Institution: University of Exeter

Unit of Assessment: UoA 3 Allied Health Professions, Dentistry, Nursing and Pharmacy

Title of case study: Reducing diabetes by informing the creation, content and development of the NHS Diabetes Prevention Programme

Period when the underpinning research was undertaken: 2003 - 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:
Dr Jane Smith	Senior Lecturer in Primary Care	2012 to date
Professor Colin Greaves	Associate Professor of Psychology Applied to Health	2003 to 2018
Dr Phil Evans	Associate Professor of General Practice and Primary Care	2012 to date

Period when the claimed impact occurred: 2015 - 2020

Is this case study continued from a case study submitted in 2014? No

1. Summary of the impact

Type 2 diabetes affects around 4 million people in England, with over 200,000 new diagnoses every year. It can be prevented by identifying early signs of its development (so-called 'pre-diabetes') and supporting people to improve their diet, increase physical activity and lose weight. Behaviour change research at Exeter since 2003 directly informed the creation of the NHS Diabetes Prevention Programme (NHS DPP) in England in 2015, and its subsequent development. The NHS DPP is a large primary and community care-based screening and behaviour change intervention delivered by diverse health professionals including nurses, and qualified nutrition and exercise professionals. Over 400,000 people have been referred to NHS DPP, and for the five years of the programme from 2016 to 2020 the NHS's own impact analysis estimated 18,000 cases of diabetes prevented or delayed, with net economic benefits of £1.2bn.

2. Underpinning research

Around four million people in England have diabetes, 90% of whom have type 2 diabetes. For people at high risk of developing type 2 diabetes, progression can be delayed or prevented through intensive lifestyle interventions, particularly with weight loss of 2kg or more. Developing and implementing effective and cost-effective ways to support people to reduce their risk of type 2 diabetes is an urgent public health priority in the UK and globally.

Research about the preventability and prevalence of diabetes and pre-diabetes:

A systematic review by Exeter researchers in 2011 identified components of behaviour change interventions associated with increased effectiveness for improving diet and physical activity **[3.1]**. The providers of interventions in this review included nurses, dieticians and nutritionists. Identifying interventions that are acceptable to patients and which are effective in real-world clinical and community settings is important in developing interventions to change behaviour and improve patient outcomes.

This work, along with a screening study assessing a pragmatic nurse-delivered system for identifying people at high risk of type 2 diabetes **[3.2]**, was used as a basis for 11

recommendations on the content of diabetes prevention interventions (and ways to identify people at risk) in the 2012 NICE public health guidance on diabetes prevention. The observational screening study in 1,287 primary care patients showed that screening people with a high BMI and aged >50 by fasting glucose identified a substantial prevalence of both undetected type 2 diabetes (3-6%) and impaired glucose regulation (5-8%) (people with high diabetes risk - "pre-diabetes").

A 2014 systematic review of pragmatic, real-world diabetes prevention programmes by Greaves and others **[3.3]** concluded that diabetes prevention programmes are effective at achieving weight loss; but they could also be more effective by maximising adherence to the above-mentioned NICE guidance on adopting healthy lifestyles.

Research to improve patient understanding of pre-diabetes:
In conjunction with screening, it is crucial that people identified with pre-diabetes can understand their condition and the lifestyle changes they need to make to avoid developing diabetes. Exeter researchers worked with doctors, nurses, and allied health professionals to develop and evaluate a patient education package for more effective communication between health professionals and patients with impaired glucose tolerance or impaired fasting glycaemia (The WAKEUP study - *Ways of Addressing Knowledge Education and Understanding in Pre-diabetes*) **[3.4]**. This mixed-methods study showed that health professionals need to convey three key messages to patients identified with pre-diabetes: the seriousness of the condition, the preventability of progression to diabetes, and the need for lifestyle change **[3.5]**.

Demonstrating the effectiveness of lifestyle change interventions to prevent diabetes

In 2017, Smith and Greaves conducted a randomised controlled trial, the Community-based Prevention of Diabetes (ComPoD) study, at two sites (Devon and Birmingham) that evaluated the effectiveness of a voluntary sector-led diabetes prevention programme **[3.6]**. The 'Living Well Taking Control' programme encouraged lifestyle and behaviour change to support weight loss amongst adults identified as having increased risk of type 2 diabetes. The trial involved objective measurements of weight and physical activity in 314 participants and showed that the programme more than doubled the proportion losing >5% of their weight, and generated an average 1.7kg of weight loss at 6 months. Higher engagement in the programme was associated with greater weight loss **[3.6]**. Although no changes in physical activity were found, it is known that weight loss is the key driver for reducing the risk of diabetes (Hamman RF, et al. *Diabetes Care*. 2006;29(9):2102-7).

3. References to the research (Exeter authors in **bold text**)

3.1 **Greaves CJ**, Sheppard KE, **Abraham C**, et al. Systematic review of reviews of intervention components associated with increased effectiveness in dietary and physical activity interventions. *BMC Public Health* 2011;11(119):1-12. doi: 10.1186/1471-2458-11-119

3.2 **Greaves CJ**, **Stead J**, **Hattersley A**, et al. A simple pragmatic system for detecting new cases of type 2 diabetes in primary care. *Family Practice* 2004;21(1):57-62. doi: 10.1093/fampra/cmh113

3.3 Dunkley AJ, Bodicoat DH, **Greaves CJ**, et al. Diabetes Prevention in the Real World: Effectiveness of Pragmatic Lifestyle Interventions for the Prevention of Type 2 Diabetes and of the Impact of Adherence to Guideline Recommendations: A Systematic Review and Meta-analysis. *Diabetes Care* 2014;37(4):922-33. doi: 10.2337/dc13-2195

3.4 **Evans PH**, **Greaves C**, Winder R, et al. Development of an educational "toolkit" for health professionals and their patients with prediabetes: The WAKEUP study (Ways of Addressing Knowledge Education and Understanding in Pre-diabetes). *Diabetic Medicine* 2007;24(7):770-77. doi: 10.1111/j.1464-5491.2007.02130.x

3.5 **Evans P**, **Greaves CJ**. Helping people at high risk of type 2 diabetes: Using the WAKEUP materials. *Diabetes and Primary Care* 2015;17(4):175–79.

3.6 **Smith JR, Greaves CJ**, Thompson JL, et al. The community-based prevention of diabetes (ComPoD) study: a randomised, waiting list controlled trial of a voluntary sector-led diabetes prevention programme. *Int J Behav Nutr Phys Act*. 2019;16(1):112. doi:10.1186/s12966-019-0877-3

4. Details of the impact

Results from the primary research and systematic reviews conducted by Greaves, Smith, Evans and others have directly informed the main NHS diabetes prevention strategies and services across the UK since 2015,. These programmes are typically delivered in primary care or community settings by approved providers commissioned by NHS England (e.g. voluntary sector, community interest companies). This research has resulted in: the creation of the NHS Diabetes Prevention Programme itself; its ongoing delivery and expanded uptake between 2015 and 2020; preventing or delaying thousands of people from developing diabetes, and the related economic benefits, and; other related developments in service delivery models, widening access and patient education**.**

4.1 Creation of the NHS Diabetes Prevention Programme

Evidence from University of Exeter research which first led to the 2012 recommendations of the NICE public health guidance (PH38) on diabetes prevention [NB. *not claimed as a REF impact here*] also directly informed the creation, in 2015, of the NHS Diabetes Prevention Programme (NHS DPP) **[5.1]**. The programme consists of at least 13 sessions, with 16+ hours of face-to-face contact time (usually in groups), spread across a minimum of 9 months. People are supported to set and achieve goals and make positive changes to their lifestyle to reduce their risk of developing Type 2 diabetes. Referrals to the programme are typically from practice nurses or GPs.

One systematic review in particular **[3.1]** formed the cited evidence base for NICE Public Health Guidance recommendations on intervention content for the included diabetes prevention programmes **[5.2]**. This review of the effectiveness of existing prevention programmes was updated (2014) and published in full (2015) by Public Health England (PHE) as a major part of the evidence base underpinning the NHS DPP **[5.1]**.

4.2 Ongoing delivery and expanded uptake of the NHS DPP

Since 2016, the NHS DPP has been a joint programme of *NHS England*, *Public Health England* and *Diabetes UK*, delivering at scale, evidence-based behavioural interventions for individuals identified as being at high risk of developing Type 2 diabetes. The Exeter research has subsequently been reflected in full within both the 2016 and 2019 service specifications of the NHS DPP **[5.3; 5.4],** which also recommends that delivery is by diverse, suitably trained health professionals, for example those specialising in nutrition or exercise**.** The programme is now delivered by four providers across 30 counties in England **[5.5; 5.6]**.

To date over 400,000 people have been referred to NHS DPP and in 2018-19 NHS DPP exceeded its mandate and NHS '*Five Year Forward View*' target of 100,000 people on the programme each year, by delivering 105,000 places. Due to this success, the *NHS Long Term Plan* (2019) makes a commitment to doubling capacity on the programme from 100,000 places per year to 200,000 places per year and notes that demand for the programme has '*outstripped supply, and it has proven highly effective*.' **[5.7]**

More recently, findings from the Exeter-led community-based prevention of diabetes (ComPoD) study (ref. **[3.6]**) have directly informed policy reviews of the NHS DPP. As a result, and with an update of the programme in 2019, 'Living Well, Taking Control', a partnership between a Birmingham-based social enterprise and an Exeter-based charity 'Westbank Community Health and Social Care', became one of the five providers of the 'Healthier You: NHS DPP' in 2019 **[5.5]**. This resulted in the programme reaching a broad spectrum of local populations, including men, those from ethnic minorities and those living in deprived areas. The NHS England National Clinical Director of Diabetes and Obesity marked the success of 'Living Well, Taking Control' by publicly saying:

"Around two-thirds of adults and one-third of children are now overweight or obese, driving higher and higher rates of Type 2 diabetes that we are now focusing huge efforts to address, as outlined in the NHS Long Term Plan.
I'm delighted that our work so far in this area has been producing really positive results. This weight loss is promising – and we hope to help many more of those who are at risk of Type 2 diabetes to not get it in the first place." **[5.5]**

4.4 Uptake of Exeter-developed WAKEUP pre-diabetes education materials

Exeter's WAKEUP study **[3.4; 3.5]** developed and piloted ways of improving practice systems for managing pre-diabetes. In 2015, following revised NICE Guidance, Exeter's WAKEUP study's patient and practitioner education materials were revised. The WAKEUP materials have since been sent to all Public Health England leads in the 152 local authorities for the National Diabetes Prevention Programme. From 2015, more than 10,000 copies of the patient information booklet have also distributed via a large-scale diabetes prevention initiative in Wales.

4.3 Estimated prevention of diabetes and economic benefits of the NHS DPP

Based on similar participation assumptions, NHS England's own impact analysis of the NHS DPP (in 2016) estimated that by the end of the fifth year of the programme (i.e. 2020) 18,000 cases of diabetes would have been prevented or delayed among 390,000 programme participants **[5.8]**. This impact analysis further estimated that the overall undiscounted economic net benefit would be £1.2bn (£967m discounted) for the five-year cohort (based on cost savings from reduced health expenditure, and the health gains from the reallocation of these savings within the NHS) **[5.8]**.

A health economic model of diabetes prevention (led by SCHaRR, University of Sheffield, but involving Prof Greaves of Exeter) was used as the basis for the PHE/NHS evaluation of the NHS DPP, and for developing the Payment by Results model which has been used to fund the programme since 2018 **[5.9]**. The study clearly showed that diabetes prevention interventions very similar to those included in the NHS DPP "are likely to be cost-effective and may be cost-saving over a lifetime" in those people defined as high risk for diabetes **[5.9]**.

5. Sources to corroborate the impact

5.1 Public Health England Evidence review of diabetes prevention programmes: A systematic review and meta-analysis assessing the effectiveness of pragmatic lifestyle interventions for the prevention of type 2 diabetes mellitus in routine practice (2015) https://www.gov.uk/government/publications/diabetes-prevention-programmes-evidence-review This was the main evidence document cited by NHS DPP at its launch – and in subsequent Service Specifications.

5.2 NICE Expert Report EP8 (2012) – by Colin Greaves (publishing of the underpinning 2011 systematic review evidence in full alongside the guidance, citing the screening study). https://www.nice.org.uk/guidance/ph38/evidence Showing which elements of intervention content are most associated with effectiveness

5.3 NHS England's 2016 service specification for commissioning the intervention to be delivered in the NHSE DPP, which are derived from the NICE recommendations. https://www.england.nhs.uk/wp-content/uploads/2016/08/dpp-service-spec-aug16.pdf (p.23)

5.4 NHS England's 2019 service specification for commissioning the intervention to be delivered in the NHSE DPP, which are derived from the NICE recommendations. https://www.england.nhs.uk/wp-content/uploads/2016/08/nhs-dpp-service-specification-aug-2019.pdf (p.8 – see specific references to PH38 recommendations 1.9.2, 1.9.3 and 1.9.4 and p.25)

5.5 Update of the '*Living Well, Taking Control*' initiative as a provider of the 'Healthier You: NHS Diabetes Prevention Programme' (2019) https://www.lwtcsupport.co.uk/copy-of-news-nhs-dpp

5.6 NHS Diabetes Prevention Programme FAQ: https//www.england.nhs.uk/wp-content/uploads/2016/08/dpp-faq.pdf (2016)

5.7 NHS Long Term Plan Version 1.2 p.37 (2019) https://www.longtermplan.nhs.uk/wp-content/uploads/2019/08/nhs-long-term-plan-version-1.2.pdf

5.8 NHS England (2016) Impact Analysis of implementing NHS Diabetes Prevention Programme 2016 to 2021 https://www.england.nhs.uk/publication/nhs-england-impact-analysis-of-implementing-nhs-diabetes-prevention-programme-2016-to-2021/

5.9 Breeze PR, Thomas C, Squires H, Brennan A, Greaves C et al. The impact of a Type 2 diabetes prevention programmes based on risk-identification and lifestyle intervention intensity strategies: a cost-effectiveness analysis. *Diabetic Medicine* 2017, 34(5); 632-640. https://doi.org/10.1111/dme.13314