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Ultra-Processed Foods and Dietetic Practice: Findings From a Survey and Focus Group With UK Dietitians

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ABSTRACT

Background: Food processing converts fresh food into products and is of interest to nutrition professionals including dietitians given emerging evidence linking consumption of 'ultra-processed' products with health.

Objective: To explore dietitians' professional practice around the topic of processed foods and health, including their perceptions of individual food products.

Methods: An online survey was developed to evaluate professional involvement, confidence and views using a 5-point scale (i.e., 1 = never, 5 = daily). Respondents' perceptions of three products were also obtained, including level of processing (LoP) (from 1 = unprocessed to 5 = ultra-processed) and recommended frequency of consumption (FoC) (from 1 = avoid to 5 = several times/day). Eligible survey respondents (UK dietitians) were recruited via the British Dietetic Association and social media. Data were analysed descriptively. A focus group was held with five dietitians to discuss current practice around this topic. Verbal data were thematically analysed.

Results: Survey respondents ($n = 366$) possessed an average of 13 ± 9.8 years practising across various specialisms. Most discussed (82%) and provided guidance on (77%) processed foods and health monthly or more frequently, with 'high' levels of confidence (61%–59%), and agreed that healthy diets may include processed (94%) or 'highly/ultra' processed (71%) foods. Perceptions of each individual food product varied, yet the largest proportion of respondents selected LoP and FoC options for Tinned tomatoes: 'minimally processed' (54%), 'several times/week' (69%); mycoprotein mince: 'highly/ultra-processed' (57%), 'several times/month' (40%); and wholemeal bread: 'processed' (46%), 'several times/week' (58%). Focus group themes included uncertainties in definitions of ultra-processed and negative consumer perceptions around processing.

Conclusion: This first survey of UK dietitians on processed foods suggests that dietetic practice frequently involves this topic and that views on the role of these foods in healthy diets are varied. Respondents also possessed a range of perceptions on the LoP of individual products, and further work is now warranted to support future development for dietetic practice.

1 | Introduction

Food processing, including freezing, canning and pasteurising, helps make fresh food last longer and become more palatable, convenient and safe to eat [1]. Products which experience high levels of industrial processing and which contain ingredients including additives are now often referred to as 'ultra-processed' [2]. These types of foods feature within the epidemiological evidence, which links their increasing consumption with poor health outcomes, including the risk of obesity, type-2 diabetes, cardiovascular disease, poor mental health and various cancers [1, 2]. One way to categorise foods based on the level of their

Summary

- Surveyed dietitians are frequently involved in discussing and providing guidance on the topic of processed foods and health.
- Survey and focus group findings highlight there exists a wide range of perceptions of the LoP of individual food products, which were provided here with label information (nutrition and ingredients).
- There exists a variety of views on the role of such products in healthy diets and there is a need for further evidence in this area and future dietetic practice.

processing is using an approach called the NOVA system [3], which uses ingredients and other (manufacturing) information to assign a level from 1 (unprocessed) to 4 ('ultra-processed'). Although this classification of ultra-processed foods (UPFs) does not recognise the food's nutritional content [3], processing levels are of interest to nutrition professionals because these may modify the nutritional composition of food products [1]. In addition, diets of people in the UK are thought to comprise at least 50% UPF [4] with higher intakes inconsistently associated with higher energy density and poor dietary quality [5, 6]. At the same time, it is thought that only a small minority of people (approx. 1%) [7] meet the UK Government's food-based dietary recommendations (The Eatwell Guide) [8] for fruits and vegetables, fish, saturates, salt, sugars and so forth.

Given the current media attention the topic of UPF is receiving [9], it is likely that members of the public and nutrition professionals alike are becoming aware of the concept that individual foods can be classified according to the extent and purpose of processing. In the UK, less than half of those UK consumers surveyed claim to understand the term 'ultra-processed', while their perceptions of such foods are generally negative [10]. Food professionals from a range of sectors have also highlighted a lack of clarity on future practice, industrial product development and policy, all of which are intended to support members of the public to choose and consume healthier, nutritionally balanced diets [11].

Currently, there is no UK policy or recommendations regarding the role of processed food in a healthy diet and no specific practice guidance for nutrition professionals such as dietitians on this topic. The UK Scientific Advisory Committee on Nutrition's review of evidence on processed food and health raised several concerns about subjectivity, quality and a potential lack of applicability to existing UK dietary guidelines [1]. Furthermore, insights on current dietetic practice in the UK around this topic are not available yet. A survey of dietitians practising in Australia ($n = 120$) indicated dietetic perceptions of the healthiness of individual food items are often based on the evaluation of a combination of the product's nutritional content and the nature of ingredients [12]. Since dietitians work to bridge the gap between nutritional science and the public by educating and giving advice to a range of people [13], capturing their current views and involvement in this topic is required to inform future dietetic professional practice and policy. The current study aimed to explore UK dietitians' levels of involvement, confidence and perceptions around the topic of processed foods and health, including specific processed food products.

2 | Methods

2.1 | Study Design

To provide a picture of UK dietitians' current perceptions of, and involvement in practice with, the topic of processed foods and health, a mixed methods approach was employed to collect data from dietitians in the UK using a survey and focus group.

2.2 | Ethics

Approval from the University of Leeds Ethical Board was granted before the study commencing.

2.3 | Survey of UK Dietitians

2.3.1 | Survey Questionnaire Development

An online survey questionnaire was developed to evaluate a cross-section of UK dietitians' involvement and confidence in practice with processed foods and health and their current views around processed food products and healthy diets. The questionnaire (see Supporting Information: S1) was developed by adapting items from other surveys of dietitians [14, 15] and consumers [10, 16, 17]. The survey questionnaire was composed of a total of 44 questions across three sections and began by collecting information on demographic and professional practice characteristics (i.e., age, gender, qualifications, number of years practising dietetics and areas of dietetic specialisms). Respondents were asked to rate their involvement and confidence in five practice aspects around processed foods and health (i.e., 'I have p*rovided guidance to people on the topic*') within the last year by selecting a single response from the corresponding 5-point category scale (i.e., 1 = never to 5 = daily; 1 = not confident to 5 = very high confidence) (see Supporting Information: S1) [14]. In addition, survey respondents were also asked to rate their level of agreement with five opinion-based statements on processed foods and health (i.e., '*A balanced diet can include some processed foods*') (5-point Likert scale: 1 = strongly disagree, 5 = strongly agree) [17].

In the final section of the survey, respondents were shown images of three real-life individual food products (wholemeal sliced bread, tinned tomatoes and frozen mycoprotein mince) alongside their corresponding label information (i.e., product description, back of pack nutrition table, front of pack nutrition label Multiple Traffic Lights and ingredients declaration), which was captured from the product's online supermarket information webpage (see Figure 1). These three products were selected based on (i) their appearance within different food groups of the Eat Well Guide dietary recommendations [8] (i.e., carbohydrates, protein foods and fruit/vegetables), (ii) their degree of processing and (iii) their low content of key nutrients of public health concern (i.e., fats, sugars and salt). It

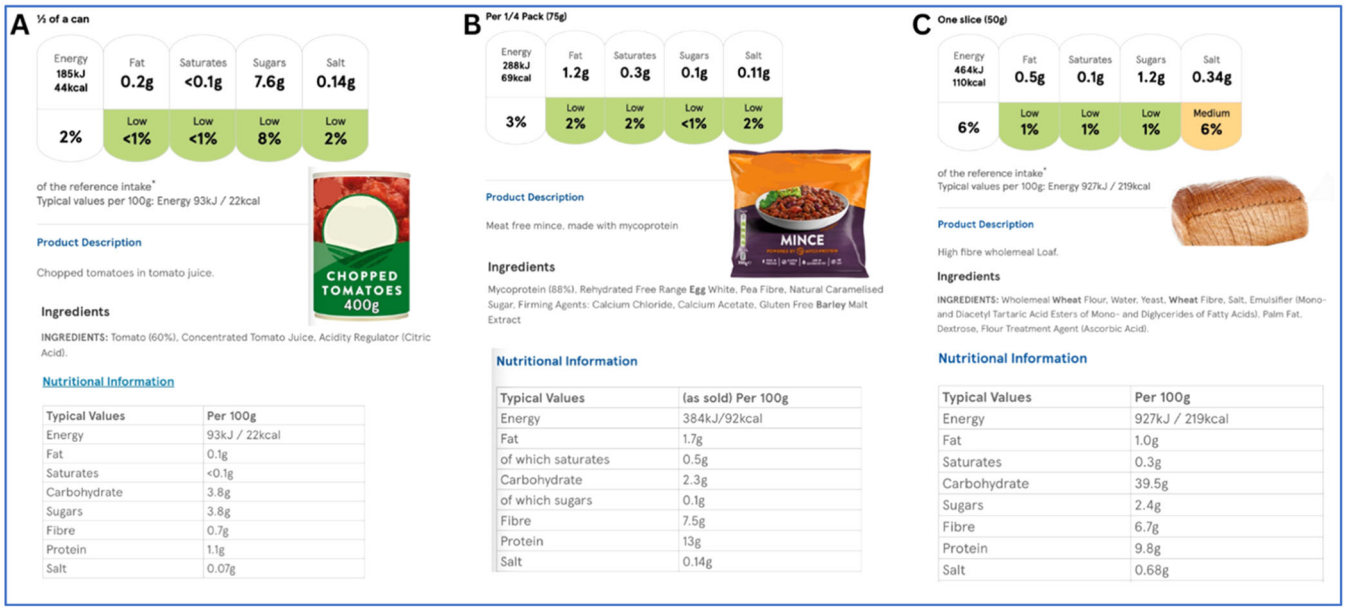

FIGURE 1 | Images of the three products provided in the survey, shown with their label information including nutrition and ingredients declaration. (A) is tinned chopped tomatoes, (B) is frozen mycoprotein mince and (C) is sliced wholemeal bread.

was decided to include three, rather than more, products in this initial evaluation to reduce participant burden. For each product, respondents were asked to first select the Level of Processing (LoP) (i.e., 1 = not processed, 2 = minimally processed, 3 = processed, 4 = highly/ultra-processed and 5 = I don't know) and provide an explanation of their selection using an open text box (see Supporting Information: S3). To design the four response options on LoP, NOVA [3] categories were used as a guide, rather than verbatim, to obtain respondents' own perspectives for each of the individual products. For example, our 'minimally processed' option reflects 'minimally processed culinary ingredients given as NOVA 2', which indicates products which will not have had extensive processing. Respondents were then asked if they were aware if each product occurred within the UK Eatwell Guide (i.e., yes, no and I don't know) and to select the recommended frequency of consumption (FoC) for each product within a healthy balanced diet (i.e., 1 = should be avoided, 2 = occasionally, 3 = several times a month, 4 = several times a week and 5 = several times a day) [15]. Perceived confidence in their selections was evaluated using a 5-point category scale (i.e., 1 = not confident and 5 = very high confidence).

A draft of the survey was piloted with SM (a registered dietitian) and, following this, with four other dietitians in clinical and community practice to obtain feedback on (i) the time taken to complete all questions (ii) the face content validity of specific questions and (iii) any suggestions/improvements. Following this, minor changes to the questionnaire format (i.e., adding section headings), question wording and increased product picture sizes were made to support readability and accessibility.

2.3.2 | Survey Recruitment

Respondents were recruited online, via an advert invitation to British Dietetic Association (BDA) members, inviting eligible qualified dietitians, who practised in the UK, to complete the 10-min survey. An incentive to opt in for a £50 retail voucher prize draw was offered. This recruitment advert was sent by the BDA to all recipients of their weekly members newsletter ($n = 500$), the BDA membership quarterly Research E-Zine email ($n = 10{,}000$) and via the BDA website 'pop up'. The advert was also posted on the researcher's social media (LinkedIn). Hosted in JISC, the survey was opened and disseminated from December 2023 to February 2024.

2.3.3 | Survey Data Analysis

Survey responses to each question item were exported from JISC to Excel spreadsheet for analysis in Excel (MS 2016). Descriptive statistics including proportions (%) and frequencies were used to describe the professional and demographic characteristics of the whole sample. Respondents' levels of involvement and confidence with the topic of processed foods and health were summarised and then analysed by first collapsing both 5-point scales into three categories (1, 2 = low, 3 = moderate and 4, 5 = high) [14] before calculating proportions of participants (%) who selected each of the included ratings for the whole sample. Respondents' levels of agreement with each of the five statements on processed foods and health were summarised by also calculating the proportion of respondents of the whole sample who selected each of the five agreement ratings (i.e., of the 5-point Likert Scale). Data collected from all respondents on their perceptions of each individual product's processing level, recommended FoC and appearance in the Eat Well Guide, as well as associated confidence in these, were analysed as proportion of the sample (%) who selected each response option.

2.4 | Focus Group

2.4.1 | Design and Data Collection Procedure

Alongside the survey, detailed qualitative data were collected from dietitians using a small focus group. This approach was

chosen to foster group discussion using open questions and opportunities to share professional insights [11, 18] on this relatively new topic. The focus group was designed around best practice guidance on group facilitation in qualitative research [18, 19] with the aim of encouraging attendance and a range of contributions from dietitians in different specialist practice fields. Specifically, (i) being hosted as a focus group online via video call for a comfortable time frame (no more than 90 min), (ii) agreeing to housekeeping rules to ensure participation remained anonymous 'outside the room', with contributions not shared elsewhere nor attributed to any individual participant or their organisation of work and (iii) involving between three and five participants to foster a natural, honest and open online verbal discussion. Group discussion prompts were primarily guided by the research question, and to support equitable access, question prompts were delivered using simple screen-shared slides and text and verbalised by the facilitators, repeated, and explained as required (VM and SM) (see Supporting Information: S2). The focus group started with a brief introduction to the topic and icebreaker, including open questions such as 'Does this topic come up in your practice?' 'How would you say you are involved with processed foods in your practice?'. Opportunities for everyone to speak were offered throughout and the facilitator summarised points to check for alternative views. Data were collected during the video call using the transcription function on MS Teams and the meeting was recorded.

2.4.2 | Recruitment of Dietitians for the Focus Group

Participants were recruited using an email invitation from the researchers detailing the study and date and time of the online focus group meeting, which was forwarded by the BDA to five dietitians who were members of a range of specialist groups (i.e., diabetes, obesity, public health, gastrointestinal, etc.). The invitation detailed the nature of the study and the payment incentive to compensate for participant's time. Dietitians who responded to this email invitation were then sent detailed study information and asked to provide informed consent before being sent an invitation and participation agreement.

2.4.3 | Focus Group Data Analysis

A transcript of the meeting was created automatically using MS Teams software. This was exported to Word before being read, anonymised and edited for accuracy (i.e., word spellings, etc.) by the researcher (V. M.) while listening to replays of the video recording of the meeting. Used here, thematic analysis [18, 20] is a general approach to identify and describe patterns and themes in verbal data suitable for early-stage research of this type in nutrition and dietetics [18] and has been used previously with professionals on a related topic [11]. First, the entire transcript was read, and initial manual open-coding was undertaken, by the researcher (V. M.) using colours to highlight text and note initial concepts and ideas [20]. Both coding and the creation of 'themes' were inductive, without reference to a coding framework [20, 21]. Both coding and theme generation were reviewed by and discussed with the second researcher (S. M.) and a third, not involved in the conduct of the focus group (P. H.), and iteratively adjusted in review until these were agreed to adequately describe the data in terms of the research question [20–22]. The final set of themes and sub-themes reported here are displayed visually and defined and described with illustrative quotes.

3 | Results

3.1 | Survey Sample Characteristics, Practice Involvement and Confidence and Views on Processed Foods and Health

The online survey received a total of 369 responses, of which three were removed because they were from students and did not meet the eligibility criteria which required respondents to be UK-based qualified dietitians. Data collected from the remaining 366 respondents were mostly from those identifying as female ($n = 353$, 96%) with an average of 13 ± 9.8 years practising dietetics across several sectors and areas of specialisms, including clinical practice in parenteral/enteral nutrition ($n = 82$, 22%), diabetes ($n = 75$, 21%) and management ($n = 68$, 19%) (Table 1).

Respondents' levels of involvement with processed foods in dietetic practice varied across the five listed activities (Table 2). Those activities with the highest levels of involvement were 'discussing processed foods with people' and 'providing guidance on processed foods and health' undertaken by around half of the survey respondents ($n = 185$, 51% and $n = 170$, 46%, respectively) on either a weekly ($n = 143$, 39% and $n = 131$, 36%, respectively) or daily basis ($n = 42$, 12% and $n = 39$, 11%, respectively). In contrast, involvement with 'training/education on this topic' and 'advising people where to access information on processed foods' were undertaken yearly or never by around two thirds ($n = 281$, 77%) and half ($n = 179$, 49%) of respondents. Levels of confidence in undertaking each of the activities were generally moderate to high, with the largest proportion of respondents reporting the highest confidence (i.e., high = 4 and very high-5) when discussing ($n = 224$, 61%) and providing guidance ($n = 217$, 59%) on this topic (Table 2).

Views on processing also varied across the sample in terms of the proportions of respondents who agreed (i.e., selected either 'strongly agreed' or 'agreed' from the 5-point Likert scale) with each of the five statements on processed foods and health (Figure 2). For example, the largest proportion of respondents agreed ($n = 345$, 94%) that 'a healthy balanced diet can contain some processed foods', followed by those who agreed ($n = 261$, 71%) with the statement that a 'healthy balanced diet can contain some highly/UPFs'. While a smaller proportion of respondents agreed with the statement that 'nutritional content is more important than processing' ($n = 224$, 61%), a quarter of respondents ($n = 90$, 25%) indicated they 'neither agreed nor disagreed' making this the statement with the highest proportion of ambiguous responses.

TABLE 1 | Survey respondents sample characteristics ($n = 366$).

Age (years)	*n*	(% of total sample recruited)	Areas of specialism[1]	*n*	(% of total sample recruited)
20–30	102	(28)	Allergy & Intolerance	24	(7)
31–40	113	(31)	Community	57	(16)
41–50	86	(23)	Diabetes	75	(20)
51–60	51	(14)	Older people	51	(14)
60+	9	(2)	Mental Health	38	(10)
Don't specify	5	(1)	Paediatric	63	(17)
Gender			Public health	11	(3)
Male	10	(3)	Clinical specialisms[2]	258	(71)
Female	353	(96)	Weight management	53	(14)
Don't specify	3	(1)	Food/medical nutrition industry	11	(3)
Years practicing			Media/writing	12	(3)
1–5	103	(28)	Management	68	(19)
6–15	139	(38)	Research	12	(3)
16–25	78	(21)	Other[3]	65	(18)
25+	46	(13)			

[1]Participants could select up to three areas of specialism.
[2]Those indicated were: Gastroenterology, Neurology/neuroscience, HIV/Aids, Oncology, Parenteral/enteral Nutrition and Renal.
[3]'Other' included specialisms such as critical care, teaching, sustainability, cystic fibrosis, surgery, women's health, maternal health and major trauma.

3.2 | Survey Findings on Perceptions of Individual Processed Products and Their Role in Healthy Diets

3.2.1 | Level of Processing (LoP)

For each of the three products shown with label information in the survey, responses to the question on perceived LoP ranged from 1 (unprocessed) to 4 (highly/ultra-processed), with the exception of mycoprotein mince where no (0%) respondents selected level 1 'unprocessed' (Figure 3). For each product, the largest proportion of respondents classified processing levels for tinned tomatoes as 'minimally processed' ($n = 198$, 54%), mycoprotein mince as 'highly/ultra-processed' ($n = 210$, 57%) and wholemeal bread as 'processed' ($n = 167$, 46%).

Most respondents reported high or very high confidence (ranging from 60%–62% across the three products) in their selection of processing classification, although around a third of respondents reported only 'moderate' confidence in their choices (range: 29%–31%) (Table 3). Respondents' explanations for classifying each of the three products varied within and between the three products, with respondents frequently referring to the ingredient list, claims (i.e., 5 a day) and manufacturing processes involved. For example, 63 respondents mentioned a 'minimal' or 'basic' ingredients list when classifying tinned tomatoes as either 'unprocessed' or 'minimally' processed (see Supporting Information: Table S1).

3.2.2 | Individual Products: Eatwell Guidance Inclusion

Respondents varied in their responses (i.e., yes/no/don't know) regarding whether each product was featured in the UK Eatwell Guide, although most respondents correctly identified that tinned tomatoes ($n = 275$, 75%) and wholemeal bread ($n = 344$, 94%) were featured in the UK Eatwell Guide, with around half ($n = 173$, 47%) stating correctly that mycoprotein mince is also featured. The highest proportion of 'don't know' responses were received for mycoprotein mince ($n = 89$, 24%) and tinned tomatoes ($n = 65$, 18%) (Table 3).

3.2.3 | Frequency of Consumption (FoC)

For each of the products, responses to the question on the recommended FoC within a healthy diet ranged from 'should be avoided' to 'several times a day', with the most popular response being 'several times a week' for tinned tomatoes ($n = 251$, 69%) and bread ($n = 214$, 58%) and 'several times a month' for mycoprotein mince ($n = 147$, 40%). Respondents' levels of confidence in their selection of FoC were generally high across products, with most reporting had 'high' or 'very high' confidence for tinned tomatoes ($n = 294$, 64%) and wholemeal bread ($n = 217$, 59%) and either 'moderate' ($n = 160$, 44%) or 'high/very high' ($n = 161$, 44%) for mycoprotein mince.

3.3 | Findings From the Focus Group

Analysis of verbal data obtained from the five focus group participants ($n = 5$, 40% male) of various practice specialisms, including public health, diabetes and obesity, found three clear themes (Figure 4).

First, discussion around the concept of defining UPFs, or classifying individual foods according to processing level (Theme 1), included a spontaneous mention of the NOVA definition and

TABLE 2 | Survey respondents' involvement and confidence with activities in the last year ($n = 366$).

In the last year have you…	Involvement			Confidence[4]		
	Low[1] *n* (%)	Moderate[2] *n* (%)	High[3] *n* (%)	Low *n* (%)	Moderate *n* (%)	High *n* (%)
Discussed with people (e.g., service users) about processed foods?	66 (18)	115 (31)	185 (51)	32 (9)	109 (30)	224 (61)
Provided guidance to people about processed foods?	84 (23)	112 (31)	170 (46)	42 (11)	105 (29)	217 (59)
Provided training or education (e.g., to students/healthcare professionals) about processed foods?	280 (77)	60 (16)	24 (7)	113 (31)	120 (33)	133 (36)
Advised people on where to access information on processed foods?	178 (49)	101 (28)	87 (24)	122 (33)	106 (29)	138 (38)
Discussed with people about the evidence/risk around processed foods and health	122 (33)	130 (36)	114 (31)	52 (14)	116 (32)	197 (54)

[1]Low involvement = Never/yearly.
[2]Moderate involvement = Monthly.
[3]High involvement = Weekly/daily.
[4]Confidence: Low = 1/2, moderate = 3, high = 4/5.

views including the need for a consistent approach. Such classifications were viewed as needing to acknowledge evidence of diets and dietary patterns that are associated with a negative impact on health while acknowledging that not 'each and every' individual processed/UPF is unhealthy or is associated specifically with risk of disease. In addition, the nature of these classifications may have 'nuances' that need to encompass food ingredients such as emulsifiers and sweeteners, the presence of which may also be involved in associations around food and health.

> *"That's where concept of ultra-processed food can be challenging- its very broad script that captures lots of different foods, and then how do we classify it."*
>
> (P1 Male, Diabetes specialist)

Second, focus group participants consistently cited their views around the concept of processing 'as a tool' (Theme 2), including in the context of enabling nutrient intakes in line with recommendations. Views expressed on this also included the need to align diets, involving meals, with advice to consume some foods in moderation or 'less often', particularly those which deliver high levels of those nutrients of public health concern (i.e. salt, saturated fat, sugar). Processing was also viewed as a tool to enable accessible and low-cost healthy eating.

> *"It's meals not foods…and some of these things are just so useful for making our overall diets better."*
>
> (P2 Female, Obesity Specialist)

> *"We should be facilitating and making it easier, more convenient, accessible, cheaper, enjoyable to go for the minimally processed food."*
>
> (P3 Male, Public Health Specialist)

Finally, several 'negative perceptions' (Theme 3) were raised, including those cited as from the media, which may also impact people (i.e., via stigma), their diets, knowledge and health. For example, participants highlighted that nutrition professionals and others in people-facing roles are encountering growing emotion and confusion around processed foods. This could lead to processing avoidance, or 'demonising' foods or whole food groups, including those in healthy balanced diet, such as frozen vegetables or canned fish, and there is a need for new messaging on this topic.

> *"I think thinking is very black and white in the media and on social media. And also perhaps in the public, whereas it is actually much more grey and it's much more nuanced. And I think it is quite difficult to convey those messages."*
>
> (P4, Female, Weight Management)

4 | Discussion

This work aimed to explore dietitians' current practice and perceptions relating to processed foods and health and indicates

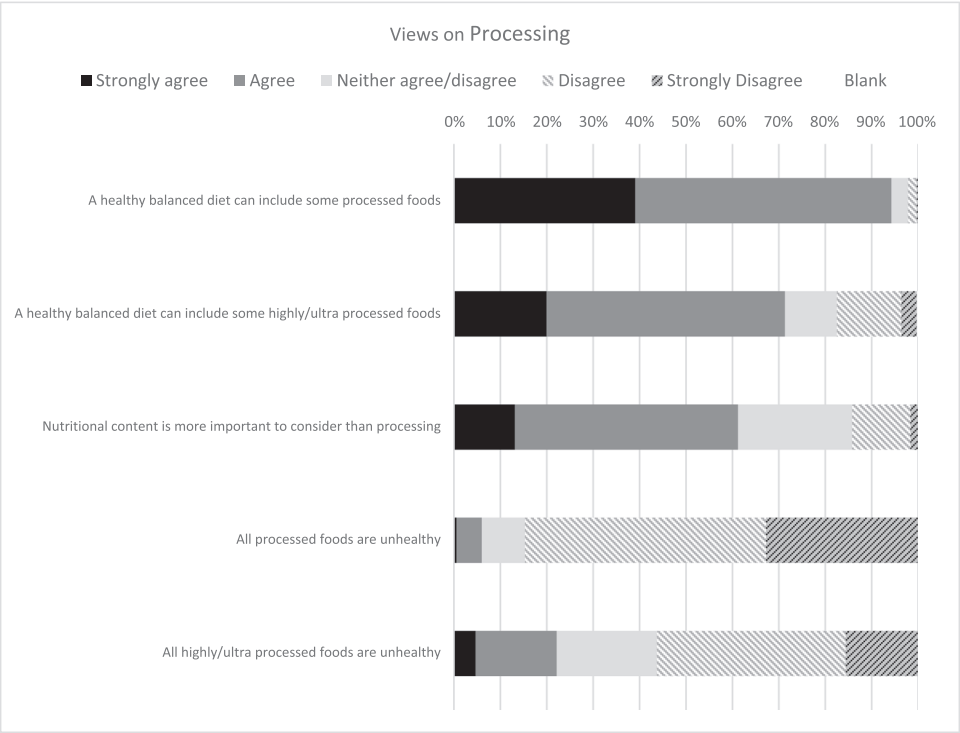

FIGURE 2 | Proportion of survey respondents (%) ($n = 366$) who selected each of five agreement levels, for each of the five statements on processed foods and health.

that those surveyed are generally highly involved in frequently discussing and providing advice in this area. Survey findings, reflecting mostly highly experienced UK dietitians working across a range of clinical specialities, show a view held by the majority of respondents that processed and 'ultra-processed' foods can be included in a healthy balanced diet. There was also majority disagreement, with exceptions, that 'all processed' and 'all ultra-processed' foods are 'unhealthy'. In contrast, only half of UK consumers recently surveyed [17] considered that 'a healthy balanced diet' should include these foods. Furthermore, our survey responses suggested that most (61%) strongly agreed or agreed with the statement that 'nutritional content is more important than processing'. This finding echoes a previous survey of Australian dietitians [12], in which the majority reported primarily rating the healthfulness of products based on nutritional content, followed by the type of ingredients. However, our survey responses also suggest there is some current ambiguity around this view and also some disagreement. This may be somewhat explained by the identified focus group themes, including the perception that processed foods can contribute towards nutrient intakes and accessible healthier diets (processing as a tool) alongside the need for agreement on the classification of individual 'ultra-processed' products. Overall, findings reflect the views of nutrition professionals at a recent roundtable [23] and a previous position statement of the BDA, which emphasise the importance of nutritional quality over processing to support healthy eating [24].

A second key finding of the current work is the variation across survey responses in selected levels of processing (i.e., not processed/minimally processed/processed/ultra-processed) of each of the three individual products shown in the survey with their label information. The majority of survey respondents selected either 'processed' or 'highly/ultra' processed for wholemeal bread, which using the NOVA system is considered ultra-processed NOVA 4, although the NOVA classification system definitions were not reproduced verbatim in our survey. Likewise, for tinned tomatoes, the majority of respondents considered these either minimally processed or unprocessed, without consensus, although the NOVA system appears to classify these as processed foods ('Canned vegetables') NOVA 3 [3]. Ambiguity and uncertainty in such classifications also exist among UK consumers when shown images (without labels) of individual products (i.e., canned baked beans) [11] or generic product names [25]. Perceptions of processing may also vary across product categories; a large survey of 10,000 consumers across Europe found that six in 10 consumers (61%) identified energy drinks as ultra-processed, with less (34% and 22%, respectively) selecting this classification for vegan cheese and chocolate bars [26]. The provision of product labelling (and ingredient) information in our survey of dietitians, together with respondents' varied selection of LoP, implies there is a need for greater consistency and agreed definitions in this area, as also identified in our focus group.

Furthermore, survey respondents also varied in terms of their knowledge of whether each of the three products was included in the recommended healthy balanced diet (i.e., the UK Eatwell Guide). All three products currently appear in these UK dietary recommendations, which most respondents were aware of albeit with the exception of mycoprotein mince, which is not illustrated in the guide's product imagery but included in the accompanying text [8]. More varied were survey responses on the recommended FoC of these individual products, which potentially reflect respondent's perceptions of each product's LoP; that is, the greatest proportion of respondents selected 'several times a week' for tinned tomatoes and wholemeal bread and 'several times a

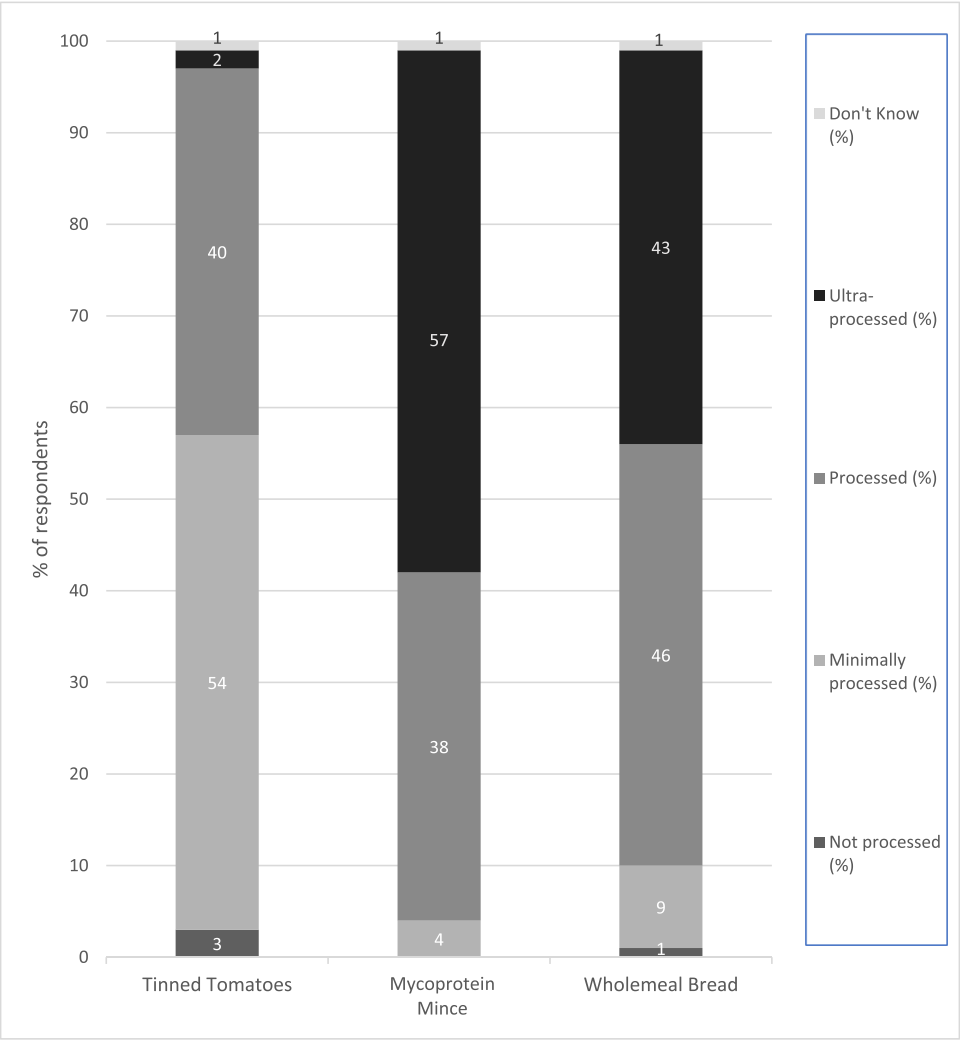

FIGURE 3 | Proportions (%) of survey respondents ($n = 366$) who selected each category of processing level, for each product provided with label information in the survey. The considered LoP for each product: wholemeal bread 'highly/ultra-processed', tinned tomatoes 'processed', mycoprotein mince 'ultra-processed'.

month' for mycoprotein mince. Consumers may also associate product healthiness with processing level [27]. In our survey, a minority of responses, ranging from 2% to 20% (for mycoprotein mince) indicated each of the three products should be consumed 'occasionally' or 'avoided'. In addition, our focus group findings highlight dietetic awareness of the 'nutrients versus processing' arguments and ongoing critique of the NOVA scheme that omits consideration of nutritional composition [1, 28], together with recognition of new research that aims to explain and unpick associations between both [29, 30]. These focus group findings may also help to explain the range of responses in our survey, since the issue of defining ultra-processed foods remains unresolved in nutrition practice, nor guided by policy or dietary recommendations. Previous and similar findings from a survey of dietitians on wholegrain products and health identified needs around further professional education and training [31].

5 | Limitations and Strengths

To the best of our knowledge, there exists no validated set of questions that assess knowledge of UPFs or product-level classifications. As such, our survey aimed to evaluate professionals' views and current practice using questionnaire items adapted from other instruments used to evaluate professional practice involvement [14] and perceptions of processed food and health [16]. Our survey questionnaire instrument was piloted with dietitians and tested for face-content validity, although future formal testing of reliability is now warranted [32]. A strength of our work is our survey's large sample size of UK dietitians working across many areas of specialist clinical practice, which reflect other surveys of UK dietitians in professional practice [14, 15]. However, there are over 10,000 registered dietitians in the UK, and as such, our findings reflect survey respondents rather than all UK dietitians.

Due to the need to reduce participant burden and number of questions, only three products were presented to respondents in our survey, therefore restricting the findings to these and not all types of food products. However, the foods selected are common in the UK retail market, from three different food groups, and all are currently featured in UK dietary recommendations The Eatwell Guide [8]. Finally, another possible limitation of our survey is that the answer options presented to respondent to

TABLE 3 | Survey respondents' perceived level of processing (LoP) of individual products and associated aspects (Column 1) around healthy balanced diet recommendations.

How confident are you in your selection of processing level?[1]	Tinned tomatoes *n* (%)[2]	Mycoprotein mince *n* (%)[2]	Wholemeal bread *n* (%)[2]
Low	32 (9)	30 (8)	33 (9)
Moderate	106 (29)	112 (31)	110 (30)
High	167 (46)	160 (44)	172 (47)
Very high	59 (16)	61 (17)	50 (14)
Is this food featured in the UK Eatwell Guide?			
Yes	275 (75)	173 (47)	345 (94)
No	24 (7)	103 (28)	5 (1)
I don't know	65 (18)	89 (24)	13 (4)
How often should this product be consumed?[3]			
Several times a day	23 (6)	6 (2)	69 (19)
Several times a week	251 (69)	132 (36)	214 (58)
Several times a month	73 (20)	147 (40)	38 (10)
Occasionally	15 (4)	74 (20)	33 (9)
It should be avoided	2 (1)	6 (2)	12 (3)
How confident are you in your answer to the above?[1]			
Low	32 (9)	41 (11)	30 (8)
Moderate	95 (26)	160 (44)	118 (32)
High	175 (48)	132 (36)	165 (45)
Very high	59 (16)	29 (8)	52 (14)

[1]Confidence was rated on scale 1–5, then condensed into four categories (Low = 1, 2, Moderate = 3, High = 4 and Very High = 5).
[2]Percentage of total participants ($n = 366$).
[3]Frequency of consumption (FoC) when recommended as part of healthy balanced diet for populations.

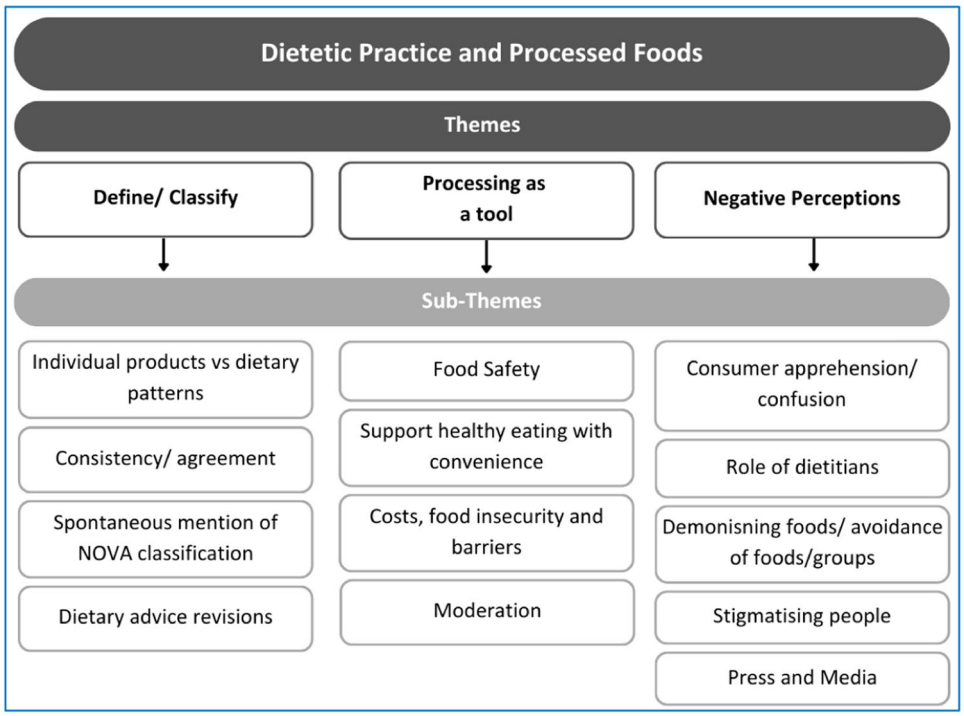

FIGURE 4 | Visual of key themes and sub-themes identified around professional practice and processed foods, within the focus group with dietitians.

classify each product's LoP (i.e., 1 = not processed, 2 = minimally processed, 3 = processed, 4 = highly/ultra-processed and 5 = I don't know) were guided by, rather than reproducing, NOVA. For example, our option 2 was based on 'minimally processed culinary ingredients' NOVA 2 [3]. If survey respondents were familiar with the product-level application of the NOVA system, it is possible this may have impacted their responses and, as such, our survey findings. However, our research intended to evaluate dietitians' perceptions of degree of processing, for the provided, labelled, individual products, to describe any consensus or ambiguity across respondents, rather than to objectively assess their accuracy when applying the NOVA system, which is not yet recognised in UK policy [1].

A strength of our work is the complimentary use of a focus group comprising dietitians from across several specialist practice areas, which helped explain and further enrich the data collected from the survey on professional practice. However, only one focus group was undertaken, and data saturation was not formally assessed [20]. Nonetheless, we followed best practice by checking the understanding of views expressed by participants during group facilitation and ensuring all participants had the chance to speak or offer further additional or competing views [19]. In addition, focus group facilitators and data analysis stages included an experienced qualitative researcher (S. M.) and another researcher not involved in the research with the aim of improving rigour and reducing bias in verbal data interpretation [18]. This was also important given that the reflexive role, experiences and backgrounds of the researchers involved included a registered dietitian (S. M.) and prior work in the food industry (V. M.) [33]. Overall, this work is the first to research dietetic practice in the UK with respect to processed foods and contributes to the existing literature on consumer and industry perspectives as well as dietetic professional development needs.

6 | Conclusion

Survey and focus group findings presented here show that UK dietitian respondents are frequently involved in providing advice and guidance on processed foods and health and are generally confident in doing so. However, we find respondents varied in their product-level classification of (three) individual product's LoP and their views on the recommended FoC of each product as part of a healthy balanced diet. Explanations for this include the recognised lack of agreement in definitions of processed foods and health and a lack of nutrition policy or training in this area. Findings underpin the need for further work to characterise professional development needs in this area.

Author Contributions

Veronica Moran and Sally G. Moore conceptualised the study and research question. Veronica Moran conducted the data collection and analysis, with guidance from Peter Ho. Veronica Moran, Sally G. Moore and Peter Ho drafted the manuscript, which has approval from all authors.

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Ethics Statement

Ethical approval was obtained before the start of the study from the University of Leeds Ethical Review Panel (Number 0886).

Conflicts of Interest

The authors declare no conflicts of interest.

Peer Review

The peer review history for this article is available at https://www.webofscience.com/api/gateway/wos/peer-review/10.1111/jhn.70029.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section.