Institution: University of Southampton

Unit of Assessment: 04 Psychology, Psychiatry and Neuroscience

Title of case study: 04-01 Food for Thought: Shaping Europe-Wide Policy on Additives and Colourings

1. Summary of the impact

The University of Southampton's Food Additives and Behaviour in Children (FABIC) study has driven major changes in food processing and labelling policies. As a direct result of the research, the UK's Food Standards Agency recommended six artificial colourings – which have come to be known as the 'Southampton Six' – be removed from food. In addition, the European Parliament now requires clear labelling to indicate the use of these colourings, as well as an accompanying warning about their effects on attention and behaviour in children. The risk of youngsters throughout Europe being exposed to potentially harmful additives has thus been significantly reduced.

2. Underpinning research

Forty years ago American scientist Benjamin Feingold proposed that artificial food colourings and additives caused hyperactivity in children. His contention sparked a decades-long debate over the existence of a clear and proven link between food additives and Attention Deficit Hyperactivity Disorder (ADHD) in young children. Jim Stevenson, Professor of Developmental Psychopathology at the University of Southampton, was principal investigator on a 2003 paper that showed adverse behavioural reactions in children as a result of food additives. The UK Food Standards Agency argued the data was inconclusive but, in search of a definitive answer on which to base future policy decisions, funded Southampton to carry out a £750k study between 2004 and 2007 to investigate whether artificial food additives could cause hyperactivity in children. Principal investigators on the Food Additives and Behaviour in Children (FABIC) study were Professors James Stevenson and Edmund Sonuga-Barke both of the School of Psychology; and John Warner, then Professor of Child Health in the School of Medicine, who moved to Imperial College London in 2006.

The rigorously designed landmark trial studied a representative sample of 300 children selected from the general population, aged either three or eight, over a period of seven weeks. The additives studied were Tartrazine (E102), Ponceau 4R (E124), Sunset Yellow (E110), Camoisine (E122), Quinoline Yellow (E104) and Allura Red (E129) (now known internationally as the 'Southampton six'), which are commonly found in sweets, biscuits and soft drinks. The children were given one of three drinks: one containing a powerful mix of colourings and additives; one representing average daily additive intakes; and a placebo that was additive-free. Researchers also carried out direct observations in classrooms and conducted regular interviews with parents and teachers.

The findings, published in *The Lancet*, showed a significant increase in ADHD-type behaviour, including impulsive behaviour and loss of concentration, in children from both age groups. The size of this effect was not affected by clinical or background factors. In their report to the Council of the Food Standards Agency the Southampton research team said the size of the effect of food colours on hyperactivity was comparable to the size of the effect of elevated lead levels on children's IQ, as demonstrated in other studies. The academics estimated 6.6 per cent of children in the UK aged 3 to 12 – a total of 462,000 – suffer from ADHD, the most common behavioural disorder in the UK, and that the figure could be reduced by 30 per cent (or 140,000) if the additives were banned.

3. References to the research

3.1 McCann, D, Barrett, A, Cooper, A, Crumpler, D, Dalen, L, Grimshaw, K, Kitchen, E, Lok, K, Porteous, L, Prince, E, Sonuga-Barke, E, Warner, J O and Stevenson, J (2007): Food

Additives and Hyperactive Behaviour in Three-Year-Old and Eight/Nine-Year-Old Children in the Community: A Randomised, Double-Blinded, Placebo-Controlled Trial, Lancet, 370, 1560-1567. (cited 424 times Google scholar)

3.2 Stevenson, J, Sonuga-Barke, E, McCann, D, Grimshaw, K, Parker, K, Rose Zerili, M J, Holloway, J W, Warner, J O (2010): The Role of Histamine Degradation Gene Polymorphisms in Moderating the Effects of Food Additives on Children's ADHD Symptoms, American Journal of Psychiatry, 167, 1108-1115. (cited 29 times Google scholar).

Project grant

'Food Additives and Behaviour', from the Food Standards Agency', awarded 2004-2007 to University of Southampton with PIs Stevenson, Warner and Sonuga-Barke. (Grant value: £750,000).

4. Details of the impact

The FABIC study was wholly responsible for the withdrawal of six food additives from the shelves of major supermarkets and the menus of leading fast-food restaurants in the UK, eventually forcing a change in European Union legislation. This reduced the risk of children across Europe – including the estimated 462,000 in the UK suffering from ADHD – being exposed to these potentially harmful food colourings. ***Children's health was thus improved through the reduction of hyperactivity associated with difficulties in learning to read, wider behavioural issues in later childhood and social isolation [5.1, 5.2].***

Although it commissioned the study, the Food Standards Agency (FSA) initially contested the findings published in *The Lancet* in 2007. But huge pressure from international media and consumer groups, combined with lobbying from the Southampton study authors, pushed the issue up the political agenda. Although much of the widespread media coverage – including front-page news in *The Guardian* and lead items on BBC Radio 4's *Today* – occurred in September 2007, before the beginning of REF 'impact period', the weight of public interest ensured its impact continued into 2008. For example, the *Daily Mail* launched a 'Ban the Additives' campaign and provided continued coverage in 2008 **[5.4]**. It claimed support from all the major supermarkets in the UK and pledges from numerous firms, including Cadbury and Mars, to remove the colourings. The FABIC study remains one of the most highly covered stories released by the University of Southampton press office. Two months after the study was published the Food Commission, a not-for-profit company that campaigns for healthier and safer food in the UK, launched 'Action on Additives', a campaign to list all the foods, drinks and medicines containing the six additives **[5.5].**

In January 2008 the Parliamentary Food and Health Forum, comprising peers and MPs from all parties, recommended a ban on the six and criticised the FSA for failing to protect children. In April 2008 the FSA called for a voluntary ban on the colourings, which it now referred to as the 'Southampton Six' **[5.1].** A legal ban could not be enacted by UK legislation, but the FSA formally recommended government ministers back a Europe-wide ban. Referring to Southampton's research, the FSA said it had based its recommendation on 'a scientific study of the highest quality' **[5.1].** The Southampton team provided the European Food Standards Agency (EFSA) with evidence and raw data, responded to queries and attended an EFSA working group meeting in Brussels***. In July 2008 the European Parliament voted in favour of a legal requirement to label foods containing the 'Southampton Six' with the words 'May have an adverse effect on activity and attention in children' [5.3].***

In November 2008 UK ministers accepted the FSA's proposal for a voluntary ban. Since then the issue has remained in the spotlight through continued pressure from consumer groups and the media. An online survey of more than a thousand mothers by Net Mums, a website with 4 million visitors, showed 87% wanted the additives removed and 98% were worried about the colourings' impact on their children's health and behaviour **[5.6]** – statistics quoted on BBC Five Live and ITN News. In 2009, as part of its ongoing review of food additive safety **[5.7],** the EFSA lowered the

Acceptable Daily Intakes for three of the six colourings.

According to the FSA's figures in January 2012, in the UK the product lines of 10 leading restaurant chains, including McDonald's and Pizza Hut, 90 food manufacturers, including Heinz and Northern Foods, and 15 food retailers, including Tesco and Sainsbury's, are free from the 'Southampton Six' [5.8]. This reflects the FABIC study's impact on a multi-billion-pound industry. According to a 2011 report by Leatherhead Food Research, 'The Global Food Additives Market' **[5.9]**, global sales of food and drink additives reached $27.4bn in 2010. However, the report noted: 'The trend towards natural and/or additive-free food and drinks is expected to continue in the short term, largely due to increasing consumer concern over artificial ingredients.'

The US Food and Drug Administration assessed the research, but it required evidence of harm from individual food colourings and so chose not to act. While the UK government is prepared to consider the precautionary principle when developing policy on food, pressure from a profit-driven industry acts as a powerful political restraint in the US. Nonetheless, ***through media coverage and consumer pressure groups, the Southampton study has informed the public debate over the safety of food additives in the United States.***

In 2009 a paper was published specifically on the impact of the FABIC study on government policy **[5.10]**.

5. Sources to corroborate the impact

5.1 For the UK government's response to this research – i.e. recommendations to eliminate the six additives in the original study – see Food Standards Agency webpage 13 Nov 2008:

http://webarchive.nationalarchives.gov.uk/20120206100416/http://food.gov.uk/news/newsarchive/2008/nov/colours

5.2 Following the UK government's decision there were calls for the same additives to be phased out across the EU. http://www.foodnavigator.com/Financial-Industry/Renewed-calls-for-European-ban-on-Southampton-additives

5.3 The EU Parliament responded positively to these calls:http://www.europarl.europa.eu/sides/getDoc.do?language=EN&type=IM-PRESS&reference=20080624BRI32584&secondRef=ITEM-004-EN

5.4 http://www.dailymail.co.uk/news/article-480448/Now-ban-food-additives-Daily-Mail-Campaign-begins.html

5.5 http://www.foodcomm.org.uk/campaigns/additives/

5.6 http://www.netmums.com/family-food/healthy-eating/food-nasties/food-additives-and-bad-behaviour

5.7 http://www.netmums.com/family-food/healthy-eating/food-nasties/food-additives-what-mums-want

5.8 http://food.gov.uk/multimedia/pdfs/board/info120101.pdf

5.9 http://www.leatherheadfood.com/mixed-outlook-for-the-global-additives-market-says-leatherhead-food-research

5.10 Paper specifically on the impact of the FABIC study on government policy. Lofstedt, Ragnar (2009): Risk Communication and the FSA: The Food Colourings Case, Journal of Risk Research, 5, 537-557.