Cyflwynwyd yr ymateb i ymgynghoriad y Pwyllgor Iechyd a Gofal Cymdeithasol ar Atal iechyd gwael - gordewdra

This response was submitted to the Health and Social Care Committee consultation on Prevention of ill health - obesity

OB20 : Ymateb gan: Professor Jeff Brunstrom, Professor of Experimental Psychology; Dr Dani Ferriday, Senior Lecturer; Dr Annika Flynn, Research Associate; Emeritus Professor Peter Rogers, Professor of Biological Psychology

| Response from: Professor Jeff Brunstrom, Professor of Experimental Psychology; Dr Dani Ferriday, Senior Lecturer; Dr Annika Flynn, Research Associate; Emeritus Professor Peter Rogers, Professor of Biological Psychology

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Senedd Cymru Welsh Parliament Health and Social Care Committee inquiry into the prevention of ill health – obesity: Written evidence from the Nutrition and Behaviour Unit at the University of Bristol

About the Nutrition and Behaviour Unit (University of Bristol)

The Nutrition and Behaviour Unit has been established since 2006 and it forms one of the largest groups of its kind studying human food choice, dietary behaviour, and appetite control.

Located within the School of Psychological Science at the University of Bristol, our work has been supported by a range of funding agencies, including; BBSRC, ESRC, EPSRC, EU FP7, MRC, and NIHR.

Currently, members of the NBU (Professor Jeff Brunstrom and Dr Dani Ferriday) lead the UK BBSRC-OIRC 'Consumer Lab' hub – a 5-year initiative to build partnerships between academic and industry researchers, exploring ways to facilitate the translation of academic research to enable the food industry to deliver a healthier diet.

Brunstrom and Ferriday are also affiliated with the Population Diet and Physical Activity Theme of the Bristol-NIHR Biomedical Research Centre.

This submission is made on behalf of the following researchers:

Professor Jeff Brunstrom, Professor of Experimental Psychology
Dr Dani Ferriday, Senior Lecturer
Dr Annika Flynn, Research Associate
Emeritus Professor Peter Rogers, Professor of Biological Psychology

Executive Summary

This submission addresses bullet point 1 “gaps/areas for improvement in existing policy and the current regulatory framework (including in relation to food/nutrition and physical activity)” and bullet point 2 “the impact of social and commercial determinants on obesity” being considered by the Committee.

Gaps/areas for improvement in existing policy and the current regulatory framework (including in relation to food/nutrition and physical activity)

1) We have concerns about the *quality* of the evidence base that is often used to inform policy, in particular research associating dietary decisions and behaviours to ill health and obesity.
    a. Evidence in this area is primarily derived from observed correlations between food choice and obesity. There is little acknowledgement that correlations can be explained by confounding variables and/or reverse causality. To implement evidence-supported strategies that reduce obesity, researchers need to demonstrate that consumption of particular foods and/or diets *causes* obesity and ill health.
    b. Randomised controlled trials (RCTs) can be used to investigate causality. However, there are concerns about ecological validity and a failure to account for dietary adaptation (changes in behaviour can occur over time).
2) We have concerns about the *interpretation* of the evidential base by researchers and commentators.
    a. Claims are often oversimplified and are made without reference to a long history of research which relates food composition to dietary behaviour.
    b. Claims are often made based on intuition or, perhaps mistakenly, based on the assumption that causal associations are grounded in scientific evidence when this evidence is missing.

The impact of social and commercial determinants on obesity

There is a tendency to view consumers as ‘passive recipients’ of products that have been developed and marketed by the food industry. This narrative overlooks a complex reciprocal relationship between consumers and producers. Consumer preference is governed by food composition, and, in turn, this drives product development.

We recommend:

1. Future research funding calls should encourage researchers to include ‘scientific triangulation’ in their approach - stronger scientific conclusions can be drawn when different methods are used, and findings coalesce around the same conclusion.
2. The Welsh Government convenes groups of experts to produce consensus statements on what is and is not known about effects of foods/diets (e.g. low-calorie sweeteners and ultra-processed foods) and energy balance, and publish guidance on conducting, reporting, and interpreting research in this area.
3. To improve population-level diet and health, funding agencies (e.g. Life Sciences Hub Wales) should actively promote academic-industry collaborations.

Response to "Gaps/areas for improvement in existing policy and the current regulatory framework (including in relation to food/nutrition and physical activity)"

Policy decisions should be guided by high-quality evidence. Here, we have concerns about research associating dietary decisions and behaviours with ill health and obesity.

Studies in non-human animals can help to provide evidence for causal mechanisms. However, with animal data alone, it can be difficult to estimate likely effect sizes in human populations. By contrast, studies revealing population-level associations between foods and health outcomes can indicate real-world effect sizes. However, causal inference is more challenging in these observational studies.

To illustrate this point, a reliable association is often observed between skipping breakfast and risk of overweight or obesity. However, RCTs do not show that skipping breakfast increases body weight. If anything, they show a reduction in calorie intake and body weight. Similarly, there is a positive association between low-calorie sweetener consumption and having overweight or obesity, but RCTs show that replacing some of the sugar in the diet with low-calorie sweeteners reduces body weight. RCTs also show that the effect on body weight of long-term consumption of low-calorie sweetened drinks is equivalent to the effect of consuming water.

In these examples, the different outcomes for correlational and intervention studies (RCTs) can mainly be explained by reverse causality. For example, to reduce calorie intake and body weight, a person with obesity might skip breakfast or use low-calorie sweeteners. As such, these examples illustrate why caution needs to be applied when evaluating evidence based solely on a correlation.

Another problem with correlational evidence is 'confounding.' Here, a relevant example is the finding that missing breakfast in young people is associated with poorer educational attainment. This evidence has been used to support the setting up of school breakfast clubs. However, an unintended consequence is that some children then consume two breakfasts – one at home and one at school, thereby increasing the risk of calorie over-consumption.

Furthermore, the evidence that missing breakfast, per se, harms learning performance is weak. Rather, the correlation between missing breakfast and educational outcomes is most likely explained by relatively more difficult home and family circumstances of young people who miss breakfast on school days. In other words, missing breakfast is a 'marker' for a less nurturing and perhaps less aspirational home environment. This confound is not, or cannot, be fully controlled for in the statistical analyses of the observational study datasets.

The potential for correlations to mislead us about causation matters. Without a sound evidential base, there is a risk that resource aimed at improving public health is misdirected.

To demonstrate causality, a common approach is to conduct randomised controlled trials, often in a university laboratory. In a typical study, volunteers (participants) are asked to consume a food or meal that has been reformulated. In a broader sense the term 'reformulation' refers to any change in visual appearance, taste, portion size, calorie content, source of protein, and so on. Reactions are often assessed using sensory and/or hedonic rating scales, and immediate or delayed food intake may be monitored. The body of literature drawing on this approach encompasses thousands of studies, conducted from the 1950's onward. These acute randomised controlled trials are popular because a reformulated food can be compared against a standard 'control', which enables researchers to draw conclusions about the effects of reformulation.

The ecological validity of laboratory-based studies is often challenged, partly because people behave unnaturally if they are aware they are being assessed. In addition, numerous observations also demonstrate that humans (as with other omnivores) adapt their food preferences and behaviours over time, and do so, for example, based on post-ingestive

feedback – in crude terms, biological signalling of the actual energy content of food. The upshot is clear – acute laboratory studies tell us little about whether a reformulated food will remain acceptable over time, and whether it will continue to deliver the net reduction in energy intake that is promised by a single observation.

Of course, one solution is to monitor responses at regular intervals and over a long period. Studies of this kind are conducted, but are rare by comparison, and often this is because their cost is prohibitive. Even single small-scale experiments (~80 participants) are labour intensive and often require a large budget, perhaps in excess of £100K. Consequently, monitoring tends to occur over only days or a few weeks. Moreover, and again reflecting cost, participant cohorts are woefully insufficient (perhaps powered only to detect medium-to-large effect sizes), which means that key population-relevant benefits are likely to be missed.

To illustrate this point, many studies have shown an acute effect of portion size on food intake (larger portions promote larger meals), which suggests that portion-size reformulations might aid weight loss. In response, a Public Health England report advocates for portion-size reformulation as part of their strategy for reducing overweight and obesity. However, this conclusion was drawn from acute studies. In 2018 a group from Penn State University reported results from a rare study that monitored the effect of consuming smaller portions over a 12-month period. This was a remarkable achievement. Nevertheless, participants who consumed smaller portions lost no more weight than a control group and, post intervention, they rejected smaller portions and regained weight even faster than controls. This point is made, not to rule out future portion-size interventions, but to demonstrate that extrapolating from acute studies is problematic and that the efficacy of dietary interventions needs to be assessed over extended periods. One promising solution might be to use novel methods of data capture (e.g.,supermarket loyalty card data and research conducted within real-world cafes and canteens) that can enable researchers to assess population-level behaviours over long periods.

Recommendation 1: Fund academic research that embraces 'scientific triangulation'

As outlined above, methods of data capture vary in their relative strengths and weaknesses. For this this reason, others promote the merits of 'scientific triangulation' – the idea that stronger scientific inference can be drawn when different methodological approaches produce outcomes that converge on the same conclusion. As an example, epidemiological studies (including those employing Mendelian randomisation) observe a relationship between sodium consumption and elevated blood pressure. In addition, intervention studies using a variety of methodologies (e.g., nutrition education, self-help materials, salt substitutes, and food reformulation) have found that a modest reduction in salt intake reduces blood pressure in hypertensive and normotensive participants. Because these different methods have different strengths and weaknesses, and because these studies draw the same conclusion, we can make a stronger claim about a causal association between salt consumption and elevated blood pressure.

Rather than merely advocating for scientific triangulation, **we recommend that future funding calls should strongly encourage researchers to include scientific triangulation in their approach**. In so doing, research quality will improve, along with the quality and strength of the scientific inference that can be drawn from this research.

Recommendation 2: Publish consensus statements and guidelines for standards of research in this area

We see a disconnect between researchers contributing to scientific evidence, and agencies, policymakers, and commentators, who are acting in the public interest but who are unaware

of scientific evidence, oversimplify it, or perhaps wrongly assume that evidence exists. Further, we argue that those who inform public debate around dietary behaviour often lack an understanding of the extant literature. In turn, this disconnect between scientists and other agencies leads to stronger-than-warranted conclusions about the impact of certain foods. In this regard, it is perhaps worth noting that the UK can boast considerable expertise in this area and 2024 marks nearly 50 years of one of the largest annual gatherings of experts in human eating behaviour in the world (The British Feeding and Drinking Group).

We recommend that the Welsh Government convenes groups of experts to produce and publish consensus statements on what is and is not known about effects of specific foods or ingredients (e.g., UPFs, low-calorie sweeteners) and energy balance, including a clear statement of the strength of the evidence supporting each claim.

Building on these consensus statements, **we recommend that the Welsh Government should commission a report outlining standards for research in this area.** This might form a guide for both academic and non-academic commentators alike, clarifying the relative merits of studies conducted in humans, non-humans, real-world settings, and so on, and highlighting the importance of discriminating studies based on factors such as experimental control, effect size, and the capacity to draw causal inference.

Response to "The impact of social and commercial determinants on obesity"

Recognising human 'nutritional intelligence'

There is a common misconception that the food industry drives trends in diet. However, we argue that the food industry is highly sensitive to consumer feedback and sales. Thus, it is the reciprocal industry-consumer relationship that drives trends in food and diet, not the food industry operating autonomously, and in isolation.

Scientists are motivated by the principle of parsimony – the idea that we should favour simple and concise explanations over those that are more complex. However, an underlying danger is that simplification leads to oversimplification.

In the case of nutritional psychology, we sometimes observe complex interactions with foods and our food environment, patterns which are reliable and replicable, but which are then translated into oversimplified 'universals' or 'principles' that can be easily communicated, but which fail to capture the complex patterns of behaviour on which they are grounded.

When this happens, they wrongly cast human interaction with food as simple and, in turn, this leads us to conclude that human dietary behaviour is passive and disengaged, and therefore our food intake is driven largely by the foods that are available to us, foods that are largely determined by 'the food industry.'

As an example, we often hear that overweight and obesity are caused by the food industry delivering increasingly energy-rich products. While the energy density of food is likely important and while it may be tempting to draw such a simple conclusion, human interaction with foods of varying energy density is far from simple, and decades of research, including our own (see for example, Brunstrom et al., 2018; Brunstrom et al., 2023; Flynn et al., 2022), suggests that the relationship is quite complex.

Studies conducted in a controlled laboratory environment sometimes suggest that humans are insensitive to the energy content of foods and that they eat the same weight (g) of food, regardless of its calorie content (Robinson et al., 2022).

However, studies assessing interactions with familiar, everyday foods, provide a different picture and demonstrate a surprising sensitivity to food energy density (Brunstrom et al., 2008; Brunstrom et al., 2018, Flynn et al., 2022; Flynn et al., 2023a, Flynn et al., 2023b).

More generally, human sensitivity to food composition is likely far more nuanced than many would lead us to believe, and it is also likely that the type of calorie (i.e., protein, fat, or carbohydrate) or other nutritional qualities of food (e.g., fibre and the blend of carbohydrate and fat) can influence dietary behaviour (Buckley et al., 2019, DiFeliceantonio et al., 2018; Perszyk et al., 2021; Rogers et al., 2024).

This implicit sensitivity to the composition of everyday foods (including even micronutrient content, Brunstrom & Schatzker, 2022) is captured in our concept of 'nutritional intelligence' (Brunstrom et al., 2023).

If consumers unconsciously discriminate and select foods based on their composition, then this means that the success or failure of a commercial product will, in part, be determined by this process.

Thus, rather than characterising the food industry as a force that drives diet and consumer behaviour, it might be more accurate to imagine consumers having collective agency. Specifically, their preferences and purchasing habits feedback to influence decisions around product innovation and reformulation, so the interaction between the consumer and the producer is reciprocal.

In summary, we would suggest that **the food and drink industry is not solely responsible for determining the foods on supermarket shelves**, that **the consumer and consumer preferences are key drivers as well**, and that this interplay should be acknowledged in discussions moving forward.

Research funding in collaboration with the food industry

Researchers who collaborate with pharmaceutical and medical device companies are often accused of a conflict of interest, even though these collaborations are actively encouraged by UKRI. This tendency to vilify certain groups of researchers extends to those who are funded by, or work in collaboration with, the food industry. Often this is based on the false assumption that their research and its interpretation will be biased, failing to recognise the myriad sources of bias and incentives that can influence academic research, irrespective of its funding source.

Issuing unsubstantiated challenges to the personal and academic integrity of industry-funded researchers has other negative consequences; it is time-consuming, it undermines public confidence in science, and it polarises the academic community, which prevents some of our best scientists from working on problems that could bring immediate population-level benefit.

When researchers work with the food industry, conflicts of interest are often claimed. However, equally problematic is 'white-hat bias.' White-hat bias occurs when research takes place in the service of what may be perceived to be righteous ends, but which leads to the distortion of information and a failure to interpret outcomes objectively. In this regard, researchers who have an interest in obesity and its attendant causes may be especially vulnerable. Indeed, there are examples of white hat bias in obesity research, yet this is rarely acknowledged. Our proposed triangulation approach (outlined above) will also help to minimise the risk of this kind of bias.

A final benefit of encouraging academic-industry collaboration is that it ensures that academic research is actionable and that it can be easily translated and used by the food industry to promote human health.

Recommendation 3: Actively promote academic-industry collaborations to improve population diet and health

With our 5-year BBSRC OIRC 'Consumer Lab', we are already seeing the benefits of promoting academic-industry partnerships. Building on this success, and that of other BBSRC OIRC hubs, we recommend that even greater resource should be allocated.

Indeed, rather than polarising academic and industry researchers, we should be working together to deliver the tools and knowhow that will be needed to effect meaningful population-level changes to purchasing and eating habits.

To do this, **we need to build academic-industry partnerships that can leverage fundamental research on consumer behaviour**. In turn, **this will generate theory-driven strategies that de-risk product innovation and deliver new products that are both healthy and commercially viable**.