Institution: University of Leeds

Unit of Assessment: 4

Title of case study: Breakfast research informs national school breakfast provision, local public health breakfast interventions, and Corporate Social Responsibility marketing.

Period when the underpinning research was undertaken: 2005-2020

Details of staff conducting the underpinning research from the submitting unit:

Name(s):	Role(s) (e.g. job title):	Period(s) employed by submitting HEI:
Louise Dye	N8 Chair and Professor of Nutrition and Behaviour	1994-present
Clare L Lawton	Associate Professor in BioPsychology	1990-present
Alexa Hoyland	PhD Student; KTP Associate	2005–2009 2009-2012
Katie Adolphus	PhD Student; Postdoctoral Research Fellow	2010-2014 2014-2016; 2017-present

Period when the claimed impact occurred: 2013-2020

Is this case study continued from a case study submitted in 2014? N

1. Summary of the impact (indicative maximum 100 words)

Our research, demonstrating positive effects of breakfast consumption on cognitive function, academic performance, and in-class behaviour in children and adolescents has created impact in three areas: 1) Evidence-based policy change in England: it has expanded the government-funded national school breakfast programme, benefiting over 650 additional schools in England. It also helped successfully pass the first reading of the School Breakfast Bill in Parliament. 2) Health and wellbeing: it has expanded a food industry-funded national breakfast club programme, benefiting 300 additional schools. It has also prompted a Local Authority Public Health breakfast intervention to mitigate the impact of the covid-19 (CV-19) pandemic lockdown on children's health and wellbeing. 3) Commercial impact in the food industry: it has helped a global food company deliver evidence-based Corporate Social Responsibility marketing.

2. Underpinning research (indicative maximum 500 words)

First systematic review on the effect of breakfast on cognitive performance in children and adolescents.

Despite the widely held view that breakfast is good for performance, prior to 2009, there had been no systematic review of the evidence. In 2009, Hoyland, Lawton, and Dye published the first systematic review of the effect of breakfast on cognitive performance in children and adolescents **[1].** This work was updated in another systematic review published in 2016 by Adolphus, Lawton and Dye **[2]**. Taken together, there was consistent evidence that breakfast consumption relative to fasting has a short-term (same morning) positive, domain specific, effect on cognitive function.

First large randomised controlled trial (RCT) on the acute effect of breakfast on cognitive function in deprived British schoolchildren.

Our systematic review highlighted priority design recommendations for research in this field **[1]**. In 2011, these were implemented in the largest RCT conducted to date of the acute effect of breakfast (ready-to-eat-cereal [RTEC] and milk) vs. no breakfast on cognitive function in adolescents **[3]** by Hoyland, Adolphus, Lawton, and Dye. This study demonstrated that consuming RTEC and milk for breakfast vs. fasting has a positive acute effect on reaction time, visual-sustained attention, and visual-spatial memory.

First systematic review of the effects of breakfast on academic performance and in-class behaviour in schoolchildren.

Direct measures of academic performance and behaviour in the classroom have most relevance to pupils, parents, teachers, and educational policy makers and as a result have greatest potential impact. In 2013, Adolphus, Lawton and Dye published the first systematic

review of the effects of breakfast on behaviour and academic performance in children and adolescents **[4]**. Our review concluded that both habitual breakfast consumption and school breakfast programmes are positively associated with academic performance in children and adolescents. The review was reported globally in the Huffington Post, New York Times, Sydney Morning Herald, and Canberra Times.

First study on the association between habitual school-day breakfast consumption frequency and academic performance in British adolescents.

Following publication of our systematic review **[4]**, Adolphus, Lawton and Dye conducted the first study to examine the relationship between habitual school-day breakfast consumption and GCSE attainment **[5]**. Our key findings (published in 2019) showed that skipping school-day breakfast was negatively associated with GCSE performance. This is the first study to demonstrate a relationship between eating breakfast and GCSE performance.

The extent of skipping breakfast demonstrated in a large representative sample of UK schoolchildren.

Prior to 2012, UK-specific data on breakfast consumption patterns in schoolchildren from large representative samples were not available. In 2012, we published a study examining breakfast consumption patterns in a large representative sample of UK schoolchildren aged 5-15 years **[6].** The findings showed that, on average, one in seven UK schoolchildren had nothing to eat at breakfast (14%).

3. References to the research (indicative maximum of six references)

1. **Hoyland**, A., **Dye**, L., & **Lawton**, C. L. (2009). A systematic review of the effect of breakfast on the cognitive performance of children and adolescents. *Nutrition Research Reviews, 22*(02), 220-243. doi: doi.org/10.1017/S0954422409990175.
   Peer-reviewed journal article. First systematic review of the effects of breakfast on cognition in children and adolescents. >600 citations to date.
2. **Adolphus**, K., **Lawton**, C. L., Champ, C .L., & **Dye**, L. (2016). The effects of breakfast and breakfast composition on cognition in children and adolescents: A systematic review. *Advances in Nutrition.* 7(3), 590S-612S. doi: doi.org/10.3945/an.115.010256.
   Peer-reviewed journal article. The updated review extended our earlier work by evaluating the effects of breakfast by cognitive domain, highlighting those that are more sensitive to the effects of breakfast consumption. It is ranked by Altmetric Attention Score in the top 5% of all research outputs scored.
3. **Adolphus**, K., **Hoyland**, A., Walton, J, Quadt, F., **Lawton**, C. L., & **Dye**, L. (Research report for external body). Breakfast compared with no breakfast has a positive acute effect on cognitive function and subjective state in 11-13 year olds: A school-based, randomised controlled trial. Can be supplied by the University on request.
   This study provided new evidence under highly ecologically valid conditions. It was conducted as part of a Knowledge Transfer Partnership (KTP) with Kellogg's and was awarded the highest grade of "outstanding" by the KTP Grading Panel.
4. Adolphus, K., Lawton, C. L., & Dye, L. (2013). The effects of breakfast on behaviour and academic performance in children and adolescents. *Frontiers in Human Neuroscience*, *7*. doi: doi.org/10.3389/fnhum.2013.00425.
   Peer-reviewed journal article. First systematic review of the effects of breakfast on behaviour and academic performance in children and adolescents. It has received >420,000 views, is ranked by Altmetric Attention Score in the top 5% of all research outputs scored and is among the highest-scoring outputs from this journal (#11 of 5,703). >350 citations to date.
5. Adolphus, K., Lawton, C., & Dye, L. (2019). Associations between habitual school-day breakfast consumption frequency and academic performance in British adolescents: A cross-sectional study. *Frontiers in Public Health.* doi: doi.org/10.3389/fpubh.2019.00283
   Peer-reviewed journal article. First study to examine the relationship between habitual school-day breakfast consumption and GCSE attainment employing performance indicators used within the education system. The focus on school-day breakfast consumption in this relationship was novel and renders the study findings particularly relevant for informing school-based interventions. It is ranked by Altmetric Attention Score in the top 5% of all research outputs scored.
6. Hoyland, A., McWilliams, K. A., Duff, R. J., & Walton, J. L. (2012). Breakfast consumption

in UK schoolchildren and provision of school breakfast clubs. *Nutrition Bulletin, 37*(3), 232-240. doi: doi.org/10.1111/j.1467-3010.2012.01973.x
Peer-reviewed journal article. First study examining patterns in breakfast consumption in a large representative sample of UK schoolchildren aged 5-15 years

Grants, Strategic Partnerships, and RCUK-funded Research Studentships:

- Cargill/Nestec (2008) - GBP55,000
- ESRC, BBSRC, TSB, Kellogg's (2009) – Knowledge Transfer partnership - GBP148,500
- Kellogg's (2010-2016) – GBP170,000
- Kellogg's - GBP110,000 (October 2011 - present)
- ESRC 1+ 3 PhD studentship to Alexa Hoyland 2005-2009
- ESRC Collaborative Award in science and Engineering (CASE) PhD studentship to Katie Adolphus 2010-2013. Collaborative external partner: The Schools Partnership Trust.

4. Details of the impact (indicative maximum 750 words)

Research informs evidenced-based policy and legislation:

National School Breakfast Programme

Our research **[1-5]** has informed evidence-based policy change in England and led to the renewal of funding of the National School Breakfast Programme (NSBP) in 2020. The NSBP is funded by the Department for Education and is delivered by two national charities: Magic Breakfast and Family Action. The NSBP gives children in the most disadvantaged areas of England access to a healthy breakfast at school, without barrier or stigma. It supports schools in socio-economically deprived areas across England. Schools are eligible for the NSBP if ≥50% of pupils fall within the most disadvantaged bands (A-F) in the Government's Income Deprivation Affecting Children Index (IDACI;) and they either have no existing breakfast provision, or the breakfast provision has scope for improvement. The programme offers each school free, healthy breakfast food delivered direct to the school, support from a dedicated member of NSBP staff, a detailed resource pack, and a GBP500 start-up grant.

Between September 2019 and December 2019, Magic Breakfast and Family Action used our research **[1-5]** as the central empirical evidence in advocacy campaigns calling on the government to renew funding of the NSBP beyond March 2020. Dr Katie Adolphus was selected by Magic Breakfast and Family Action as the opening speaker at a House of Commons Policy Roundtable (Sept 2019; **[A]**), which called on the government to renew funding. She provided the scientific evidence **[1-5]** demonstrating that breakfast improves cognitive function, academic performance, and in-class behaviour, to prompt evidence-based policy change. Our research **[2,4]** informed, and is cited throughout, a Magic Breakfast policy proposal **[B],** circulated to MPs for consideration during the event. We produced a joint press release, based on our research **[5]**, with the University of Leeds press office, Family Action, and Magic Breakfast **[C]**. The press release led with the new findings showing that skipping breakfast is associated with lower GCSE grades and called on the government to extend the NSBP. The study was reported in national media including the Independent, The Daily Telegraph (also in print), Daily Mail, The Times (also in print), The Sun (also in print), and iNews. In January 2020, Family Action and Magic Breakfast were granted a one-year GBP11.8 million extension to the original contract, to run the NSBP until March 2021 **[D]**. This funding allowed them to roll-out clubs to 650 more schools giving over 180,000 thousand children in disadvantaged areas the opportunity to attend a breakfast club. Initial funding of GBP23.7 million allowed the NSBP to run between March 2018 and March 2020. The Chief Executive Officer of Magic Breakfast stated that our research **[1-5]** had *"been so crucial in the campaign to ensure children no longer experience food insecurity and can access healthy meals."* **[E]**. The NSBP has improved mental and emotional wellbeing and dietary habits in schoolchildren. Eighty-two percent of teachers surveyed by Magic Breakfast reported observing improvements in children's mental and emotional wellbeing as a result of school breakfast provision **[B]** and 90% of teachers in Magic Breakfast schools reported observing an improvement in children's healthy eating habits since establishing such a provision **[B].**

The School Breakfast Bill

On October 8th 2020, our research **[1-5]** was used as the central empirical evidence at a

Magic Breakfast and Feeding Britain parliamentary briefing on The School Breakfast Bill: primary legislation requiring all state-funded primary and secondary schools in England – including academies, free schools, special schools, and pupil referral units – to provide children with access to a healthy school breakfast. The Bill gives schools with significant evidence of need (at least 50% of pupils in IDACI bands A-F) the required support to provide a free nutritious breakfast meeting School Food Standards, to all children. The school support guarantees funding to cover the costs of food, delivery, and additional staff time. The Bill also places a requirement on the Department for Education to provide additional funding for the food and delivery costs of providing school breakfasts in schools which do not have 50% of pupils in IDACI bands A-F if a school requests it. The briefing aimed to gain cross-party support for the Bill, and engage Department for Education officials in the Bill, prior to its presentation to Parliament on October 14th 2020 through a 10-minute rule motion. Dr Katie Adolphus was selected by Magic Breakfast as the academic speaker at the Bill's parliamentary briefing **[F]**. She was the only speaker to provide the scientific evidence **[1-5]** showing that breakfast improves cognitive function, academic performance, and in-class behaviour, to prompt the adoption of evidence-based legislation. A Magic Breakfast policy proposal **[G]** was circulated, citing our research in order to secure cross-party support amongst MPs for the bill. The policy proposal and presentation during the briefing, both led with our findings showing that children who ate breakfast regularly achieved an average of 2 GSCE grades higher than children who rarely ate breakfast **[5].** The School Breakfast Bill was presented to Parliament by Emma Lewell-Buck MP in its first reading on 13th October 2020. In her speech **[H]**, she reported the findings from our study **[5]** in order to empirically support the Bill: "*Schools in my constituency have said that, without this Bill, they may have to charge for or cease breakfast provision next year. Research by the University of Leeds found that children who eat a regular breakfast achieve an average of two GCSE grades higher than those who rarely eat breakfast. Not only is the Bill the morally right thing to do; it clearly makes no long-term economic sense to deprive children of this vital meal* **[H].** Because of this scientific support, the School Breakfast Bill passed its first reading in Parliament. The date of the second reading of the Bill is still to be announced. As of 31st December 2020, 70 MPs supported the Bill demonstrating cross-party political support **[H]**. This includes key MPs such as Robert Halfon, who demonstrated his support in an article in iNews and reported the findings of our study **[5]** as a key reason for supporting the Bill, "*Third, a recent study from the University of Leeds found that children who ate breakfast regularly achieved an average of two GCSEs higher than those who did not. There is an opportunity here to tackle the widening attainment gap between disadvantaged pupils and their better-off peers which is estimated to increase by as much as 75 per cent as a result of recent school closures*."

Impact on health and wellbeing:

Corporate Social Responsibility (CSR) national breakfast club programme

Our research **[3-4]** has influenced Corporate Social Responsibility (CSR) activity within the food industry and provided evidence to support the expansion of Kellogg-funded school breakfast clubs in England **[I]**. Dr Katie Adolphus was selected as an expert honorary panel member of the Kellogg's Breakfast Club Trust, using our research findings to inform Kellogg's breakfast club funding, commitments, training, and operating models. Our research on the positive acute effects of breakfast on cognition **[3]** provided empirical evidence to inform the decision, in 2019, to increase funding and double their breakfast programme with focus on providing breakfasts in areas of greatest need. Kellogg's Corporate Social Responsibility Manager noted that the research, *"gave us hard evidence that breakfast clubs make a difference to mental performance in children, and therefore informed our decision to expand the Kellogg breakfast club programme to reach more schools to make a difference to learning at school."* **[I].** In 2017 and 2018, Kellogg's funded 300 school breakfast clubs in England. Our research **[3]** provided scientific evidence to inform the decision in 2019 to double the funding, to 600 clubs in England with a focus on schools with over 30% of children eligible for free school meals **[I]**. Our research **[4]** on breakfast also fed into (including citation) the Kellogg's Breakfast Club Training Guide, which has been distributed nationally to all Kellogg-funded school breakfast clubs since 2017. The expanded breakfast club programme will have a positive impact on children's diets and learning at school. Kellogg-funded breakfast clubs

typically provide cereal and milk, bread and fruit, which individually or combined can make a significant contribution to the micronutrients known to be low in the diets of children in lower income households, including vitamin D, calcium, and vitamin C (Novakovic et al., 2014).

Local Authority Public Health CV-19 breakfast intervention

Our research **[1-5]** has prompted a Local Authority Public Health Directorate to implement an evidence-based universally-free school breakfast intervention to mitigate the impact of the CV-19 pandemic lockdown on children's health and wellbeing **[J]**. Shropshire Council Public Health approached Professor Dye to inform the implementation of an evidence-based school breakfast intervention to prevent further widening of health and education gaps after the extended school closures and periods of food insecurity among children. We disseminated our research **[1-5]** showing that school breakfast programmes can improve diet quality, macro- and micronutrient intake, weight status, psychosocial development, cognitive function and educational outcomes to the Shropshire Council Public Health Directorate. This prompted their action to implement a public health breakfast intervention **[J]**. We also co-designed the breakfast intervention using findings from our research **[1-5]**. The public health breakfast intervention provided four schools (over 2500 children), in areas of deprivation, with a universally-free nutrient rich breakfast intervention for two weeks at the start of term. The breakfast included a special-recipe bagel, fortified with vitamin D_3 (cholecalciferol), low in saturated fat, and a source of fibre and protein. Many Shropshire schools are not eligible for the NSBP and poverty is hidden by pockets of affluence. Furthermore, the CV-19 lockdown increased the numbers of families below the poverty line, even in those who have remained in work. The intervention provided a nutritional jumpstart on return to school to boost the likelihood of attendance, particularly amongst at-risk children, to address hunger and its effects on cognition and attention, and to create a return-to-school experience that is nurturing rather than anxiety-provoking. Shropshire Council's Public Health Consultant said that Professor Dye and her group's work had *"prompted and informed the local implementation of a return to school breakfast intervention to mitigate the impact of the Covid-19 pandemic lockdown on children's health and wellbeing on return to school in September 2020."* **[J].**

Commercial impact in the food industry:

Corporate Social Responsibility (CSR) marketing

Our research **[4,6]** has helped deliver evidence-based CSR marketing strategies for both Kellogg's UK & Ireland and Quaker's UK breakfast club programmes in 2018 and 2015, respectively. It informed copy for Kellogg's on-pack messaging, with Adolphus et al. (2013) **[4]** cited in the UK and Ireland on two of Kellogg's top selling cereals, Corn Flakes and Rice Krispies **[K]**. Kantar sales data of these cereals shows annual sales of 8460 and 8110 tonnes, respectively, in the UK alone in 2018. The findings of our research **[6]** were also used as advert copy and were reported in a Quaker's UK television advertisement **[K].** These initiatives have raised public awareness of their respective breakfast club programmes and the benefits of the breakfast club programmes for children's learning at school.

5. Sources to corroborate the impact (indicative maximum of 10 references)

A. House of Commons Policy Roundtable Agenda
B. Magic Breakfast NSBP Policy Proposal
C. Joint press release – University of Leeds, Magic Breakfast, Family Action.
D. Magic Breakfast Department for Education funding announcement
E. Email Testimonial from Chief Executive Officer of Magic Breakfast
F. The School Breakfast Bill Parliamentary Briefing Agenda
G. The School Breakfast Bill Policy Proposal
H. House of Commons Official Report: Parliamentary Debates (Hansard) Tuesday 13th October 2020
I. Testimonial from Corporate Social Responsibility Manager at The Kellogg Company
J. Testimonial from Shropshire Council Public Health Consultant.
K. Kellogg's Corn Flakes pack shot and Quaker UK TV advertisement