Eco-score labels on meat products: Consumer perceptions and attitudes towards sustainable choices

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A B S T R A C T

Non-profit organisations have developed labelling strategies to communicate the environmental impact of food products, helping consumers make more informed purchase decisions. The evidence on whether environmental food labelling can change behaviours toward environmental meat choices is unclear, due to context factors within shopping environments and differences in attitudes towards meat and the environment. This study investigates attitudes towards an eco-score label on meat products by measuring the influence of meat and environmental attitudes and identifying drivers and barriers through a mixed-methods design. An online questionnaire (N = 255) posed questions concerning meat consumption, label perceptions, and use intentions. Recruitment was via convenience sampling under the criteria of UK dweller, omnivorous diet and over 18 years of age. Nine semi-structured interviews explored the drivers and barriers for intended use through thematic analysis. Perceptions Scores (PS) and Purchase Intention (PI) scores of the label were positive. Results showed an individual's Meat attachment (affinity) score (MAAS) negligibly influenced PS but provided a moderately negative relationship with PI. Environmental label use and attitudes positively influenced PS and PI. The qualitative data identified label design and concept perceptions as drivers for use, whereas habitual shopping behaviours and perceived price were barriers. The research contributes to the transtheoretical model of behavioural change, identifying that 58% of participants contemplate label use but require more information. Explanations found for the gap between positive perceptions and low behavioural intentions support this, as poor label awareness and knowledge of the environmental impact of meat production were highlighted.

1. Introduction

The negative impact of livestock production in the UK is evident, with ruminant meat causing the greatest harm, mainly from methane emissions and demanding the highest volumes of land and water (FAO, 2013; González, Marquès, Nadal, & Domingo, 2020; UK Government. (2021), 2021). To mitigate the environmental burden of current UK diets, the UK Climate Change Committee (2020) advises the UK government to reduce beef, lamb and dairy consumption by 20% by 2030. In addition, the recent government food strategy objective to reduce greenhouse gas (GHG) emissions and the food system's environmental impact is linked to the government's ambition for net-zero commitments and biodiversity targets (GOV.UK, 2022).

Recently environmental profiling and labelling schemes have emerged from Non-Governmental Organisations (NGO) and private companies to communicate the ecological attributes of products to consumers (Djekic, Batlle-Bayer, Bala, Fullana-I-palmer, & Jambrak,

2021). Several systems exist to improve transparency and help consumers make informed choices however, there is no single method of calculation agreed among experts and researchers. For instance, the Product Environmental Footprint (PEF) approach calculates 16 environmental impact categories but excludes biodiversity and soil fertility and relies on supplier-specific data (European Commission, 2019). Whereas the 'Enviroscore' collects primary data from each party throughout the chain (Ramos, Segovia, Melado-Herreros, Cidad, Zufia, & Vranken, 2020). A further variation can be found under the 'eco-score' method that utilizes an average PEF value per product type based on secondary data from the Agribalyse database which eliminates competitive advantage for more environmentally produced products within the product category (WBCSD, 2021). The producer's certificates, origin, recyclable plastics and biodiversity are also considered though the value of certificates such as organic can be contested (De Bauw, Vranken, & Matthys, 2022).

In September 2021 Foundation Earth (FE) created and launched a

pilot eco-score labelling scheme using the 'Eco-Impact' method, providing a unified summary of carbon emissions, water usage, water pollution and biodiversity loss throughout the product life cycle (excluding consumer use and end of life) (Foundation Earth a., no date). Relying on primary data, a grade between good, A (dark green) to poor, G (dark red) is presented in a Traffic Light System (TLS) design (Fig. 1). The final grade is specific to the manufacturers' and farmers' production practices, reflecting the true environmental impacts while providing a comparison of different products found within the same food type (De Bauw et al., 2022). Since the current study, FE has adopted a PEF base scoring system utilising a 'cradle-to-grave' Life Cycle Assessment (LCA), considering various factors such as preparation, consumer food waste, and end-of-life emissions and translating a single score of all 16 environmental impact categories into the A + to G label design (Foundation Earth b., 2023).

The International Organisation for Standards (2018) ISO 14024:2018, advises that eco-labelling should be accurate, not misleading and encourage consumption that would cause less environmental stress. The transparent, scientifically robust label by FE meets this standard and could play a vital part in reducing the environmental harm of meat production and release a shift in consumption towards a more sustainable diet. However, promoting organic production practices and sourcing local ingredients with low food miles have unhelpfully become totemic as environmental goals (Camilleri, Larrick, Hossain, & Patino-echeverri, 2019; Siegrist & Hartmann, 2019). Consumers often rely on these indicators to evaluate the ecological friendliness of food choices, while the actual environmental outcomes of other production factors are overlooked. Nevertheless, other studies have found that whilst organic labels are mainstream, they do not necessarily have high levels of trust and that a new colourful eco-labelling like the eco-score label could be more attractive to consumers (Sonntag, Lemken, Spiller, & Schulze, 2023; Janβen and Langen, 2017).

Consumer attitudes towards the environment can play a significant role in their willingness to use labels for determining product choice (Barker, Wong, Jones, & Russell, 2019; Bozowsky & Mizuno, 2004; Daugbjerg, Smed, Andersen, & Schvartzman, 2014; Petrescu & Vermeir, 2019; Zanoli, Naspetti, Janssen, & Hamm, 2015). However, the studies are based on organic labelling so any insight into the impact of eco-score labels is limited. Similarly, the few studies about the effect of food labels on meat choice are concerned with animal welfare (Nocella, Hubbard, & Scarpa, 2010). Nevertheless, experience of organic labelling emphasises the significance of trust, familiarity and confidence on food labels with sustainability claims (Camilleri et al., 2019; Edwards-jones, 2021; Potter et al., 2021).

Comprehension of the label is also essential for consumer acceptance. Sirieix, Delanchy, Remaud, and Zepeda (2017) found that understanding current sustainability labelling is complicated and consumers preferred an interpretive label combining sustainability claims. This suggests that the eco-score label may help communicate and raise awareness more clearly than existing single-attribute eco-labels (D'Angelo, Gloinson, Draper, & Guthrie, 2020; LEAP, 2020; Vlaeminck, Jiang, & Vranken, 2014). Hallez, Qutteina, Boen, and Smits (2021) suggest that prior experience and familiarity with the nutritional TLS label may further assist with interpreting and adopting the eco-score

label TLS design. Furthermore, research into the effect of the nutritional label TLS design found that it increased the nutritional value of food choices (De Temmerman, Heeremans, Slabbinck, & Vermeir, 2021; Poquet et al., 2019).

In considering the shift in pro-environmental behaviours, such as eco-score label adoption for meat purchases, the Transtheoretical Model recognises that behaviours do not change instantly or decisively. The model assumes that changing behaviours is a continuous process through a cycle (pre-contemplation – contemplation – planning – action – maintenance – relapse) and that different public health and environmental interventions are more effective depending on each stage of the model (Prochaska & Velicer, 1997). Therefore, it is vital to note the stage of the process of an individual's or population's intentional change to determine the effectiveness of such interventions.

In the Attitude-Behaviour-Context model, the alignment of attitudes with trade-offs such as price, convenience, nutrition or brand can impede behaviours, regardless of attitudes towards sustainability (Guagnano, Stern, & Dietz, 1995). Grankvist and Biel (2007) provide support by finding that beliefs about the product characteristics, such as taste and price, predicted the purchase frequency of eco-labelled alternatives. In contrast, De Bauw et al. (2022) found that Eco-Scores were equally as important as price and localness for vegetable purchases. There is limited research specific to the influence of eco-labels on meat products and willingness to pay and follow-up from purchasing decisions.

Vermeir et al. (2020) suggest that eco-labels increase public awareness, influence values, and trigger goal intentions to lower meat consumption. However, Taufik (2018) finds that sustainability impacts are insufficient to change behaviour and willingness to reduce meat intake significantly. Pieniak, Aertsens, and Verbeke (2010) also find that perceptions can have a greater impact than factual information from labels.

In applying the Theory of Planned Behaviour, the Meat Attachment Questionnaire (MAQ) measures how social and cultural aspects (hedonism, entitlement, affinity and dependence) impact willingness and intentions to reduce meat intake, where higher meat attachment is associated with a lower desire to change (Graça, Calheiros, & Oliveira, 2015; Ortiz-luis, Biology, & Ortiz-luis, 2020). Meat is often associated with masculinity, status, pleasure and health, which is reinforced through traditions and community practices particularly, but not exclusively, in Western culture (Graça et al., 2016, 2019; Slade, 2018; Szejda, Urbanovich, & Wilks, 2020). However, findings are limited to the sample group tested as trends and values differ among cultures alongside varying availability of meat alternatives and exposure to informational interventions. Nonetheless, the research implies that meat attachment may inhibit the impact of eco-score label on changes to meat consumption.

While the eco-score label aims to promote informed food choices, behavioural science indicates that attitudes and beliefs are pivotal for adoption. Isolating the effects of an eco-label on consumer choice in the context of other factors such as price, taste and nutrition, social and cultural factors while testing within natural behavioural environments presents real challenges. Therefore, this research specifically focusses on whether factors such as Meat Attachment (MA) and purchase attitudes can impact consumers' behavioural intentions to adopt eco-score label and seeks to identify the main drivers and barriers to adoption.

2. Method

A sequential mixed method strategy was employed to collect primary quantitative and qualitative data through a survey and semi-structured interviews (Johnson & Christensen, 2014; Onwuegbuzie & Collins, 2007). The survey was used to explore attitudes towards the eco-score label (Fig. 1) and to examine the relationship between perceptions of meat and meat shopping, while the interviews gained rich insights into drivers or barriers into eco-score label adoption for meat purchases.
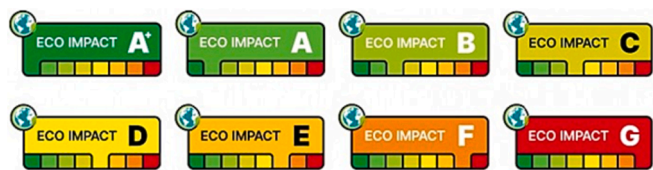

Fig. 1. The Foundation Earth Eco-Score label (Foundation Earth c., no date). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

2.1. Questionnaire

The questionnaire was created using Survey Monkey (Appendix a.) and distributed online via social media networks: Facebook, Instagram, LinkedIn and Next Door, with the potential of onward referral. The approach increased response rates and times in accessing a large, diverse sample and overcoming geographical boundaries while maintaining confidentiality and anonymity (Bell & Waters, 2014; O' Leary, 2017).

Firstly, the Meat Attachment Questionnaire (MAQ) by Graça, Calheiros, and Oliveira (2016) was amended to include four affinity statements related to environmental concerns toward meat consumption (Graça et al., 2016). A Meat Attachment Affinity Score (MAAS) for each respondent was calculated by summing the Likert scale numbers (1–5) reflecting the agreement levels, giving a score range of 5 (low MAAS) to 20 (high MAAS) (Appendix b). Questions then evaluated the influence of eco labels on past shopping behaviours (Joshi & Rahman, 2015). A ranking scale then assessed the importance of environmental friendliness compared with contextual factors (quality, nutritional information, ingredients list, brand familiarity, price and locally sourced) to allow for external determinants of purchasing decisions to be considered (Carrero, Valor, Díaz, & Labajo, 2021; Hoek, Malekpour, Raven, Court, & Byrne, 2021; Shuai, Ding, Zhang, Guo, & Shuai, 2014).

Respondents were presented with the FE eco-score label on meat products and meat alternatives with relevant background information. A Perception Score (PS) was calculated as the sum of familiarity, comprehension, trust and credibility. The PS ranged from 16 to 80, with higher numerical values indicating positive perceptions of the label. Hypothetical shopping scenarios then measured Purchase Intentions (PI) of eco-score label meat products (Aschemann-Witzel & Niebuhr Aagaard, 2014; Vermeir & Verbeke, 2006). The level of agreement with each scenario was also summed to provide a PI score ranging between 5 and 25. Finally, a multiple-choice question, incorporating the Transtheoretical Model of Behaviour Change (Pre-contemplation – contemplation – planning – action – maintenance – relapse), described participants' readiness to adopt environment-related or health-related behaviours (Culliford & Bradbury, 2020; Prochaska & Velicer, 1997).

Statistical Package for the Social Sciences (SPSS) version 27 was used to apply linear regressions to measure the influence of MAAS with PS (y = 46.94–0.37*x) and PI (y = 27.45–0.64*x). A non-parametric Spearman's Rank test was performed to determine the relationship between frequency of label use and environmental importance ranking with PS and PI.

2.2. Interviews

Twenty-two potential interviewees were identified from the survey respondents and invited to attend an interview based on their readiness to adopt the eco-score label (five per category, or if fewer than five, all). Nine interviews were completed with representatives from each behavioural stage (there were no volunteers from the participants who use the eco-score label confidently). An interview guide (appendix c.) was created that expanded on the themes from the survey. Interviews were conducted, recorded and transcribed in MS Teams. After checking transcript accuracy, thematic analysis was conducted within NVivo 1.5 through coding and developing a thematic framework. NVivo 1.5 organises unstructured text, audio and video data, saving time and improving efficiency of analysis (Wong & Li Ping, 2008).

3. Results

3.1. Quantitative phase

Of 315 total responses, 255 met the inclusion criteria of: adults over 18, resident in the UK and with an omnivorous diet. Responses that were inconsistent or completed in less than three minutes were removed for poor quality. The sample was comprised of 69% women and 31% men,

with 38.8% aged below 35, 41.6% between 35 and 54 years and 19.2% above 55 years. Respondents resided within Northern Ireland (76.1%), England (18.8%), Scotland (2.7%) and Wales (2.4%). Most had completed higher education, with 42.7% postgraduates or above and 25.1% undergraduates, while 22% were high school graduates, 6.3% obtained a trade qualification (6.3%), and 1.2% had completed school or obtained a diploma (Table 1.).

Table 1 also shows that meat is consumed in meals at least once a day by 37.3% of the sample, 41.6% consume 4–6 meals and 21.2% 1–3 meals per week. The YouGov (2022) UK food study (2021) similarly found that meat is consumed at least once a day (7 or more portions per week) by 37% and 41% a few times a week and 8% a few times a month. Table 2. shows that the average MAAS was 15.58 (SD 3.462, median 16) out of 20. The high MAAS implies that participants had low levels of repulsion or concern regarding meat consumption for ethical, environmental or health and safety factors.

The weighted average ranking of context factor importance is shown in Table 2. When considering the median and mode, the top 3 factors for meat purchases were quality (6.09 S.D.1.482, median 7, mode 7), purchasing locally (4.53 S.D.1.976, median 5, mode 6) and price (4.16, SD 1.89, median 4, mode 6) while environmental friendliness was one of the least important factors (3.28, SD 1.747, median 3, mode 3).

To establish the overall acceptability of the eco-score label among participants, presentation and comprehension, trust and credibility scores were combined to give individuals total PS between 16 and 80. Table 2. shows that the mean PS was 41.19 (S.D. 7.286) giving moderate perceptions towards the eco-score label. The PI score for using the eco-score label within hypothetical scenarios (Table 2) provided a mean PI of 17.40 (S.D. 4.575) out of a maximum of 25 which is moderately high. When looking at the individual statements measured for PI, Fig. 2.

Table 1

Socio-demographic and dietary characteristics of the sample population.

Socio-Demographic Attribute	Frequency (N = 255)	Percentage (%)
Location		
England	48	18.8
Northern Ireland	194	76.1
Scotland	7	2.7
Wales	6	2.4
Gender		
Female	175	68.6
Male	79	31
Prefer not to say	1	0.4
Age		
18–34	99	38.8
35–54	106	41.6
55+	49	19.2
Prefer not to say	1	0.4
Education		
Less than high school/college graduate, diploma or equivalent	3	1.2
High school/college graduate, diploma or equivalent	56	22
Technical qualification or trade certificate	16	6.3
Undergraduate	64	25.1
Postgraduate or above	109	42.7
Prefer not to say	7	2.7
The average number of meals containing meat per week		
1–3		21.2
4–6		41.6
7–9		20.0
10–12		9.8
13*		7.5

Table 2

Descriptive analysis (mean, mode median) of shopping factor important, eco-label use, MAAS and eco-score label perceptions (PS) and purchase intentions (PI).

	Weighted Mean	Median	Mode	Std. Deviation	Coefficients of Variance
Shopping factor importance					
1. Good quality*	6.09	7	7	1.482	24%
2. Local*	4.53	5	6	1.976	44%
3. Price*	4.16	4	6	1.89	45%
4. Nutritional information*	3.81	4	3	1.678	44%
5. Environmental friendliness*	3.28	3	3	1.747	53%
6. Ingredients list*	3.17	3	2	1.554	49%
7. known brand*	2.97	2	1	1.777	60%
Eco-Label use					
Place of origin**	3.04	2	1	1.001	33%
Animal welfare**	2.85	2	1	1.143	40%
Packaging**	2.22	3	2	1.163	52%
Organic**	2	3	3	1.099	55%
Environmental impact**	1.62	3	4	1.181	73%
Score Results					
Perception Score (PS) (16–80)	41.19	41	48	7.286	18%
Purchase Intention Score (PI) (5–25)	17.40	18	20	4.575	26%
Meat Attachment Score (MAAS) (5–20)	15.58	16	20	3.462	22%

Note: * 1 = least important 7 = most important.

** 1 = never 5 = always.

illustrates that positive messaging on meat products is more impactful than negative, with 79% (51% and 28%) reporting being encouraged by good eco-scores (A + -B) compared to 63% (23% and 40%) being deterred from purchasing poor eco-score (G).

Readiness to adopt the eco-score label for meat purchase decisions in Fig. 3. finds 58% reportedly in the contemplation phase of the transtheoretical behavioural change model, while 15% claimed to be in the planning phase (Prochaska & Velicer, 1997). At the time of the survey,

the label was still at an early stage of its roll-out; therefore, low familiarity may explain low label adoption (10% action and 2% maintenance) due to lack of previous exposure and opportunity. Meanwhile, 15% expressed no interest within the pre-contemplation stage, and 2% were reported to be in the relapse stage.

In Fig. 4. the visual evaluation of the plots, and the regression line of fit imply that there is a slight linear relationship showing that when a participant's MAAS (affinity attachment to meat) increased, their PS of the eco-score label decreased. The equation for prediction was y = 46.94—32 0.37x therefore, for every unit increase in MAAS value, PS points would decrease by 0.37 (0.63 to 0.11 95% confidence intervals). Whilst significant, the negative correlation of r (255) = 0.175, p 0.005, accounted for only 3.1% of the variance in outcomes for PS, which is a low causation (Cohen, 1988). This indicates that MAAS has a negligible influence on eco-score label PS among the study group.

The influence of MAAS and self-reported beliefs of using the eco-score label within hypothetical scenarios (Fig. 5.) also provided a negative linear relationship. Correlation was significant, r(255) = 0.488, p < 0.001; a unit increase of MAAS predicted a decrease of 0.64 (95% confidence intervals, 0.79 to 0.50) from PI points. The regression equation for predicting use from MAAS was y = 27.45–0.64x and 23.8% of the variance in intended label use is predictable from level of MAAS which is considered a moderate relationship (Frost, no date).

Table 3. illustrates how the perceived importance of the environmental friendliness of meat products was the only significant contextual factor influencing PS (0.161 p = 0.05) weakly and more pronouncedly, PI (0.423 p = 0.01) (Akoglu, 2018). Insignificant, weak negative relationships were identified for other contextual factors for PS and PI. Significant positive relationships were also found regarding eco-label use frequency on PS (p = 0.01) in Table 3.; 'Organic' (0.195), packaging (0.186), animal welfare (0.172) and environmental impact (0.311)) and for PI; 'Organic' (0.322), packaging (0.338), animal welfare (0.366) and environmental impact (0.431). A stronger influence on PI was observed for all eco-label types, with the frequency of using environmental impact labels having the strongest influence for both dependant variables. However, the 'Place of Origin' label use had a minimal and insignificant effect on both PS (0.090) and PI (0.075). This implies that perceptions of the eco-score label are unlikely to be determined by current shopping attitudes and self-reported behaviours but have more, yet also moderate to weak influence, on purchase intentions of using the eco-score label, apart from place of origin, which had the least influence (Akoglu, 2018).
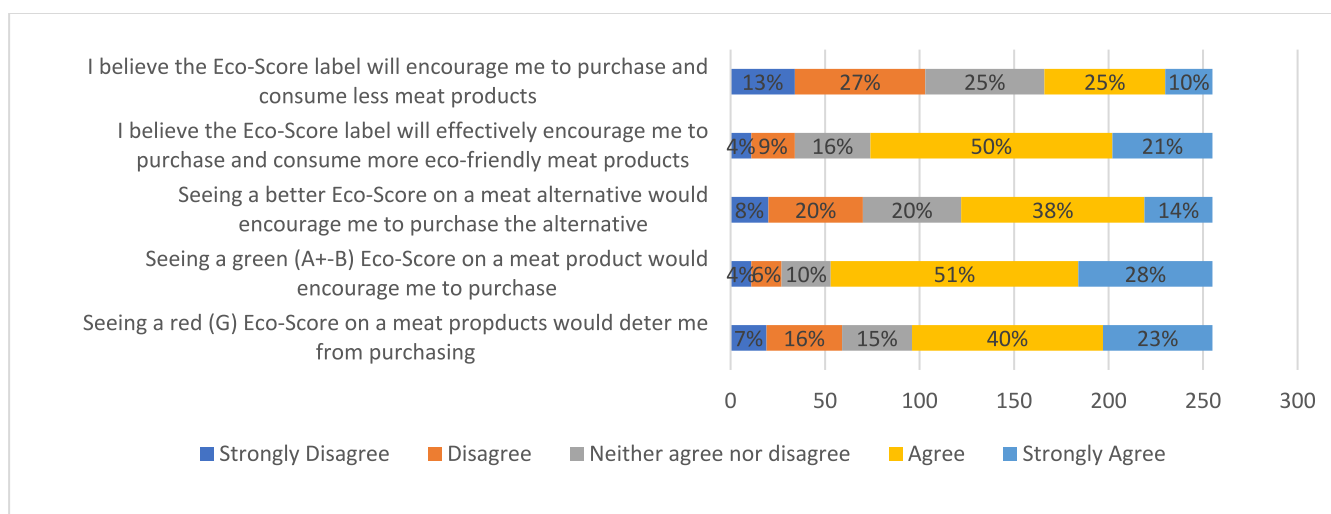

Fig. 2. Intended use of the label within hypothetical scenarios. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)
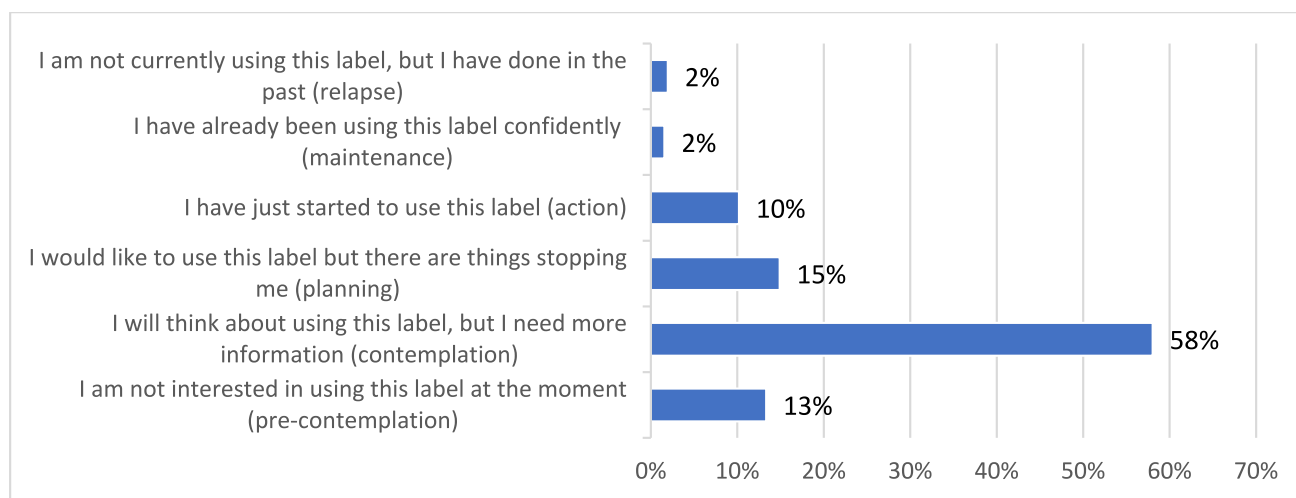
Fig. 3. Percentage distribution of self-reported interest in adopting the Eco-Score label.
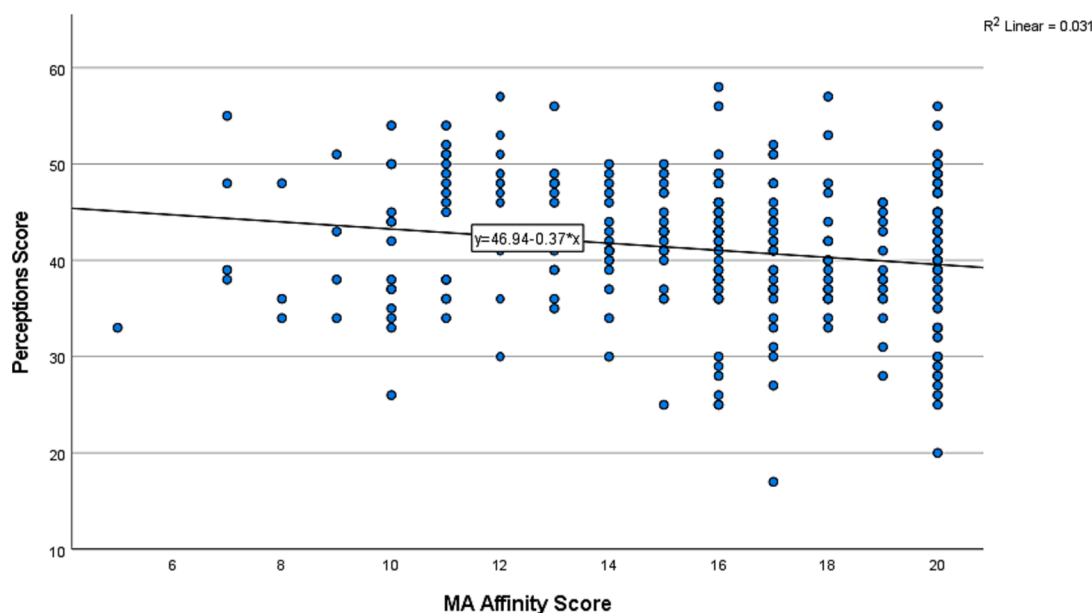

Fig. 4. Relationship between Meat Attachment (Affinity) Score (MAAS) and Perception Score (PS).

3.2. Qualitative phase

The thematic framework that emerged from the interview analysis is displayed in Fig. 6., highlighting (i) the key drivers (label concept, design, prevalence, awareness and knowledge) and (ii) the barriers (label design, prevalence, awareness and knowledge, habitual shopping and price).

3.2.1. The gap between label concept and adoption

All participants were supportive of displaying an eco-score on meat products. In addition, participants consistently agreed that communicating environmental impact information is essential and a helpful way for consumers to make informed decisions when purchasing meat products. Three respondents also believed that the concept makes consumers responsible for their choices, makes manufacturers accountable for production methods, and provides a positive nudge:

'I think it makes people and producers responsible, there's a bit of accountability built into it as well. I would imagine there's plenty of shortcuts when it comes to producing products' (Respondent G)

Nevertheless, two participants were sceptical with no interest in using the eco-score label with respondent A expressing *'I know what I need to do but I'm not going to do it…'*. Others such as respondent F suggested that the label is more likely to influence the purchase decisions of already environmentally conscious or younger consumers; *'I feel like you're more likely to if you are younger…I'm gonna look out for it more now' (Respondent F)*. The remaining participants did not report current use of the eco-score label, however, signs of contemplation or preparation for future use were shown by 7 out of 9 interviewees including respondent H saying *'I haven't changed my [shopping] behaviours, but I am more conscious that I want to change'* (Prochaska & Velicer, 1997). The drivers and barriers from Fig. 6 help explain the reasons for the gap identified between the concept acceptance and lack of action among the participants.

3.2.2. Mixed perceptions of label design

Participants found label design to be both a driver and a barrier. The seven who saw the TLS design as a driver compared it with more familiar existing labels, such as the nutrition TLS label, with some describing how the familiar, simple design aided use:
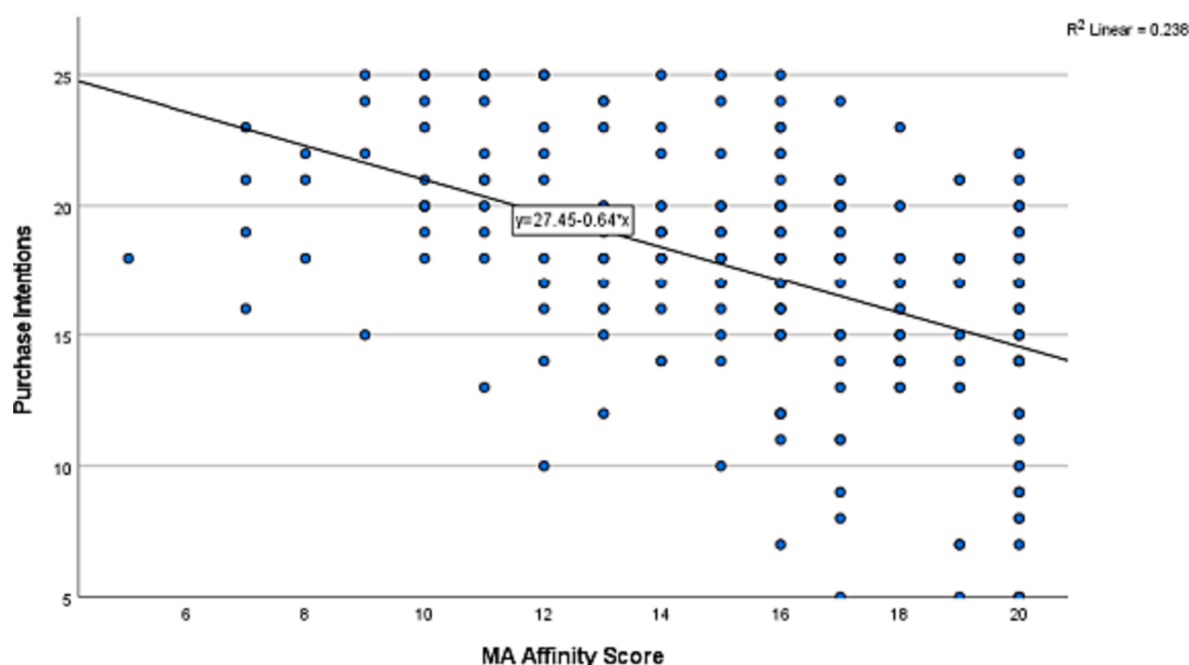
Fig. 5. Relationship between MA (Affinity) Score (MAAS) and Purchase Intentions (PI).

Table 3
Spearman ranks correlation coefficients of shopping attitude and habit variables with PS and PI.

Correlation Variables	Spearman's Rho	
Importance Ranking	**Vs PS**	**Vs PI**
Good quality	−0.049	−0.224
Nutritional information	−0.074	−0.035
Ingredients list	−0.065	−0.111
known brand	0.030	0.028
Environment	0.161*	0.423**
Price	0.071	−0.092
Local	−0.070	−0.022
Frequency of Label Use	**Vs PS**	**Vs PI Score**
Organic	0.195**	0.322**
Packaging	0.186**	0.338**
Animal Welfare	0.172**	0.366**
Environmental impact	0.311**	0.431**
Place of Origin	0.090	0.075

**. Correlation is significant at the 0.01 (2-tailed).
*. Correlation is significant at the 0.05 (2-tailed).

> *It's visually so striking. … I like the way visually… you've got that it just scales … A + down to the G … visually that's really, it's very quick to get that information across as opposed to anything else… (Respondent I)*

However, participants B and H cautioned that positioning the label beside similar FOP TLS nutrition labels could cause confusion, disliking the trade-off between both dimensions:

> *… it's [Nutrition TLS label] something that we're kind of probably familiar with … would it [Eco-Score label] get lost in amongst all of that as well maybe? where calories were green but the eco score was red… will it conflict with the other sort of scores (Respondent B)*

While most participants found that the information provided by colour-coding and grading was sufficient, participants B and E claimed that they did not understand the grades. When notified of the additional eco-score information on the back of the pack label (BOPL), participant B became more accepting of the label but expressed that they do not check BOPLs:

> *there's not really anything on the label to say what red actually means … nutritional labels are more scientific … I get that [nutritional TLS label] information and like I can make a more informed decision…… I do not actually pick up that product and turn it over as I don't look at like the backs of products…I didn't know that that information is on the back (Respondent B)*

In comparison, participant I adopted a more optimistic view believing that consumers do not question FOPL (front-of-pack labels) and therefore trust the 'face–value' without needing additional information. Other interview responses supported this view. Despite such differences, label design was found to be more of a driver rather than a barrier.

3.2.3. The role of habitual shopping and price as a barrier

Participants confirmed that purchasing the same products for (i) desired quality and satisfaction or (ii) to meet family's needs impedes noticing or using the eco-score label. The data shows that habitual purchases are associated with perceptions of quality (which corresponds with Table 2) and selecting familiar products was seen to save time.

> *I wouldn't really have time to look at the label…I go for the product I always go for and don't have time to stand and read the product labels when I know what I am getting. (Respondent A)*
> *We would be habitual shoppers…we just pick the same stuff every time…if the label isn't on it, we're not really going to see it unless we venture outside of our usual shopping basket. With kids, you become a creature of habit and gravitate to the exact same stuff. (Respondent G)*

Table 2 also shows how price was ranked as the third most important factor in purchase decisions and one that was often prioritised over the environment. Three participants also considered price the main priority over environmental impact, while others acknowledged that 'eco-friendly', 'environmentally conscious' or 'sustainable' products were perceived to be expensive.

> *the biggest selling point for me is gonna be the price … my assumption would be that if it's more like eco-friendly, it's probably gonna be more expensive. (Respondent E)*
> *This one got an A plus rating for the environment, but it's twice as expensive as the one beside it, which has got a D rating, but you know, the*
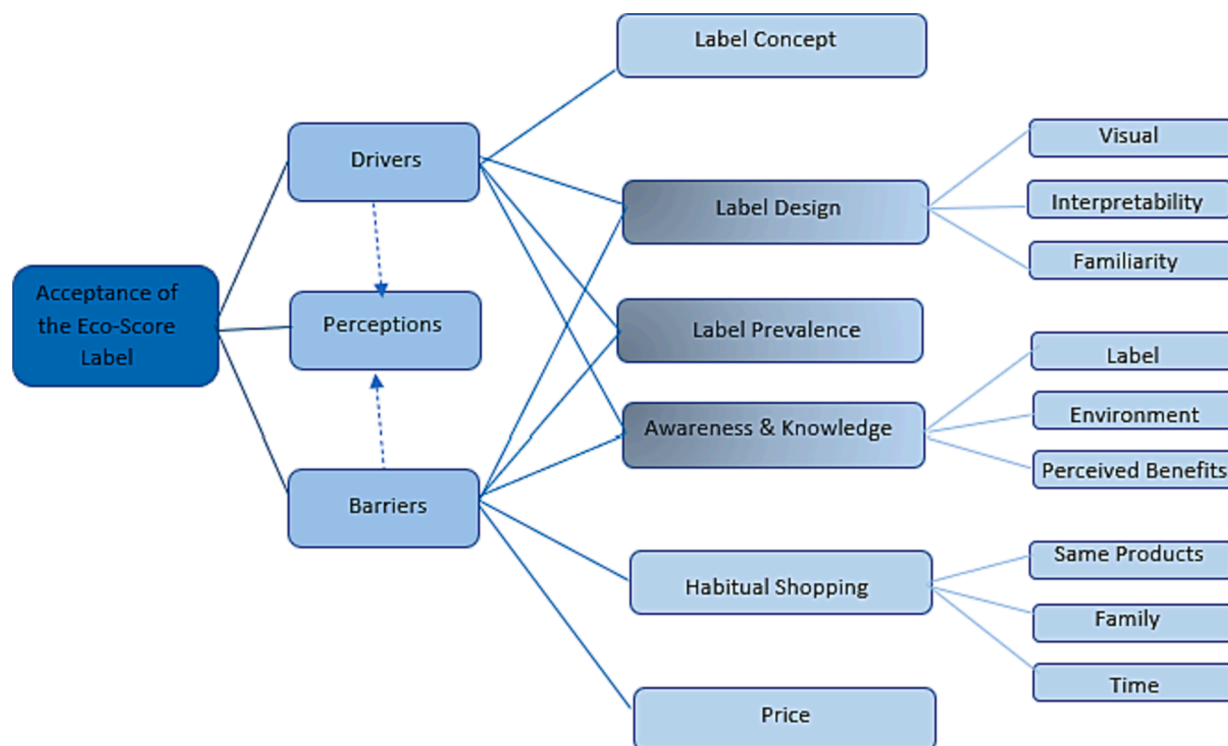
Fig. 6. The thematic framework displaying the key themes that emerged from each category within the transcripts, contributing to the acceptance of the Eco-Score Label.

D rating is in my budget… the label becomes debunked if we you need to factor in the parts that are more important to you. (Respondent F)

3.2.4. Participants' knowledge of factors affecting the eco-score label

Seven participants identified 'food miles' as the main component in the label rating. Four participants identified water, land use, emissions, and waste management. Other factors mentioned included packaging and animal welfare;

water usage and the impact on the lands, fuel and gas, and then transport of importing or exporting them, exporting that product to other countries. (Respondent B)

travel time from where they made this, to like it gets onto the shelves, I think that's taking their actual water needs of the animals … they will use gas like as well, like if we are talking about beef, I'm sure there will be the whole thing with gas (Respondent C).

Distance. You know, how far a product, is to having to go… we would use the butcher that is literally just around the corner… it doesn't have any eco-label, but it stipulates where the meats come on from … it's a local butcher, so. Yeah. We can't really falsify those things, so I will take distance. (Respondent G)

Many found it challenging to provide an answer regarding the environmental factors included within the label without being prompted with four participants confessing that they were not confident about the subject:

I wouldn't be a hundred percent on that… I tend to buy local. (Respondent A)

I don't really have an overall good awareness of like what does good farming look like or what does sustainable farming look like … I don't think there's enough awareness around it for me… (Respondent B)

The perceived importance of buying local meat among the interview participants mirrors the survey results; it was the second most important purchasing factor (Table 2.). Therefore, the responses indicate an unclear understanding of the component factors of the label and the

environmental impacts. Hence, improved awareness and knowledge were mentioned as essential to improve understanding which reflects the finding within Fig. 2 showing that 58% of survey respondents require more information to adopt the label. Interview participants elaborated: suggesting television and social media channels to educate themselves and the public, with two participants referring to the success of previous public health campaigns to reduce salt and sugar intakes:

…a public health campaign so, if there is universal information for everyone to kind of be like, 'right these labels [eco-score label] are important, and this is what it [eco-score label] means'…. they did a campaign around salt and sugar a couple of years back and it does make people aware … (Respondent B)

If I knew or had more information, I would… give a product a go… we need to just promote it and get it out on social media and maybe get the backing of like some people like… the Green Party… to help people be more conscious about the food, I mean there's loads of adverts on TV about… renewable energies and stuff… (Respondent D)

4. Discussion

This research found that participants' perceptions and purchase intentions were broadly positive towards eco-score label use. The majority of participants fell within the contemplation or planning phases of intended behaviour change for adopting the eco-score label. The survey found that environmental attitudes positively influenced perceptions and intended label use while MAAS negatively influenced intended use only (see Fig. 7). The survey responses showed that hypothetical context factors within shopping environments did not significantly influence views whereas the interviews identified price and habitual shopping behaviours as the principal barriers. Both methods found that design and concept were broadly acceptable however, improved awareness and knowledge of the label and subject are required for use among the study population.
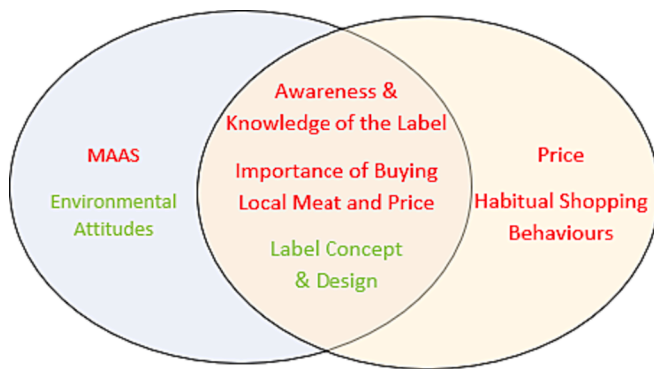
Fig. 7. The key quantitative (blue) and qualitative (yellow) and overlapping (blue and yellow) findings from the mixed methods approach showing the identified label use drivers (green) and barriers (red). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

4.1. Price and habitual shopping behaviours hinder label adoption

The quantitative results indicate that confounding factors commonly encountered during shopping, such as price and quality, did not have a significant impact on consumers' perceptions or intentions towards eco-label adoption. This finding aligns with the study by Grunert, Hieke, and Wills (2014), which also found that these factors were not influential. However, the qualitative findings revealed that habitual shopping behaviours and price were identified as contextual barriers that hindered label adoption, despite positive attitudes towards the label and concept. The presence of these contextual barriers suggests that consumers are unlikely to pay attention to the label on their regular purchases or explore labels on other products in the meat section. This lack of inclination to check labels can be attributed to consumers' high trust in established brands, as suggested by the FSA (2016) and Vermeir and Verbeke (2006).

The literature further suggests that while environmental cues can influence habitual shopping behaviour, their impact on intentions is limited, acting as a barrier to taking action (Joshi & Rahman, 2015; Tsakiridou, Boutsouki, Zotos, & Mattas, 2008; Van't Riet et al., 2011; Verplanken & Aarts, 1999). The effectiveness of the eco-score label, therefore, depends on changing habitual behaviours, in line with the Transtheoretical model of behaviour change (Prochaska & Velicer, 1997). While Machín et al. (2020) suggest that FOPL schemes still have the potential to disrupt these habits, policymakers should support focus on building trust through credible communication of the rigorous certification processes and transparent information the label provides.

Price emerged as a more influential factor for consumers compared to environmental concern. There is a perception that sustainable meat is more expensive than conventional meat, leading to a lower intention to purchase the sustainable option (De Backer, Hudders, & Pauwels, 2015; Li, Jensen, Clark, & Lambert, 2016; Vermeir & Verbeke, 2006). Galarraga Gallastegui (2002) emphasises that labelling only reduces the purchase of less environmentally friendly products if they are priced similarly to the environmentally friendly alternatives. However, recent research suggests that some consumers are willing to pay more for meat products with eco-labels indicating sustainability (Bastounis et al., 2021).

To address these barriers, policies and strategies are needed to make sustainable meat more affordable and accessible to consumers, as the current retail prices do not reflect the true environmental costs of production (Blay-Palmer, Sonnino, & Custot, 2016; Committee on Food & Environment, 2020). The acknowledgement of price as a barrier underscores the need for systemic changes within the food system to reflect the true cost of sustainably and unsustainably produced meat products (Rana & Paul, 2017). While communicating the environmental impact

through the eco-score label may increase consumers' willingness to pay for sustainable choices, it is insufficient on its own to drive demand for sustainable meat products (Bastounis et al., 2021; Verbeke, Pérez-Cueto, de Barcellos, & Grunert, 2010).

4.2. Meat attachment effects the gap between perceptions and intentions

The quantitative data revealed that an individual's MAAS has a negative impact on their purchase intentions when considering eco-labels, but not on label perceptions. This highlights a gap between label perceptions and actual intentions to use them. Previous research has demonstrated that high levels of MAAS are associated with detrimental effects on PI (Circus & Robison, 2019; Graça et al., 2015). Dowsett, Semmler, Bray, Ankeny, and Chur-Hansen (2018) found that meat attachment levels remained unchanged even when subjects were confronted with animal welfare and meat production concerns, indicating a moral detachment from meat consumption. Consequently, individuals with strong meat attachment may continue consuming meat despite being aware of its environmental implications (Ruby, Heine, Kamble, & Cheng, 2013). This helps explain why consumers do not intend to use the label for meat product purchase decisions. Participants in the qualitative study similarly acknowledged the importance of using eco-labels to make more environmentally friendly meat choices but admitted that their actual behaviour might not align with this intention. While existing green marketing studies have identified a discrepancy between consumer perceptions and intentions, there is limited research on the influence of meat attachment (MA) and the use of eco-labels (Claudy, Peterson, & O'driscoll, 2013; Vlaeminck, Jiang, Vranken, & Verbeke, 2017; Zhang, Bai, Mills, & Pezzey, 2021).

However, Lentz, Connelly, Mirosa, and Jowett (2018) suggest that understanding the effect of MA on the theory of planned behaviour is crucial for comprehending meat consumption patterns and motivations for dietary change (Ajzen, 1991). Ginn and Lickel (2019) along with the motivation-ability-opportunity model, also emphasise that internal motivations, knowledge, and awareness are necessary for effectively implementing behavioural change (Jackson et al., 2005). Therefore, the gap indicated between label perceptions and actual use also have important policy implications for eco-labels and it is essential for policymakers to recognise the role of MA in consumer behaviour. Interventions that target MA and explore strategies to shift consumer preferences towards more sustainable meat products and plant-based alternatives should be considered to support the label scheme. By increasing awareness and providing accurate and compelling information, individuals can make more informed decisions and become more motivated to implement the label and help bridge the gap between label perceptions and actual behaviour. Previous research has emphasised the need to address meat attachment in understanding and promoting dietary change and choice (Ruby et al., 2013, Graça et al., 2015).

4.3. Knowledge and awareness are prerequisites to support consumers

In order to support consumers effectively, it is essential for them to have knowledge and awareness. However, the survey results indicate that participants require more information, while interviewees express the need for increased awareness and knowledge to fully understand and adopt the label. The responses from interviews also confirm that consumers tend to associate positive attributes such as trust, health, quality, and environmental benefits with purchasing locally produced meat or meat from local butchers. From this, it is important for policymakers to recognise consumer misconceptions from the belief that buying local reduces greenhouse gas emissions from travel and contributes to landscape conservation (Campbell, Mhlanga, & Lesschaeve, 2013; Ducrot et al., 2016; FSA, 2016; Hasselbach & Roosen, 2015; Hiroki, Garnevska, & McLaren, 2016; Roininen, Arvola, & Lähteenmäki, 2006). Campaigns promoting local shopping, often endorsed by celebrities and supported by the media and government, have contributed to the confusion

between supporting local businesses and environmental benefits. Consequently, consumers may overestimate their understanding of meat purchase decisions (Collier et al., 2021; Ferguson & Thompson, 2021). Campaigns and initiatives promoting local shopping should be accompanied by accurate information and education about the true environmental impact of the meat product.

Both this study and previous research emphasise the importance of knowledge, awareness, and effective marketing strategies in enhancing label efficacy (Dangelico & Vocalelli, 2017; de Boer, 2003; Prieto-Sandoval, Alfaro, Mejía-Villa, & Ormazabal, 2016). Weinstein (1988) asserts that awareness of an issue and belief in the personal or societal benefits of change are essential for developing an intention to act and actually performing the action. Therefore, policymakers should consider developing an effective public communication campaign as part of the eco-score label scheme, utilising media channels like the internet or television, to clarify the label's meaning and personalised benefits. This approach can improve consumers' comprehension and effective utilisation of the eco-score label (Pieniak, Vanhonacker, & Verbeke, 2013). Furthermore, growth of the FE eco-label scheme is evident as food companies across various food types producing FE certified products has doubled from five to ten since data collection of the current study (Feb 2022) and now (Foundation Earth d., 2023). The growth indicates a potential solution to dispel myths about local food as more food companies produce FE certified products. While exposure and awareness of the label scheme and environmental consequences of meat choices increase, help correcting consumers' misperceptions and greater willingness to change shopping behaviours may occurr, as seen in previous campaigns that incorporated labelling (Moser, 2016; Zepeda & Deal, 2009, Bastounis et al., 2021; Péneau et al., 2017).

While promoting eco-score labels in retail food environments can significantly influence consumers' food choices, policymakers should also acknowledge that relying solely on information provision is unlikely to address the issue, as it places the responsibility solely on individual decision-making (Dagevos & Voordouw, 2013; Select committee on food poverty health and the environment, 2020). Several interviewees expressed the need for government support and regulation, drawing parallels to the approach taken with the nutrition TLS label. A multidimensional approach, involving government interventions and regulations, could create an encouraging environment for consumers to make sustainable choices. The current UK food strategy advocates for government intervention to encourage healthy and sustainable diets, including initiatives such as investing in a Community Eatwell scheme, a school cooking revolution, and establishing a more transparent food system through the Food Data Transparency Partnership (GOV.UK, 2022). The partnerships advocated in the food strategy could gradually increase awareness and knowledge about meat production and create a more conducive environment for accepting the eco-score label. However, the launch of the new FE eco-label method proposing an improved version of the European Commission's PEF method, could help achieve a harmonised labelling system like the well-known nutritional TLS label, as Europe seeks to find an optimum system to use across the continent (Foundation Earth e., 2023).

4.4. Limitations and further research

The study primarily included participants from Northern Ireland, sampled through convenience and voluntary methods, raising concerns about representativeness. However, considering that the eco-score label is present on a prominent Northern Irish meat brand available in major UK supermarkets, it can be argued that the sample adequately represents opinions regarding label awareness and familiarity with meat products within the study's time and resource constraints (Foundation Earth d., no date). Additionally, it is reasonable to assume a certain level of homogeneity among participants sharing a similar demographic. Despite the small number of interviewees, data saturation was achieved, and a comprehensive understanding was attained. It is important to also acknowledge that this study focuses exclusively on perceptions and intentions related to the eco-score label for meat products while the LCA-based label can cover full food baskets. Further research is needed to investigate the influence of labels in other food categories and to compare perceptions and intentions between meat products and other food categories to fully assess the impact of the eco-label and meat choices and MAAS.

It is crucial to recognise the potential presence of social desirability bias inherent in self-reported environmental studies (Cerri, Thøgersen, & Testa, 2019). Expanded research on habit and environmental label perceptions should also be considered. While unconscious and past behaviours are equal to rational utility in influencing choice, there is limited specific research on the effect of habit on environmental label perceptions (Machín et al., 2020; Magnusson, Arvola, Hursti, Åberg, & Sjödén, 2003). Understanding the role of habit formation and its interaction with eco-label adoption can inform the design of more effective policies and interventions to encourage sustainable choices.

Lastly, further research investigating the influence of an educational campaign or awareness and knowledge interventions in conjunction with the eco-label could offer valuable insights. Exploring the synergistic effect of these interventions in motivating consumers to adopt and engage with eco-labels more effectively. Such research has the potential to uncover effective strategies for promoting sustainable consumption behaviours and increasing consumer awareness and understanding of the environmental impact of their choices.

5. Conclusion

This study demonstrates that the eco-score label has the potential to assist consumers in making informed decisions when purchasing meat. However, factors such as habitual shopping, perceived price, and limited knowledge about the label and the environmental impact of meat production may hinder its effectiveness in improving consumers' environmental choices at present. Nevertheless, the eco-score label campaign serves as a step towards transparency for those seeking more sustainable shopping options. Policymakers should consider the identified barriers and opportunities to enhance the effectiveness of eco-labels in promoting sustainable consumption practices and increasing consumer awareness of their environmental impact. With continued efforts, eco-score labels can play a significant role in driving positive environmental attitudes and sustainable choices among consumers.

CRediT authorship contribution statement

Victoria Williams: Conceptualization, Methodology, Formal analysis, Investigation, Writing – original draft, Project administration. **Orla Flannery:** Writing – review & editing, Visualization. **Ajay Patel:** Conceptualization, Writing – review & editing, Visualization, Supervision.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The data that has been used is confidential.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.foodqual.2023.104973.

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