Dissertation Academic Paper

Title: Public Perceptions of High Protein Diets

Student Number: st20082320

2018

Supervisor:

Student Declaration In Respect of Individual Work

I declare that the whole of this work is the result of my individual effort and that all quotations from other authors have been acknowledged.

Dissertation submitted in partial fulfilment of the requirements of Cardiff Metropolitan University for the Degree of Bachelor of Science with Honours.

Signed: S.Brown

Date: 10/05/18
Abstract

Background: UK adult protein consumption far exceeds recommendations. Market research suggests a recent enthusiasm for high protein diets, the potential physiological effects of which have been extensively researched. Less understood are consumer views on protein, particularly in high quantities.

Methods: Cross-sectional survey of UK adults (n=69) via self-administered questionnaire to explore public perceptions of high protein diets. Results were analysed using Pearson’s Chi Squared test.

Results: Participants most commonly valued high protein diets for weight loss (72.4%) and for sports reasons (100%). It was unanimously agreed that protein should be consumed as part of a balanced diet. Most participants disagreed that high protein diets are associated with three named diseases: cancer (47.7%), diabetes (76.8%) and CVD (45.6%). Participants mostly agreed (41.2%) that animal protein was of better quality than plant protein. Omnivores were more likely to agree (62.3%) with this statement than participants who did not eat meat (22.2%). This finding was statistically significant (p=0.002). Participants mostly disagreed (63.2%) that animal protein was healthier than plant protein.

Conclusions: Findings from this small scale research offer broad insight to public opinion of high protein diets. Nutritional messages on attaining a balanced protein intake may be required to highlight potential health risks of high protein diets to consumers. Future research using a more qualitative approach may be indicated to further explore the effect of current dietary trends on perceptions of protein and healthy eating.

Keywords: high protein diets, public perceptions, non-communicable diseases, protein, sources
Introduction
While the RNI for protein consumption is 55.5g per day for males aged 19-50 and 45g/day for females of the same age (DoH, 1991), the National Diet and Nutrition Survey (Bates et al, 2012) reported that both children and adults in the UK are consuming “well above” the RNI—an average of 88g for men, and 65g for women. Although not necessarily cause for concern, this data coincides with a lack of adherence in the UK to nutritional guidelines (NHS, 2016), including the Eatwell Guide (Public Health England (PHE), 2016). It has been suggested that although healthy eating policies exist, they have not been evaluated sufficiently to determine the level of understanding amongst consumers (Perez-Cueto et al, 2011).

Market research suggests a recent enthusiasm for protein consumption, evidenced by increased meat consumption, increased sales of sports nutrition products, and high protein foods marketed for weight loss (Food Matters, 2013). Both beneficial and detrimental physiological effects of a high protein diet have been researched, and although higher protein consumption is reported to be protective in some groups, high intakes of some sources are associated with increased risk of non-communicable diseases (World Cancer Research Fund (WCRF), 2007; Pan et al., 2012).

At the time of writing, there is no formal definition of a high protein diet. Recent changes to the Eatwell Guide (PHE, 2016) recommend 2-3 portions of protein per day in order to maintain Nitrogen balance, now with an emphasis on beans and pulses as healthier, fibre containing sources of protein. World Cancer Research Fund (WCRF, 2007) have recommended red and processed meats not be consumed in excess of 500g per week as these are convincing causes of cancer. It is advised that fruit, vegetables, wholegrains and pulses are probably protective against cancer due to their high anti-oxidant density and dietary fibre (WCRF, 2007). This advice reiterates the importance of a balanced diet as per national guidelines (PHE, 2016), alongside modification of other lifestyle factors including Body Mass Index, physical activity, smoking and alcohol consumption.

Although in-vitro studies have initiated cancer in rats by using a high protein diet (Youngman and Campbell, 1992; Monteiro et al, 2016), diets used have been based on up to 60% protein (Monteiro et al, 2016), possibly not representative of a high protein diet in humans. It is also unclear if sufficient micronutrients, specifically antioxidants were provided in these studies. Therefore, when assessing the potential of a diet to increase risk of non-communicable
diseases in humans, it is important to take a holistic approach and refer back to reliable guidance documents (WCRF, 2007).

Additionally, environmental concerns have been raised relating to the large quantities of meat in high protein diets, including issues surrounding animal welfare and the carbon footprint of raising livestock (Westhoek et al 2014). Despite the potential consequences of high protein diets to both health and the environment, consumer attitudes appear diverse. While some studies suggest consumers are not willing to reduce their meat consumption (Tobler et al., 2011), others report the beginnings of a potential paradigm shift, whereby consumers are beginning to consciously reduce their meat intake (Dagevos & Voordouw, 2013).

Evidence surrounding the nutritional profile of vegetarian and vegan diets generally reports these diets to be adequate but lower in protein than omnivore diets (Gandy, 2014). Well planned vegan diets are higher in fruit and vegetables and dietary fibre and contain less saturated fat than omnivore diets (Gandy, 2014; Craig, 2009). Vegetarian diets have been associated with reduced risk of non-communicable diseases (Craig et al, 2009). Although “plant-based” diets appear to be increasing in popularity (The Vegan Society, 2016), the impact of this trend on healthy eating beliefs has not yet been examined.

Currently few studies exist regarding public perceptions of protein, particularly in the UK. A small study in America amongst non-athlete college age males concluded participants were poorly informed of their protein requirements and obtained their nutritional information from unreliable internet sources (Sparks, 2014). An older Canadian study investigating public perceptions of healthy eating (Paquette, 2005) reported that the public consider a balanced diet to be the healthiest, suggesting public perceptions are influenced by government dietary recommendations.

Studies investigating consumers’ reasons for eating meat have described a paradoxical relationship between beliefs and behaviours. Graca et al (2015) reported that westerners have an emotional attachment to meat and do not believe eating high quantities of animal products will have an adverse effect on their health. The same participants, however, expressed concern regarding the environmental impact of their meat consumption, but their
food habits were not indicative of this. In this study, participants did not cite any benefits to eating meat yet reported they would be unwilling to use plant substitutes.

Previous research (Sparks, 2014; Paquette, 2005; Graca et al, 2015) is predominantly US based and investigates consumer attitudes to healthy eating and meat rather than protein specifically. This research aims to examine how public opinions of protein relate to the current evidence base. Specifically, the research will investigate the perceived benefits of a high protein diet, the perceived association between high protein diets and non-communicable diseases, and public opinions of plant versus animal proteins.
Methodology

Design

Due to the lack of current research into public perceptions of healthy eating (Paquette, 2005), the research was based upon a cross-sectional design, which aimed to provide a snapshot of the current understanding and views surrounding opinions of protein. Cross-sectional surveys have been described as a flexible approach to preliminary research; providing opportunity to both investigate the current situation and to determine the need for further investigation into more specific areas (Mills et al. 2010).

To efficiently reach the largest number of participants possible in a small amount of time, a self-administered questionnaire was distributed both online via social media and in person (Dillman et al., 2009). To maximise the response rate, participants were personally approached by the researcher to determine if they would be willing to complete the questionnaire.

As questionnaires have the limitation of only allowing a small range of answers, data collection via a focus group was considered. An advantage of this method over a questionnaire is that it would have enabled collection of qualitative data, which may have allowed opportunity to more thoroughly examine participants’ opinions and the reasons behind them. Although this may have been more appropriate to the investigative aim of the study, a focus group was not chosen due to the time-consuming nature of recruiting participants, holding the focus groups and transcribing the data (Somekh and Lewin, 2011). Having to personally interview participants would have likely resulted in a smaller sample size.

A self-administered questionnaire ensures that all participants are being asked the same questions without the risk of side-tracking associated with focus groups. This increases the objectivity of the study (Denscombe, 2010). Qualitative style questions with written comments were not included in this questionnaire as it has been suggested that this style of question decreases response rate (Denscombe, 2010).
Participants

Participants were derived from the researchers’ contacts via opportunistic sampling. The study was open to those over the age of 18. Sample size was further maximised via the snowballing technique, which was implemented by requesting that participants nominate another contact to complete the questionnaire. This provided an efficient method to maximise sample size and diversity within the available time-frame and limited resources (Bryman, 2008). The limitations of an all-inclusive criterion were that the resulting sample was more representative of the researchers’ contacts than of the general population (Table 1). Although participants of all age groups and education levels were included, some were under-represented which did not enable accurate comparisons between demographics. A stratified sampling technique would have enabled a more evenly distributed sample to be obtained (Bryman, 2008).

Previous research exploring public perceptions of healthy eating reported no major differences in opinions across age groups (Paquette, 2005). Paquettes’ study, however, reviewed existing literature rather than directly surveying participants and therefore had a much larger sample size than primary research. There may be more differences in views across age groups when researching protein specifically due to recent trends towards a high protein diet (Food Matters, 2013), and associations with fitness and weight loss (Pal and Ellis, 2010), which may be more important to young people. A stratified sample may also have allowed comparison of responses between participants who did and did not eat meat.

This study was approved by the Cardiff School of Health Sciences ethics panel of Cardiff Metropolitan University prior to data collection (Appendix 1). Once approved, social media was used to identify 80 people interested in completing the survey, of which 69 were completed and returned, giving a response rate of 86%.

Materials

The research tool (Appendices 2&3) was developed following a literature review of the current evidence base surrounding high protein diets. The questionnaire comprised of three main sections. The first section intended to gather information regarding participants’ protein consumption using ‘Tick a box’ style questions. This question type was chosen to increase response rate and reduce time taken to complete the questionnaire (Somekh and Lewin,
To avoid confusion, participants were asked to quantify their protein intake in “handful sized portions per day” rather than in grams. Although frequency and sources of protein could have been more accurately analysed using a food frequency chart or a food diary (Vucic et al 2009), handful measurements provided an estimate and are more easily visualised by the general population (Vucic et al 2009).

The main body of the questionnaire consisted of Likert scale questions whereby participants were required to indicate on a four-point scale whether they strongly agreed, agreed, disagreed or strongly disagreed with the statement. The Likert scale is often cited as a useful tool for gathering public attitudes, values and beliefs (Bryman, 2008). The scale was intentionally designed with four points to omit the option of “sitting on the fence”, meaning participants had to either agree or disagree with a statement (Xiao et al, 2017). The limitations of this were that participants who genuinely had a neutral opinion were not able to express this and as a result there were some instances of questions being left blank.

The Likert scale questions referred to the most commonly researched topics in the evidence base identified by the literature review. In accordance with the objectives of the study, questions aimed to gather participants’ opinions of protein as part of a balanced diet, to aid weight-loss, for sports and the links between high protein diets and non-communicable diseases- specifically cancer, CVD and diabetes. These broad disease examples were given as it was considered that participants would generally understand the terms. Although it would have been more accurate to refer to specific cancers, for example, it is possible that this would have been too specialised. The Likert scale questions alternated between positive and negative phrasing to avoid the risk of participants selecting the same answer to all the questions (Bryman, 2008). Possible consequences of this are that participants may have misinterpreted the wording and the questions may have appeared bias.

The final section of the questionnaire collected participant demographics including age, gender and education level so that responses could later be compared across groups. Activity level was assessed using the World Health Organisation (WHO) Physical Activity Level classifications (2004). Participants were also asked to ‘Tick a box’ to indicate the option that best described their choice of diet.
To ensure reliability of the questionnaire, an evaluation was conducted amongst three friends. No issues were identified and so no changes were made to the research tool. These three participants were included as part of the final sample.

**Analysis**

Data was analysed descriptively using Microsoft Excel, 2013. Frequency of responses was calculated for each question and the significance of demographics (age, education, gender, diet and activity level) was tested against responses. This aimed to determine if there was any statistically significant correlation between public perceptions of protein and demographic group. Pearson’s Chi-Squared test was conducted using Statistical Package for Social Sciences, Version 22 to calculate the probability of observed relationships. P-Values of 0.05 and below were considered statistically significant and therefore not attributed to chance alone.
Results

Participant Demographics

The questionnaire was distributed to 80 people of which 69 returned it (86% response rate). Demographics of participants are listed in Table 1 below. The respondents were predominantly female (53.4%) and aged between 18-24 (42%). Most participants were educated to degree level (43.3%). The majority of the cohort described themselves as being moderately active (60.9%).

<table>
<thead>
<tr>
<th>Gender</th>
<th>Number of participants</th>
<th>% of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>30</td>
<td>43.4</td>
</tr>
<tr>
<td>Female</td>
<td>37</td>
<td>53.6</td>
</tr>
<tr>
<td>Undisclosed</td>
<td>2</td>
<td>2.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age</th>
<th>Number of participants</th>
<th>% of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-24</td>
<td>29</td>
<td>42</td>
</tr>
<tr>
<td>25-34</td>
<td>18</td>
<td>26.1</td>
</tr>
<tr>
<td>35-44</td>
<td>7</td>
<td>10.1</td>
</tr>
<tr>
<td>45-54</td>
<td>9</td>
<td>13</td>
</tr>
<tr>
<td>55+</td>
<td>6</td>
<td>8.7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Education</th>
<th>Number of participants</th>
<th>% of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>GCSE</td>
<td>5</td>
<td>7.5</td>
</tr>
<tr>
<td>A-Level</td>
<td>22</td>
<td>32.8</td>
</tr>
<tr>
<td>Degree</td>
<td>29</td>
<td>43.3</td>
</tr>
<tr>
<td>Masters' Degree</td>
<td>9</td>
<td>13.4</td>
</tr>
<tr>
<td>Doctorate</td>
<td>2</td>
<td>2.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Activity Level</th>
<th>Number of participants</th>
<th>% of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedentary</td>
<td>16</td>
<td>23.1</td>
</tr>
<tr>
<td>Moderately Active</td>
<td>42</td>
<td>60.9</td>
</tr>
<tr>
<td>Vigorously Active</td>
<td>8</td>
<td>11.6</td>
</tr>
<tr>
<td>Extremely Active</td>
<td>3</td>
<td>4.3</td>
</tr>
</tbody>
</table>

The majority (80.3%) of participants reported eating a diet which included meat. The remaining participants were vegetarians (7.6%), pescatarians (6.1%), vegan (1.2%) or following a different diet to the options listed (see table 2). “Other” diets (4.5%) included gluten free, dairy free and conscious meat reducers.

<table>
<thead>
<tr>
<th>Diet</th>
<th>Number of participants</th>
<th>% of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Omnivore</td>
<td>53</td>
<td>80.3</td>
</tr>
<tr>
<td>Vegetarian</td>
<td>5</td>
<td>7.6</td>
</tr>
<tr>
<td>Pescatarian</td>
<td>4</td>
<td>6.1</td>
</tr>
<tr>
<td>Vegan</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>4.5</td>
</tr>
</tbody>
</table>
Protein Consumption Patterns

The research tool required participants to indicate the sources of protein that they most commonly consume by ticking as many options as applied. The frequency that each option was selected was calculated to produce the results (Figure 1).

Figure 1: Consumption frequency of animal and plant protein sources;

![Graph showing protein sources]

Figure 1 shows the most commonly consumed sources of protein were meat (71%, n=49), poultry (72.4%, n=50), fish (62.3%, n=43), dairy (69.6%, n=48) and eggs (69.6%, n=48). Plant proteins were the least popular sources amongst the participants, as depicted on the graph below. 18.8% (n=13) of participants reported that they consume additional protein products for sports nutrition.

Approximately two thirds of participants (65.2%) consumed 2-4 handful sized portions of protein per day. Amongst the total participants, similar numbers agreed (40.3%) and disagreed (38.8%) with the statement “I consciously consider my protein intake when planning/preparing meals” (Table 3). Figure 2 shows vegetarians were most likely to consider their protein intake when planning their meals (80%, n=4), but this was not statistically significant (p=0.53). The research produced no statistically significant results to suggest that gender (p=0.79) or activity level (p=0.291) are influencing factors in whether the participants consider their protein intake when planning meals.
Table 3: Participants’ responses to the statement “I consciously consider my protein intake when planning/preparing meals”

<table>
<thead>
<tr>
<th>Response</th>
<th>Number of participants</th>
<th>% of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agree</td>
<td>6</td>
<td>8.9</td>
</tr>
<tr>
<td>Agree</td>
<td>26</td>
<td>38.8</td>
</tr>
<tr>
<td>Disagree</td>
<td>27</td>
<td>40.3</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>8</td>
<td>11.9</td>
</tr>
</tbody>
</table>

Figure 2: A comparison of omnivore and vegetarian responses to the statement “I consciously consider my protein intake when planning/preparing meals”;

Perceived benefits of a high protein diet

Figure 3 indicates that participants most commonly believed a high protein diet would be useful for professional athletes (69.6%, n=48), followed by people who participate in sports for leisure (44.9%, n=31). This is consistent with results of the Likert scale questions, whereby all of the participants agreed (56.5%, n=39) or strongly agreed (43.5%, n=30) that protein consumption was important for building muscle or other sports related reasons. Participants considered high protein diets the least useful for people with chronic diseases (8.7%, n=6) and over 65’s (15.9%, n=11) (Figure 3).
In response to the Likert questions, all participants agreed (66.6%, n=46) or strongly agreed (33.3%, n=23) that protein was an important component of a balanced diet. 72.4% (n=50) of participants considered high protein diets to be important for weight loss. Participants also indicated that they believed protein was protective against disease (48.5%, n=33). Table 4 shows that women were more likely to agree with the statement (52.8%) than men (46.7%). This association was statistically significant (p=0.005).

Table 4: Comparison of male and female responses to the statement “It is important to consume protein because I believe it is protective against disease”;

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>0</td>
<td>46.7%</td>
<td>50%</td>
<td>3.3%</td>
</tr>
<tr>
<td>Female</td>
<td>2.8%</td>
<td>52.8%</td>
<td>(p=0.005)</td>
<td>36.1%</td>
</tr>
</tbody>
</table>

Perceived associations between high protein diets and non-communicable diseases

Participant responses to Likert scale questions (Figure 4) suggest that most participants disagree that high protein diets are associated with three named diseases: Cancer (47.7%, n=33), Diabetes (76.8%, n=53) and CVD (45.6%, n=31). Of the three diseases, participants most frequently disagreed that protein was associated with diabetes.
Responses to the statement “It is not important to limit protein consumption to reduce risk of CVD” were almost equally divided, with 45.6% (n=31) of participants agreeing with the statement and 44.1% (n=30) disagreeing. Of these figures, males were statistically more likely to agree (Table 5) that limiting protein consumption would not reduce risk of CVD (56.7%, n=17, p=0.013) than females (36.1%, n=13, p=0.013).

Table 5: Comparison of male and female responses to the statement “It is not important to limit my protein consumption to reduce my risk of CVD”

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>3.3%</td>
<td>56.7%</td>
<td>40%</td>
<td>0</td>
</tr>
<tr>
<td>Females</td>
<td>2.8%</td>
<td>36.1%</td>
<td>50%</td>
<td>11.1%</td>
</tr>
</tbody>
</table>

Perceptions of plant and animal proteins

Most participants agreed (41.2%, n=28) that animal proteins were of better quality than plant proteins (Table 6) but disagreed (63.2%, n=43) that animal protein was healthier than plant protein (Table 7).

Table 6: Participant responses to the statement “Meat provides a better-quality source of protein than plant sources”:

<table>
<thead>
<tr>
<th>Response</th>
<th>Number of participants</th>
<th>% of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agree</td>
<td>10</td>
<td>14.7</td>
</tr>
<tr>
<td>Agree</td>
<td>28</td>
<td>41.2</td>
</tr>
<tr>
<td>Disagree</td>
<td>19</td>
<td>27.9</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>11</td>
<td>16.2</td>
</tr>
</tbody>
</table>
Table 7: Participant responses to the statement “Animal protein is a healthier option than plant protein”;

<table>
<thead>
<tr>
<th>Response</th>
<th>Number of participants</th>
<th>% of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agree</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Agree</td>
<td>12</td>
<td>17.6</td>
</tr>
<tr>
<td>Disagree</td>
<td>43</td>
<td>63.2</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>13</td>
<td>19.1</td>
</tr>
</tbody>
</table>

When examining trends between chosen diet and response to the above questions, 91.7% of the participants who perceived animal protein to be healthier than plant protein (Table 7) were omnivores (n=11, p=0.000) or followed an unspecified diet (n=1).

Omnivores were statistically more likely to agree or strongly agree that animal protein was of better quality than plant protein: 62.3% (n=33, p=0.002) of omnivores, compared to 22.2% (n=1, p=0.002) of participants who did not eat meat (Table 6). No statistical significances were produced using gender as a variable.
Discussion

The aim of the research was to explore public perceptions of high protein diets using a cross-sectional survey.

An objective of the research was to examine protein consumption patterns amongst participants. As discussed in methodology, the participants self-reported their daily protein intake by estimating handful sized portions as, although more accurate, it would not have been realistic to request protein consumption in grams or as a percentage of total calories. Most participants reported consuming 2-4 portions of protein per day, a figure consistent with dietary guidelines (PHE, 2016). The ambiguous nature of a “handful” limits reliability and quantification of this data, and therefore it was not possible to estimate protein intake in grams.

A further limitation of the study was that the research sample consisted predominantly of omnivores (80.3%, Table 2), meaning it was difficult to draw statistically significant comparisons of opinions between those who did and did not eat meat. Although non-meat eaters were the minority in the study, the sample (Table 2) was in fact closely representative of the UK population; survey data suggests just 2% of the UK population are vegetarian and under 1% are vegan (Bates et al, 2012), compared to 7.6% (vegetarian) and 1.2% (vegan) of participants.

Whilst it is known that overconsumption of protein is common in the UK (Bates et al, 2012), when examining the perceived benefits of a high protein diet participants unanimously agreed that it is important to consume protein as part of a balanced diet. Similarly to previous research (Graca et al, 2016) the paradox between consumption and perceptions of protein could suggest a lack of public understanding regarding recommended protein intakes.

The results of the study also suggest that participants particularly value high protein diets for sports reasons, with all participants agreeing that protein is important for building muscle, and most participants agreeing that a high protein diet is most useful for professional athletes or those taking part in sports for leisure (Figure 3).

Public perceptions that protein is important for sports are consistent with existing evidence, which suggests sports people have increased protein requirements due to enhanced
utilisation of amino acids and increased protein catabolism (Garrow et al, 2000). In this case, protein consumed after exercise is useful for tissue repair (Rodriguez et al, 2009). Specific requirements will be dependent on level of catabolism, therefore the extent to which participants will benefit from additional protein intake, particularly those participating in sports for leisure only, is likely highly individual (Garrow et al, 2000).

It is commonly understood that increased protein requirements are generally compensated by higher energy intake (Gandy, 2014), suggesting additional protein supplementation may not be necessary for athletes or sports people consuming adequate total energy. Participants’ positive associations between high protein diets and sports could possibly be linked with the growing popularity and marketing of sports protein products (Food Matters, 2013).

The implication that a high protein diet is more useful to those who participate in sports than other groups is not consistent with the evidence base. Only 15.9% of participants cited over 65’s as a group who could benefit from higher protein intake (Figure 3). Evidence suggests that higher protein intakes are useful in protection against osteoporosis (Heaney, 1999) and CVD (Levine et al, 2014) in over 65’s. This could suggest that participants had a limited understanding of the potential benefits of protein to the elderly. Another possible explanation is the demographic of the participants: most participants were aged between 18-24 and so results are representative primarily of this age group and their values. Further research amongst the over 65’s could help to determine whether protein is important to the elderly in the same ways as young people.

Another perceived benefit of high protein diets was their efficacy for weight loss, with almost three quarters of participants reporting that they value high protein diets for this purpose. The evidence base suggests that high protein diets may be effective in achieving short term weight reduction by increasing satiety and thermogenesis but may not be as effective or sustainable for longer than six months (Halton and Hu, 2004; Pal and Ellis, 2010). Recent research has attributed the popularity of high protein diets to associated initial rapid weight loss (Campos-Nonato et al, 2017). Government organisations have specifically named the Atkins’ Diet (a high protein, low carbohydrate diet popular during the 1990’s and 2000’s for weight loss) in research (FSA, 2012), suggesting distorted public perceptions of healthy eating may be linked to high protein fad diets, particularly exasperating the opinion that starchy carbohydrates are “fattening”. The previous prevalence of this weight loss message could
explain relatively strong public opinions in this research that high protein diets are important for weight loss. Further qualitative study could provide insight to the reasons participants have these perceptions.

With vegetarianism and veganism becoming increasingly popular (Gandy, 2014; The Vegan Society, 2016) and WRCF guidelines (2007) citing red and processed meat products as being probable causes of cancers, the study endeavoured to examine whether there was a perceived link between high protein diets and non-communicable disease. This was a topic previously unexplored in the literature. The results of the questionnaire suggest that participants do not associate high protein diets with increased risk of cancers, CVD or diabetes (Figure 4). More males agreed (56.7%, n=17, p=0.013) that high protein diets were not associated with increased risk of CVD than females (36.1% (36.1%, n=13), a finding which was significant (p=0.013).

Of all the named non-communicable diseases, participants most frequently disagreed that high protein diets were associated with increased risk of Diabetes (Figure 4). It is known that overconsumption of energy from meat sources is contributing to obesity (You & Henneberg, 2016) and thus Type 2 Diabetes (T2DM). This finding may suggest that the public are unaware of the potential saturated fat content of meat and meat products. Another explanation may be that previous misconceptions that T2DM is caused by over-consumption of sugar (Diabetes UK, 2017) remain prevalent, and hence participants do not consider over consumption of energy in general a risk factor for T2DM.

The reliability of the data is limited by the quality of the research tool. The questionnaire asks participants about “protein” and its links with non-communicable diseases which does not give an opportunity to differentiate between animal and plant based protein sources. This is a significant limitation, as although in vitro studies support conclusions that high protein diets (60% of calories) can illicit cellular lesions (Monteiro et al, 2016), WCRF guidelines (2007) name large quantities of red and processed meats (exceeding 500g per week) as causes of cancer, rather than high protein diets in general. The protective properties of foods rich in anti-oxidants and dietary fibre should also be considered when assessing risk of non-communicable diseases (WCRF, 2007). This includes pulses, which are also high protein foods.
The reliability of the data regarding the relationship between high protein diets and non-communicable diseases could have been improved by restructuring the questionnaire to allow participants to comment on their opinions of plant and animal protein more specifically, rather than generalisation of protein sources. Additionally, the quantitative nature of the questionnaire limits opportunity to explore the reasons that the public do not associate high protein diets with disease. This may be a theme to explore in future qualitative research.

Another objective of the research was to compare public opinions of plant and animal protein sources. The results suggest that participants believe animal sources of protein were of better quality but less healthy than plant sources (Tables 6&7). Of note, participants were not required to name specific foods and therefore it is not clear whether participants were aware that plant sources of protein can also be unhealthy – for example heavily processed convenience foods or deep fried vegetarian substitutes.

Public perceptions of plant versus animal protein sources were a theme that had been previously under-explored in the literature. Results are consistent with the evidence base discussed in the introduction of this paper (WCRF, 2007) and current Eatwell guidelines (FSA, 2016), which may suggest participants’ perceptions have been influenced by government healthy eating guidelines. Previous research attributed national guidelines as a key influencer on public perceptions of nutrition (Parquette, 2005).

Similarly to discussions regarding high protein diets for weight loss, it is also possible that the perception that plant protein is a healthier option than animal protein is related to current dietary trends. Literature has reported a recent shift towards “plant-based” diets and conscious reduction in meat consumption (Dagevos & Voordouw, 2013). Although currently supported by paucity of evidence, increasing enthusiasm in the UK for vegetarian and vegan diets (Gandy, 2016) has been prevalent in the media and trends such as “Veganuary” becoming more popular (The Vegan Society, 2016). Considering healthy eating beliefs are often influenced by dietary trends (FSA, 2012), this may be an area for further exploration.

Although participants identified plant sources of protein as being healthier, they also reported consuming these least frequently (Figure 1). This finding may suggest that, as evident in previous research (Graca et al, 2015), perceptions of healthy eating are not consistent with actual food choices or dietary intake. Other research has explored the effect of culture on
dietary choices and suggested Westerners have an emotional attachment to meat (Graca et al, 2015).

Participants who identified as omnivores were statistically more likely to agree that animal sources of protein were of better quality (p=0.002) and healthier (p=0.000), suggesting that omnivores have more positive associations with animal sources of protein than those who do not eat meat. However, as the sample was heavily over representative of omnivores (Table 2), these statistics may not be reliable. Future research could more accurately examine the opinions of plant and animal protein amongst meat eaters and non-meat eaters by using a sample which evenly represents those who do and do not eat meat.

**Conclusion**

In conclusion, this small scale research offer broad insight into public perceptions of high protein diets, with the general finding that the public do not generally associate high protein diets with increased risk of non-communicable diseases (Figure 4). Participants most frequently valued high protein diets as being useful for weight loss and sports reasons. This may indicate that nutritional messages on attaining a balanced protein intake are required to highlight potential health risks of high protein diets to consumers.

Participants perceive plant protein sources to be a healthier option than animal sources (Table 7) yet also report consuming these least frequently (Figure 1). This perception could possibly be linked to current dietary trends and changes in nutritional guidelines (PHE, 2016) although further research is needed to establish this with certainty. Further research using a more qualitative approach may be indicated to further explore the effect of increased public interest in “plant-based” diets on perceptions of both protein and healthy eating.
Reference List


Food Standards Agency (FSA). (2012). Investigating how both consumers and health professionals understand healthy eating messages. [PDF]. Scotland: Ipsos Mori for FSA. Available at: https://www.food.gov.uk/sites/default/files/media/document/753-1-1294_FS244029_1_Ipsos-_FINAL.pdf. [Accessed: 05/05/18].


Appendices
Please see additional submission documents for:

Appendix 4: Clean Excel dataset
Appendix 5: SPSS output
Appendix 1: Ethics approval

Dear Applicant

Re: Application for Ethical Approval: Public perceptions of a high protein diet

Project Reference Number : 9204

Your ethics application, as shown above, was considered by the Health Care and Food Ethics Panel on 28/06/2017.

I am pleased to inform you that your application for ethical approval was APPROVED. Minor issues may still need addressing before you commence any work – if so these will be listed below.

N/A

Where changes to the information sheet, consent form and/or procedures are deemed necessary you must submit revised versions to the relevant ethics inbox. If you are a student – your supervisor must do this on your behalf.

Note: Failure to comply with any issues listed above will nullify this approval.

Standard Conditions of Approval

1. Your Ethics Application has been given a Project Reference number as above. This MUST be quoted on all documentation relating to the project (E.g. consent forms, information sheets), together with the full project title.

2. All documents must also have the approved University Logo and the Version number in addition to the reference and project title as above.

3. A full Risk Assessment must be undertaken for this proposal, as appropriate, and be made available to the Committee if requested.

4. Any changes in connection to the proposal as approved, must be referred to the Panel/Committee for consideration without delay quoting your Project Reference Number. Changes to the proposed project may have ethical implications so must be approved.

5. Any untoward incident which occurs in connection with this proposal must be reported back to the Panel without delay.

6. If your project involves the use of human samples, your approval is given on the condition that you or your supervisor notify the HTA Designated Individual of your intention to work with such material by completing the form entitled “Notification of Intention to Work with Human Samples”. The form must be submitted to the PD (Sean Duggan), BEFORE any activity on this project is undertaken.

This approval expires on 28/06/2018. It is your responsibility to reapply / request...
extension if necessary.
Yours sincerely

Prof.

Chair of Department of Healthcare and Food Ethics Panel
Cardiff School of Health
Sciences Llandaf Campus
Western Avenue, Cardiff CF5 2YB
Tel:

Cc:
Appendix 2: Research tool

Thank-you for agreeing to take part in this questionnaire. The following questions aim to explore public perceptions of the effects of protein in their diet. Completion of the questionnaire indicates your consent for the data to be used in the study. Due to confidentiality and data protection, your questionnaire cannot be withdrawn once it is submitted. If you require any further information, please contact Katherine Gallimore (project supervisor) at kgallimore@cardiffmet.ac.uk

When answering the questionnaire, please consider the sources of protein in your diet including all meals and snacks.

Ethics number: 9204

1) What sources of protein do you most commonly consume? (tick one or more that apply)

☐ Meat
☐ Poultry
☐ Fish
☐ Dairy
☐ Eggs
☐ Quorn
☐ Tofu
☐ Plant sources – including lentils, beans and nuts
☐ Protein products for sports nutrition
☐ Other – please state ___________________________

2) Estimate how many handful sized portions of protein you consume daily:

☐ One or less
☐ 2-4
☐ 5-7
☐ More than 7

3) To which of the following groups do you believe a high protein diet would be beneficial? (tick one or more that apply)

☐ Anyone can benefit from a high protein diet
☐ Children and adolescents
☐ Over 65’s
☐ People who participate in sports for leisure
☐ Professional athletes
☐ People with chronic diseases - e.g liver disease
☐ People with acute conditions - e.g recovering from surgery
Please circle an option to indicate how strongly you agree or disagree with the following statements:

1) I consciously consider my protein intake when planning and/or consuming meals

   Strongly Agree  Agree  Disagree  Strongly Disagree

2) It is important to consume protein as it is an important component of a balanced diet

   Strongly Agree  Agree  Disagree  Strongly Disagree

3) It is NOT important to consume protein in order to aid weight loss

   Strongly Agree  Agree  Disagree  Strongly Disagree

4) It is important to consume protein to build muscle, or for other sports-related reasons

   Strongly Agree  Agree  Disagree  Strongly Disagree

5) It is important to consume protein because I believe it is protective against disease

   Strongly Agree  Agree  Disagree  Strongly Disagree

6) It is NOT important to limit my protein consumption to reduce my risk of cancer

   Strongly Agree  Agree  Disagree  Strongly Disagree

7) It is important to limit my protein consumption to reduce my risk of diabetes

   Strongly Agree  Agree  Disagree  Strongly Disagree

8) It is NOT important to limit my protein consumption to reduce my risk of coronary heart disease

   Strongly Agree  Agree  Disagree  Strongly Disagree

9) Meat provides a higher quality source of protein than plant sources

   Strongly Agree  Agree  Disagree  Strongly Disagree

10) Animal protein is a healthier option than plant protein

    Strongly Agree  Agree  Disagree  Strongly Disagree

Please tick an answer:

Gender

☐  ☐
Male    Female □ Prefer not to say

Age
□ 18-24 □ 25-34 □ 35-44 □ 45-54 □ 55 or over

Highest level of education attained eg GCSE, A-level, BSc degree, Masters, Doctorate, Professor – please state
........................................................................................................

Please tick the option that best describes your activity level:
□ Sedentary – little or no exercise
□ Moderately Active – eg a person running for one hour daily
□ Vigorously Active – eg an agricultural worker
□ Extremely Active – eg a competitive sports person

Please tick the option that best describes your diet:
□ Omnivore
□ Vegetarian
□ Pescatarian
□ Vegan
□ Other – please state: ______________________

Thankyou!
Appendix 3: Participant Information Sheet

Project reference number: 9204

Title of Project: Public perceptions of a high protein diet

This project was stimulated by previous research investigating the links between high protein diets and non-communicable diseases. Current market research suggests increased consumption of meat and of products marketed as high-protein. This project aims to explore public opinions and awareness of the potential effects of a high protein diet, in order to help develop future public health initiatives.

- This is an invitation to you to join the study, and to let you know what this would involve. The study is being organised by a final year BSc (Hons) Human Nutrition and Dietetics student at Cardiff Metropolitan University.
- If you want to find out more about the project, or if you need more information to help you make a decision about joining in, please contact the study supervisor.

Your Participation in the Research Project

Why you have been asked

In order to gather the maximum number of participants possible, we are asking anybody over the age of 18 to take part. This is so that we can guarantee informed consent.

What happens if you want to change your mind?

If you decide to join the study you can change your mind and stop part way through the completing the questionnaire. You will not be asked why you’ve stopped. We will completely respect your decision.

If you choose to complete the questionnaire in full, you are consenting to take part in the research. Once your questionnaire has been submitted, you will be unable to withdraw from the study as all data will be anonymous, meaning we will be unable to return your questionnaire.

What would happen if you join the study?

If you agree to join the study, then we will ask you to complete a questionnaire about your protein intake, and your opinions regarding protein. This will be given to you, and we think this would take you about 10-15 minutes to complete and hand back to us. There are no right or wrong answers – the study is purely designed to explore public perceptions.

Are there any risks?

We do not think there are any significant risks if you take part in the study. A healthy eating fact sheet will be provided, in case you decide you would like more information about protein as part of a healthy diet.
**Any special precautions needed?**

None

**What happens to the questionnaire results?**

Sophie Brown is responsible for putting all the information from the study into a computer programme. We will then look to see if there is a general trend regarding the publics’ perception of protein, and whether there are any further links between opinions and demographic factors, including age, gender and education level.

**Are there any benefits from taking part?**

There are no direct benefits to you for taking part.

**How we protect your privacy:**

All the information we get from you is anonymous, and everyone working on the study will respect your privacy.

All questionnaires are anonymous and we will not require your name or any personal details from you. There is no information on the questionnaire that could let anyone work out who you are.

During the study, all data will be password protected. At the end of the study we will destroy the information we have gathered.