 = *Very familiar*, with 1-point intervals. As an attention check, we asked them for the name of their president or prime minister. The study concluded by providing Prolific ID and demographic data - sex and age.

4.1.3 Results

Willingness to pay: To corroborate findings from the earlier studies where we applied a conjoint analysis, we tested whether consumers would be willing to pay more for fillets with a sustainability tag than for fillets with the MSC eco-label (see Appendix B, for a distribution of responses and an overview of dependent measures). We created an index by averaging responses to the four questions measuring willingness to pay for fillets (α = .95). A two-tailed independent samples t-test revealed that participants were willing to pay more for fillets with a sustainability tag than for fillets with the MSC eco-label ($M_{\texttt{eco-claim}}$ = \$7.65, SD = 4.36, CI_{95} = [7.03, 8.28]; $M_{\texttt{MSC-label}}$ = \$6.51, SD = 3.74, CI_{95} = [6.00, 7.02]), $t(397)$ = 2.81, p = .005, d = 0.28 (small-to-medium effect size, Cohen, 1988). We supported these findings with additional analysis, where participants stated how much more in percentages they would pay for products with either sustainability signal. Specifically, participants who were evaluating the sustainability tag (vs. MSC label) stated that they would pay more for seafood with this signal ($M_{\texttt{eco-claim}}$ = 23.13%, SD = 22.45, CI_{95} = [19.92, 26.34]; $M_{\texttt{MSC-label}}$ = 17.55%, SD

= 18.61, CI$_{95}$ = [15.01, 20.09]), $t(397)$ = 2.71, p = .007, d = 0.27 (small-to-medium effect

size, Cohen, 1988).

The mediating effect of familiarity on WTP: The results above suggest that consumers

were willing to pay more for fillets with a sustainability tag, and they felt more familiar with

this sustainability signal than with the MSC eco-label. Therefore, we investigated if such an

increase in WTP as a response to adding a sustainability tag (vs. the MSC eco-label) was

partially explained by a higher perceived familiarity with the tag (H2). We performed a

mediation analysis where we treated condition as a predictor, label/signal familiarity as a

mediator, and willingness to pay for fillets with sustainability signals as a dependent variable

(see Figure 2). The analysis was performed with the "mediation" package for R (Tingley et

al., 2014). This package provides Average Causal Mediation Effects (ACME), Average

Direct Effects (ADE), combined indirect and direct effects (Total Effect), and the ratio of

these estimates (Prop. Mediated). Nonparametric bootstrap confidence intervals were

obtained with 50,000 simulations. We report the standardized coefficients below. As Figure 2

indicates, label familiarity accounted for a significant proportion of variance (ACME = -0.14,

p = .015, CI$_{95}$ = [-0.25, -0.03]; ADE = -0.14, p = .228, CI$_{95}$ = [-0.38, 0.09]; Total Effect = -

0.28, p = .005, CI$_{95}$ = [-0.47, -0.08]; Prop. Mediated = .48, p = .020, CI$_{95}$ = [.07, 1.83]), and

the findings are indicative of a full mediation supporting H3.

(Insert Figure 2 here)

Familiarity: Further, we tested the possibility that consumers felt more familiar with a

sustainability tag than with the MSC eco-label (H3). A two-tailed independent samples t-test

revealed that participants indeed felt more familiar with the sustainability tag than with the

MSC eco-label, supporting H3, (M$_{\texttt{eco-claim}}$ = 55.28, SD = 29.72, CI$_{95}$ = [51.03, 59.54];

M$_{\texttt{MSC-label}}$ = 26.02, SD = 28.99, CI$_{95}$ = [22.07, 29.97]), $t(397)$ = 9.95, p < .001, d = 1.00

(large effect size, Cohen, 1988). Next, to test the robustness to our findings, we fitted a linear

model with label/signal familiarity as a dependent variable; condition, green consumption values, and their interaction were treated as predictors. The main effect of condition was robust to the inclusion of green consumption and its interaction with condition, $b = -24.27$, $SE = 12.08$, $t = -2.01$, $p = .045$. Green consumption predicted label/signal familiarity, $b = 7.53$, $SE = 1.71$, $t = 4.40$, $p < .001$, meaning that people who deemed themselves as shopping in a more pro-environmental way felt more familiar with sustainability signals. Crucially, the interaction term was nonsignificant ($p > .72$), meaning that more pro-environmental consumers felt more familiar with both the MSC eco-label and sustainability tag, despite the latter being a non-existent certificate.

Brand integrity, attitude, trustworthiness, and green consumption values: We found no differences between conditions in brand attitudes, perceived brand integrity, and brand trustworthiness toward brands selling products with the MSC label and the sustainability tag (all $ps > .43$). In both conditions, participants reported the same levels of green consumption values ($p > .35$).

Green consumption values and willingness to pay for either label/signal: Finally, we tested the hypothesis that consumers who deemed themselves as shopping more sustainably were willing to pay more for fillets with the MSC eco-label than their peers who put a lower value on sustainable shopping practices (H4). First, we created an index by averaging responses to the 6-item measure of green consumption values ($\alpha = .92$). Then, we tested if the willingness to pay for fillets with the eco-label or the sustainability tag interacted with green consumption values. Specifically, we fitted a linear model with willingness to pay as a dependent variable; condition, green consumption values and their interaction were treated as predictors. Additionally, to increase the robustness of our findings, we controlled for familiarity with the eco-label/signal. We found the main effect of condition: participants were willing to pay less for the MSC-labeled fillets than for fillets with a sustainability tag: $b = -$

5.08, *SE* = 1.72, *t* = -2.96, *p* = .003. Further, we found the main effect of familiarity, which was positively related to willingness to pay: *b* = .02, *SE* = .01, *t* = 2.11, *p* = .035. Importantly, and consistent with our predictions, the interaction between condition and green consumption was significant: *b* = .86, *SE* = .32, *t* = 2.66, *p* = .008. To investigate the nature of this interaction, we performed simple slopes analysis that revealed no significant effect of green consumption on WTP in the sustainability tag condition (*p* > .54), but a significant positive effect in the MSC label condition: *b* = .71, *SE* = .22, *t* = 3.22, *p* < .001, thus rejecting H4.

(Insert Figure 3 here)

4.2 Discussion

Both willingness to pay measures indicate that consumers are willing to pay more for products that are marked with a sustainability tag than with the MSC label. Interestingly, participants felt more familiar with the sustainability tag, despite this signal being fictitious. The full mediation model suggests that a higher willingness to pay for fillets with the sustainability tag was driven by perceived familiarity with such a sustainability signal. Notably, more pro-environmental (green) consumers felt more familiar with both the sustainability tag and the MSC label, suggesting that they cannot distinguish between real sustainability certificates and more simple tags signaling that a product is environmentally sustainable. These results indicate that retailers who wish to use eco-labels to promote their products need to focus on familiarizing consumers with these eco-labels. This idea may be especially true in the case of the MSC label and consumers who are unconcerned about pro-environmental shopping; these consumers were willing to pay less for fish with a MSC label than other consumers who were keener on green consumption (see Figure 3).

5 General Discussion and Conclusions

The aim of the current research was to extend the sustainability retail marketing literature from the perspective of signaling theory, to add to the knowledge about the effectiveness of sustainability tagging - compared to eco-labeling - on consumer preferences and willingness to pay. We also studied the size and utility of the green consumers' segment, defining them as consumers who place a high importance on the sustainability of the seafood they purchase. We performed two conjoint studies (Studies 1 and 2), focusing on the multi-attribute aspect related to purchase of seafood. A third, experimental study compared consumers WTP based on sustainability tagging and eco-labeling. The findings, in line with the empirical generalizations (EG1-4), research expectations (RG1-3) and formal hypotheses (H1-4), show that sustainability signaling is important regarding consumer preferences and WTP: The importance score and utility for the sustainability signal was higher in the conjoint study using a green sustainability tag than in a similar study using an eco-label. The green consumer segment was also larger in Study 2 (sustainability tag) than in Study 1 (eco-label). Study 3 showed that WTP was higher when seafood was marked with a sustainability tag than with an eco-label. Results from Study 3 additionally suggest that WTP was mediated by the perceived familiarity with a sustainability signal. Interestingly, consumers felt more familiar with a sustainable tag than with an eco-label. Finally, WTP for fillets with a sustainability tag was unrelated to green consumption values captured by the GREEN scale (Haws et al., 2004). However, green consumption values were positively related to WTP for fillets with an eco-label (MSC).

5.1 Research contribution

Limited research has been performed on the effects of sustainability signals on consumer choice, besides eco-labels. Sustainability tagging, a practice that seems to be growing among online retailers, is grossly underrepresented in research. This current research fills that gap by

testing and comparing these two types of signals, and the results strongly indicate that sustainability tagging can be used by retailers to increase preferences and higher WTP towards sustainable products beyond the effects of eco-labels.

5.2 Practical implications

Given that consumers were more familiar with a sustainable tag than with an eco-label, our results show that many consumers have limited knowledge of third-party eco-labels, such as the MSC label, despite their long-time existence in the retail environment. This finding is in accordance with previous studies showing that consumers have a rather limited understanding of what the MSC label stands for (e.g., Feucht & Zander, 2014; Chen et al., 2015). Many consumers instead seem to trust their retailer and are not consciously looking for an eco-label on fish products (Feucht & Zander, 2014). Bearing in mind that the availability of eco-labels only leads to their use if accompanied by consumer understanding (Grunert et al., 2014), this might also provide some explanation for our findings. As the last link in the total value chain, retailers can choose to look more holistically at the sustainability of individual items in their product range and as such go beyond what is communicated through the MSC and ASC eco-labels. For example, producers often use air freight to transport fresh seafood to more distant markets. The company Bakkafrost in the Faroe Islands, for example, is setting up its own airline to transport fresh salmon to the US (McDonagh, 2021). The local competitor considers this to be unethical as air freight doubles the emissions at the end of the value chain for farmed salmon that otherwise has a low carbon footprint compared to other proteins (Bøhren, 2021).

It was plausible that consumers putting a higher value to green consumption would pay less for fillets with a sustainability tag (and more for MSC-labeled fish) than consumers who are uninterested in such consumption. In contrast to this prediction, we found no effect

of green consumption on willingness to pay for fillets with a sustainability tag. However, we found a positive link between green consumption and willingness to pay for fillets with the MSC label. We might attribute this to consumer understanding. Understanding enables the more motivated consumers to utilize eco-labels in a meaningful way (Grunert et al., 2014), while the simplicity of the sustainability tag makes this signal more easily processable for less motivated consumers (see e.g., Nikolova & Inman, 2015). Given that consumers were generally willing to pay more for fillets with the sustainability tag, these results indicate that it may be beneficial to use sustainability tags in an online retail environment to inform and affect consumers who are uninterested in pro-environmental shopping in particular, but also for consumers in general.

Study 3 conveys critical implications for retailers. We found that the willingness to pay for salmon fillets with the sustainability tag was 30% higher than the willingness to pay for fillets with the MSC label. Our findings therefore provide preliminary evidence that a sustainability tag may be more efficient than a more complex MSC label in online food retailing. Considering the impact of the sustainability tag, it is likely that retailers can benefit from adding this sustainability tag to products in their assortment that already have the MSC label. Eco-labels placed on the seafood packages themselves are not particularly visible in online retail environments. As online buyers cannot physically pick up a product and examine whether its packaging conveys sustainability information, sustainability needs to be communicated by online retailers in close vicinity to product images – either as product information or through marketing signals. According to our findings, it might be effective to signal sustainability online by using a simple green sustainability tag stating that a product is environmentally sustainable for this purpose.

This research showed that online retailers have a role in assisting the consumption of sustainably sourced fish in a similar way to how brick-and-mortar retailers can influence

consumers to buy more eco-friendly products (Guyader et al., 2017; Sorensen, 2017). A sustainability tag is an actionable attribute, which is cheap and easy for retailers to apply in online stores to influence consumer choice. Retailers should take advantage of these findings and use tags in their online stores. A sustainability tag on product pictures that can be seen when consumers browse through product categories reduces the effort needed to identify sustainable products, thus increasing the chances of consumers buying sustainably sourced fish.

Since sustainability tags are easy to make and bear no cost for the online retailer, there is always a risk that some retailers use them for the purpose of greenwashing. It is therefore essential for responsible long-term effectiveness that retailers use this signaling technique only when there is an actual accreditation behind the sustainability signal.

5.3 Limitations and future research

Research has identified price as a barrier to fish consumption (Verbeke & Vackier, 2005). At the end of the studies, respondents were given the chance to share comments or thoughts on the subject of the study. A few respondents noted that the price of the salmon had been high. Although these were only a handful of respondents, an overall high price might explain why price was found to be the most important product attribute in both studies while price has usually not been the most important product attribute in similar choice studies (see e.g., Sigurdsson et al., 2020; Claret et al., 2012). Furthermore, the conditional relationship of price and procurement method made it impossible to interpret the utility scores of farmed and wild caught fish. A number of respondents commented and stated a preference for either farmed or wild caught fish. Some respondents included an explanation of their preference, which often related to either environmental reasons or health benefits. With the increasing global supply

of farmed fish, it would have been interesting to obtain reliable utility scores for wild caught and farmed fish.

Unlike many other CBC analysis research projects, the choice tasks in the studies were formatted to look like online stores, giving respondents a more realistic experience than seen in other similar research. Nonetheless, respondents were not shopping for salmon in reality and might therefore behave differently when they do their actual grocery shopping online. It is therefore important that the effect of sustainability cues can be tested further in real online stores. Furthermore, a similar study could be conducted in a brick-and-mortar setting, displaying sustainability tags on either product packaging or on shelves. Lastly, future research should test the effect of sustainability tags and eco-labels side by side in the same study to confirm if tags really are more effective quality cues than eco-labels. Lee, Bae, et al. (2020) showed in their study that purchase intention was highest when sustainable label and traceability information were provided simultaneously. Further experiments, building on their contributions and our current research, could similarly test different combinations of sustainability labels, tagging and traceability.

The results have economic value as well as positive implications for society and the environment. If the simple act of tagging a sustainable product appropriately can increase the consumption of sustainably sourced products, everybody benefits.

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Table 1

Attributes and levels for Studies 1 and 2

Attribute name	Attribute description	Attribute levels	Examples of references
Product origin	Refers to the fish product's geological origin. Fish of domestic origin is typically preferred over imported fish and is perceived by consumers to be of higher quality.	Alaska Iceland Japan Norway Scotland	Birch et al. (2012) Claret et al. (2012)
Procurement method	Indicates how the product was produced. Research indicates that wild caught fish is preferred over farmed, although the majority of fish consumed globally is farmed.	Wild Farmed	Claret et al. (2012) Jaffrey et al. (2004)
Purchase state	Refers to the state of the fish product at the point of purchase. Consumers have been shown to associate fresh fish with better taste and nutritional value.	Fresh Frozen	Birch et al. (2012) Carlucci et al. (2015)
Price	Indicates the cost of the salmon fillets.	Low Medium High	Verbeke & Vackier (2005) Verbeke et al. (2008)
Eco-label[a]	MSC or ASC eco-label, confirming the product is sustainable with minimal environmental impact.	Present Not present	Bronnmann & Asche (2017) Chen et al. (2015) Olesen et al. (2010) Johnston & Roheim (2006)
Sustainability tag[b]	A green tag stating that the product was environmentally sustainable was pictured in the upper left corner of the product picture.	Present Not present	Sorensen (2017)

Note: The attributes *product origin, procurement method, purchase state* and *price* were used in both Studies 1 and 2. [a] The attribute *eco-label* was used in Study 1. [b] The attribute *sustainability tag* was used in Study 2.

Table 2

Utility estimates and attribute importance scores from Studies 1 and 2

Attribute	Levels	Utility estimate Study 1	Utility estimate Study 2	Standard error Study 1	Standard error Study 2	Importance score (%) Study 1	Importance score (%) Study 2
Product origin	Alaska	31.24	32.03	0.60	0.62	20.11	19.33
	Iceland	11.71	7.11				
	Japan	-29.83	-25.32				
	Norway	2.23	0.08				
	Scotland	-15.35	-13.89				
Procurement method	Farmed	15.70	14.65	0.56	0.55	25.71	24.13
	Wild	-15.70	-14.65				
Purchase state	Fresh	13.11	12.52	0.33	0.33	8.85	8.06
	Frozen	-13.11	12.52				
Price	Low	58.56	53.70	0.60	0.58	30.05	28.33
	Medium	7.68	7.06				
	High	-66.24	-60.76				
Eco-label	Present	34.35	n/a	0.52	n/a	15.28	n/a
	Not present	-34.35					
Sustainability tag	Present	n/a	44.44	n/a	0.60	n/a	20.14
	Not present		-44.44				
None		-7.79	-28.72				

Table 3

Attribute importance scores (%) by consumer segments, Studies 1 and 2

Attributes	Segment 1	Segment 2	Segment 3	Segment 4	Segment 5
	Green consumers	Consumers ready to spend	Reluctant fish consumers	Frequent fish consumers	Thrifty consumers
Product origin Study 1	6.76	43.29	37.26	20.20	5.01
Product origin Study 2	6.75	39.03	60.14	12.91	5.36
Procurement method Study 1	16.07	0.10	7.31	43.51	35.56
Procurement method Study 2	19.46	9.80	4.25	46.09	37.67
Purchase state Study 1	5.46	15.22	6.23	6.65	4.63
Purchase state Study 2	4.29	13.26	0.81	6.84	3.90
Price Study 1	25.93	11.86	39.18	17.90	50.11
Price Study 2	28.63	3.51	21.33	20.24	46.32
Eco-labels	45.77	29.52	10.03	11.75	4.68
Sustainability tag	40.86	34.41	13.48	13.92	6.75
Segment sizes (%) Study 1	13.0%	31.6%	10.4%	17.3%	27.7%
Segment sizes (%) Study 2	20.7%	32.7%	10.4%	14.1%	22.0%

Figure 1

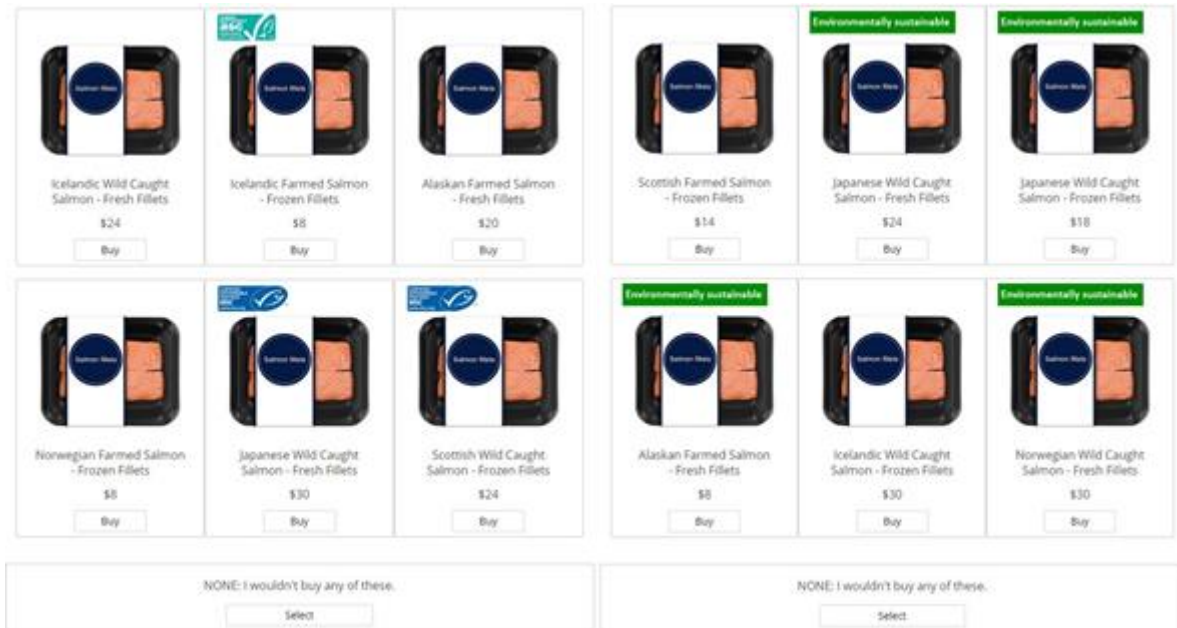*Examples of the two choice tasks from Study 1 (left) and Study 2 (right)*

Figure 2
Mediation model with standardized coefficients

$\beta = -0.89, p < .001$ Familiarity $\beta = .15, p = .006$

Label type   WTP ($)

Direct effect, $\beta = -0.14, p = .228$

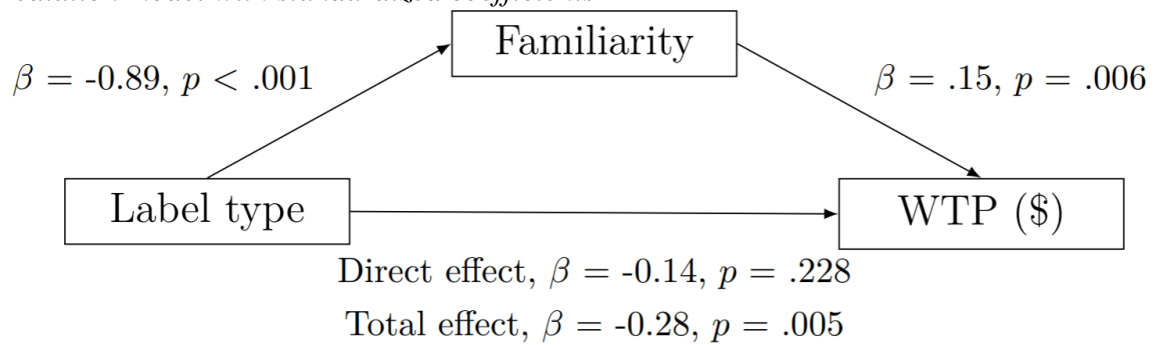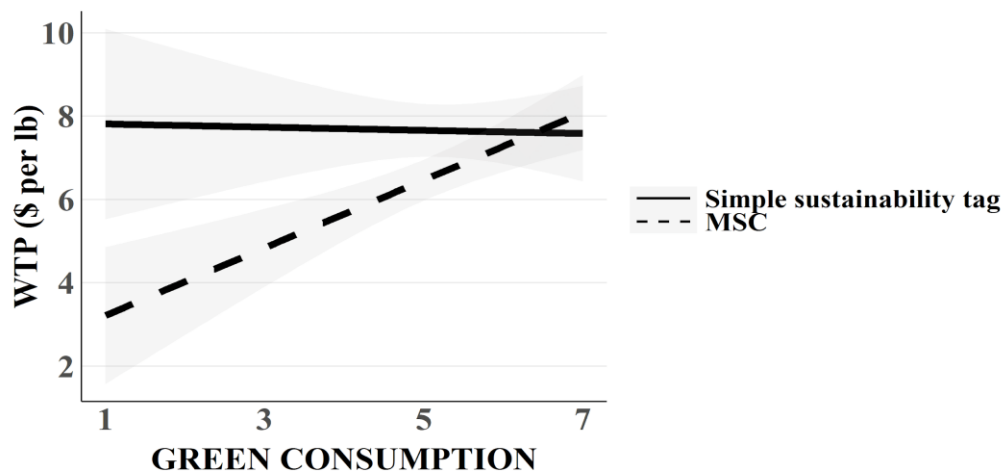Total effect, $\beta = -0.28, p = .005$

Figure 3
The effects of the interaction between condition and green *consumption on the WTP*

Appendix A
Utility estimates for attribute levels by consumer segment, Studies 1 and 2

Attributes	Levels	Segment 1 Green consumers Study 1	Segment 1 Green consumers Study 2	Segment 2 Ready to spend Study 1	Segment 2 Ready to spend Study 2	Segment 3 Reluctant fish consumers Study 1	Segment 3 Reluctant fish consumers Study 2	Segment 4 Frequent fish consumers Study 1	Segment 4 Frequent fish consumers Study 2	Segment 5 Thrifty consumers Study 1	Segment 5 Thrifty consumers Study 2
Product origin	Alaska	16.43	13.69	143.81	117.97	104.42	203.62	46.14	27.78	15.14	17.18
	Norway	1.79	2.19	-29.23	9.46	-29.15	-18.30	11.41	-0.04	0.48	-9.60
	Japan	-13.15	-20.06	-68.00	-47.38	-81.90	-50.80	-54.85	-36.77	-9.71	-6.04
	Iceland	12.30	10.18	26.09	-2.90	8.41	-37.45	15.27	13.03	3.66	5.82
	Scotland	-17.37	-6.00	-72.66	-77.16	-1.77	-97.06	-17.97	-3.99	-9.92	-7.35
Procurement method	Wild caught	-40.19	48.66	-0.25	-24.49	-18.27	10.62	108.77	-115.23	-88.89	94.19
	Farmed	40.19	-48.66	0.25	24.49	18.27	-10.62	-108.77	115.23	88.89	-94.19
Purchase state	Fresh	13.65	10.73	38.06	33.15	15.57	2.03	16.61	17.10	11.59	9.74
	Frozen	-13.65	-10.73	-38.06	-33.15	-15.57	-2.03	-16.61	-17.10	-11.59	-9.74
Price	Low	60.13	64.69	16.26	6.69	102.71	53.59	47.27	49.87	119.07	116.35
	Medium	9.39	13.77	21.52	4.14	-9.55	-0.54	-5.03	1.44	12.42	-1.11
	High	-69.53	-78.46	-37.78	-10.84	-93.17	-53.05	-42.24	-51.31	-131.49	-115.24
Eco-labels	Present	114.44	n/a	73.80	n/a	25.07	n/a	29.37	n/a	11.71	n/a
	Not present	-114.44	n/a	-73.80	n/a	-25.07	n/a	-29.37	n/a	-11.71	n/a
Sustainability tag	Present	n/a	102.16	n/a	86.02	n/a	33.69	n/a	34.80	n/a	16.88
	Not present	n/a	-102.16	n/a	-86.02	n/a	-33.69	n/a	-34.80	n/a	-16.88
None		64.56	31.38	-315.20	-473.10	284.64	324.09	49.83	78.73	81.59	96.54

Appendix B
The main effects of WTP and familiarity