

Institution: University of Southampton		
Unit of Assessment: 23 Education		
Title of case study: 23-03 LifeLab: increasing health literacy and inspiring positive health-related lifestyle and behaviour changes among teenagers.		
Period when the underpinning research was undertaken: 2007 - 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:
Marcus Grace Kathryn Woods-Townsend Andri Christodoulou	Professor of Science Education Principal Research Fellow Lecturer in Education	September 1990 – present February 2007 – present September 2011 – present
Period when the claimed impact occurred: November 2013 – December 2020		
Is this case study continued from a case study submitted in 2014? N		

1. Summary of the impact

Interdisciplinary research led by Southampton Education School has enabled the design, delivery and evaluation of **LifeLab**, a novel hospital and school-based education programme that **empowers** young people to make **positive lifestyle choices** for their physical and mental health – now, **for their future** and for their **future children**. The permanent facility at University Hospital Southampton (UHS), was launched in November 2013. Clinical trials demonstrated that the intervention has led to positive attitudinal changes to health and science learning among 13 and 14 year olds of all abilities and **increased students' understanding of the influences of health behaviours**. Endorsed by professional bodies, LifeLab has supported public health strategies and policy responses to childhood obesity and informed early-stage interventions in Ireland, Spain and Oman. LifeLab received government funding for a 'science for health literacy' programme during the COVID-19 pandemic to co-create with young people resources that enable them to respond constructively to the impact of the pandemic on their lives.

2. Underpinning research

Early life development is a critical time for setting trajectories for health and wellbeing. The concept of LifeLab was first proposed in 2008; a research-based education programme dedicated to raising adolescents' awareness of and interest in the science underpinning chronic health issues like obesity, diabetes and mental health disorders. The aim was to encourage teenagers to make positive lifestyle changes by enabling them to discover first-hand how their diets and behaviours lay the foundations for a healthier life, and how this is linked to the health of the children they may have in future. WHO estimates seven out of ten people die from non-communicable diseases (NCDs) - 80% of these deaths could be prevented by healthier lifestyles. It also addressed widely held concerns within the education community over the underrepresentation of teaching about NCDs (and their prevention) in school curricula. The key principles underpinning LifeLab are that these health issues are socio-scientific issues (SSIs) and that education should equip adolescents with decision-making skills to make informed choices. Research led by Grace identified the importance of requiring students to consider SSIs during their formal science education, and showed that the introduction of structured peer group decision-making increased the quality of students' personal reasoning [3.1]. Grace and a collaborator from University of Auckland identified eight components of a 'bridging pedagogy' that supports a 'science for health' literacy that laid the pedagogical foundations for LifeLab [3.2]. These included: demonstrating the cultural connectedness of NCDs to communities and their relevance to students' lives; a transactional model engaging scientists, teachers, students and families in interactions leading to attitude and behaviour change; the importance of interacting with science and health communities outside of a school setting; the telling of science stories and reimagining scientific data, enabling students to understand and explore science in 'real-life' contexts [3.2]. Woods-Townsend was appointed as programme manager in 2008 via a Wellcome Trust award. The principles and frameworks set out in 3.1 and 3.2 were used as the foundation of the LifeLab intervention, and activities were co-created with science teachers. The programme design was aligned with changes to the science national curriculum that gave greater prominence to NCDs. In an early evaluative study, researchers formulated a set of questions relating health literacy to the concept of *developmental origins of health and disease* (DOHaD). They found structured hospital-

Impact case study (REF3)

based classroom visits and associated science lessons have a marked effect on student engagement with health-related issues, and students' understanding of how their lifestyle choices affect their long-term health and the health of their future children [3.3]. A permanent LifeLab facility was launched at UHS in November 2013 and the research focus moved to evaluation of LifeLab's efficacy in improving health literacy in order to refine and optimise the programme. Since its inception, LifeLab has attracted GBP3,500,000 in private and public sector funding for capital spending, programme design and delivery, and research. Funding from the BUPA Foundation enabled a randomised controlled trial (RCT) to be conducted. Involving 333 students across six schools, results showed adolescents' engagement with DOHaD, via LifeLab, improved and was sustained over 12 months [3.4]. LifeLab was revised to include further components designed to convert this increased engagement to behavioural change. Funded by the British Heart Foundation, a larger-scale RCT involving 2,929 students, across 38 schools [3.5] showed that experiencing LifeLab led to improved health literacy in adolescents and that they demonstrated a move towards a more critical judgement of health behaviour 12 months after the intervention (results currently under review, details in section 4) [5.1]. A component of LifeLab called 'Meet the Scientist' involves people from a range of health-related professions undertaking science communication training and then discussing their work in a semi-structured way with small groups of students. This component has had a positive impact on both the students and scientists [3.6].

3. References to the research

-
- 3.1** Grace, M. (2009) Developing high quality decision-making discussions about biological conservation in a normal classroom setting. *International Journal of Science Education*, 31 (4), 551-570. <https://doi.org/10.1080/09500690701744595>
- 3.2** Grace, M. and Bay, J.L. (2011) Developing a pedagogy to support science for health literacy. *Asia-Pacific Forum on Science Learning and Teaching*, 12(2). Available on request.
- 3.3** Grace, M., Woods-Townsend, K., Griffiths, J., Godfrey, K., Hanson, M., Galloway, I., Azaola, M.C., Harman, K., Byrne, J. and Inskip, H. (2012) Developing teenagers' views on their health and the health of their future children. *Health Education*, 112(6), 543-559. <https://doi.org/10.1108/09654281211275890>
- 3.4** Woods-Townsend, K., Leat, H., Bay, J., Bagust, L., Davey, H., Lovelock, D., Christodoulou, A., Griffiths, J., Grace, M... (2018) *LifeLab* Southampton: A programme to engage adolescents with DOHaD concepts as a tool for increasing health literacy in teenagers - A pilot cluster- randomised control trial. *Journal of Developmental Origins of Health and Disease*, 9 (5), 475-480. <https://doi.org/10.1017/S2040174418000429>
- 3.5** Woods-Townsend, K., Bagust, L., Barker, M., Christodoulou, A., Davey, H., Godfrey, K., Grace, M., Griffiths, J., Hanson, M., & Inskip, H. (2015). Engaging teenagers in improving their health behaviours and increasing their interest in science (Evaluation of LifeLab Southampton): study protocol for a cluster randomized controlled trial. *Trials*, 16(1), 372. <https://doi.org/10.1186/s13063-015-0890-z>
- 3.6** Woods-Townsend, K., Christodoulou, A., Rietdijk, W., Byrne, J., Griffiths, J.B and Grace, M. (2015) Meet the Scientist: The Value of Short Interactions Between Scientists and Students, *International Journal of Science Education Part B: Communication and Public Engagement*, 6(1), 89-113. <https://doi.org/10.1080/21548455.2015.1016134>

Key grants:

- Engaging adolescents in changing behaviour (EACH-B): a programme of research to improve the diets and physical activity levels of teenagers. NIHR (RP-PG-0216-20004). 2017-2021. GBP2,166,779.00 (Woods-Townsend Co-I; Grace Co-I).
- Assessment of LifeLab Southampton: engaging teenagers in improving their health behaviours and increasing their interest in science. British Heart Foundation (PG/14/33/30827). 2015-2018. GBP226,165. (Grace Co-I).
- Achieving sustainable health behaviour change in adolescents. BUPA Foundation. BUPA Foundation. 2012-2015. GBP307,165 (Woods-Townsend, Co-I; Grace, Co-I).

4. Details of the impact

Since the launch of its hospital-based facility, LifeLab has engaged 11,591 students and 342 teachers across 66 schools in the Wessex region [5.1]. Rigorous evaluations have demonstrated that the educational programme has inspired positive attitudinal changes to health and science

Impact case study (REF3)

learning, improved health literacy and increased understanding of how current health behaviours can affect health outcomes in the future. Its efficacy has been endorsed by professional bodies and recognised at a regional and national public health policy level, leading to interest in applying LifeLab principles beyond the UK and government funding to create a 'science for health literacy' programme for the COVID-19 response.

LifeLab is not simply a school trip; it is a structured education programme over two weeks. It comprises: a professional development day for science teachers; pre-visit lessons at school; an immersive visit to the LifeLab facility at UHS; follow-up lessons at school; a celebration event for all LifeLab students, parents, local health professionals and public officials. As part of a current research trial, a bespoke app is being developed and piloted which supports school students to sustain new lifestyle choices. The LifeLab facility can accommodate 32 students daily and has state-of-the-art equipment that is largely unavailable in schools: an ultrasound machine to image blood flow; gel electrophoresis for DNA analysis; lung function equipment; a Tanita machine to analyse body composition. Stepping outside the classroom into a busy clinical environment is designed to create a buzz among the students; for many it is their first visit to a hospital and the experience can allay fears by showing hospitals to be vibrant places where active scientific research takes place.

Achieving positive attitudinal changes to science learning, deeper understanding of the impact of health behaviours and sustained health literacy improvements among teenagers

Schools embed the programme into their science curriculum. The majority of schools enrol two classes from Years 8 and 9; 17 schools made the significant commitment of taking entire year groups (average of 300 students) through LifeLab. RCT results [3.4, 3.5, 5.2] show that the LifeLab programme has led to positive attitudinal changes to health and science learning among 13-14 year olds of all abilities. It has resulted in sustained changes in students' standardised total theoretical health literacy score (adjusted difference between groups = 0.27 SDs (95%CI=0.12, 0.42)). For simplicity, this can broadly be interpreted as: prior to participation in LifeLab, 50% of teenagers had an above average score; 12 months after participation the proportion increased to 61%. Students also judged their own lifestyles more critically than controls, with fewer reporting their behaviours as healthy (53.4% vs. 59.5%; adjusted PRR=0.94 [0.87, 1.01]). After 12 months, intervention students had greater understanding than control students of the influences of health behaviours on their long-term health and that of their children (e.g. the percentage of students agreeing that nutrition before birth was important for long term health was 42% prior to the LifeLab programme for both control and intervention students. At 12-month follow-up, this increased by 7% for control students and by 13% for intervention students ($P<0.001$). For the statement "the food a father eats before having a baby will affect the health of his children" – at baseline, only 16% of students agreed, however following the LifeLab education programme, there was no change for control students and the percentage of intervention students agreeing increased to 26% ($P<0.001$) [5.2].

Qualitative data [5.3] also demonstrated the profound impact that LifeLab has had on the health literacy of both students and teachers. Representative feedback from students included: *"If we change our lifestyle, we can more than halve our chance of getting an illness later on in life"*; *"Eating unhealthy is not only bad for your health but your child's also"*. The programme has inspired students to consider future careers relating to science and health, and changing perceptions of science as an academic discipline. Representative feedback included: *"I found them [the scientists] really inspirational and am now considering going into nursing or medical care"*; *"Their work was really inspiring and it made me think there is lots of different jobs scientists do and how they are all so different"*; *"Most people think that scientist is posh or even 'geek', but they are not, they are normal people just like us"*. Teachers' comments also demonstrated sustained impact. Feedback included: *"Inspirational stuff. In addition to direct subject content, students are exposed to quality research work, and a variety of employment roles"*; *"Students clearly understand the impact of their current decisions on their future generations"*; *"Completely engaging and inspirational. Fantastically linked the syllabus to real life contexts which made it all the more memorable"*.

Students actively pledge to make small changes to their health-related behaviour, and these pledges are followed up in school with teachers who have received training from the LifeLab team in supporting behaviour change. During 2018-2020, 54% of the students made a pledge related to diet/nutrition, 24% related to exercise and 18% related to sleep habits. Students recognised that small changes can have a large impact on their long-term health. Examples of behaviour change

Impact case study (REF3)

included: *“Change from sugar in my tea to sweeteners”*; *“Think about what I eat before I eat it”*; *“I will eat more vegetables because that’s something I really struggle with”*; *“Put my phone down 30 mins before I go to bed”*; *“Try eat more fruit and thing because now I know how it’ll impact my health in the future”*. While positive attitudinal changes, engagement and motivation have been observed, evidence of health-related behavioural changes takes longer to demonstrate. A follow-up NIHR grant, Engaging Adolescents with Changing Behaviour (EACH-B), was initiated in October 2017 to focus on self-efficacy and behavioural outcomes. EACH-B (also called *LifeLab+*) provides *LifeLab* students with a smartphone application, designed in partnership with game designers, to turn their health pledges into behavioural change. ‘Game Jams’ have been held with teenagers to inform the design of this app and a full RCT to evaluate its efficacy has been scheduled for January 2021. 34 young people have qualified as ‘Young Health Champions’, an accredited programme run by the Royal Society for Public Health (RSPH), after completing their training at *LifeLab* [5.3]. This involves training student mentors to feel confident to engage with peers, signposting them to resources in their local communities, increasing awareness of healthy lifestyles and developing and delivering health campaigns on matters they feel are important for their peers.

Supporting regional and national public health strategies and policy responses – and informing related public health initiatives outside of the UK

LifeLab has been recognised for its contribution to the delivery of regional public health strategies. Southampton City Council’s Overview and Scrutiny Management Committee published the findings of its inquiry *Tackling Childhood Obesity in Southampton* in 2020 [5.4]. It described *LifeLab* as an ‘excellent scheme’ that is *‘making a genuine difference to the lives of children and families in Southampton’*. A key recommendation was to ‘scale up’ the *LifeLab* initiative, among others, so it reaches ‘a critical mass’. It said: *‘If all children in the city benefitted from these initiatives it could help to transform the culture and attitudes towards food and activity in the city.’* Hampshire County Council [5.5] said it was *‘strongly encouraging all our schools to take up the excellent opportunities offered by LifeLab’*. According to the CEO of UHS, *LifeLab* has contributed directly to meeting this aspect of the Trust’s vision: *‘We will play our part in the fight to improve population health working with the University of Southampton on their world-renowned research demonstrating how lifestyle and behaviour not only impacts on an individual’s health but that of future generations’* [5.6].

At a national level, the resources produced for the *LifeLab* programme were formally endorsed by the Royal College of Paediatrics and Child Health in August 2016 and they form part of the RSPH-accredited Level 2 Young Health Champions qualification [5.7]. A *LifeLab* Young Health Champion was selected to sit on a national youth panel convened by BiteBack 2030, a campaign that pushes for changes to the food system. *LifeLab* was awarded RSPH centre status in July 2017 and in 2019 won the RSPH national *Centre for Excellence Hygeia Award*. Woods-Townsend was elected to sit on the Kids Council of UKactive, a not-for-profit health body for the physical activity sector, in 2018. She contributed to the policy report *Generation Inactive 2.0*, launched in September 2018; it highlighted *LifeLab+* (also called EACH-B) as an example of excellent practice to *“to harness the power and influence of social media to positively engage young people in healthy behaviours”* [5.8]. *LifeLab* has been cited as an example of best practice in addressing childhood obesity in both parliament and the media. A meeting with Steve Brine, MP for Winchester, resulted in him commenting positively on *LifeLab* in a debate on Junk Food Advertising and Childhood Obesity [5.9]. He said: *‘I am very interested in looking at evaluations of LifeLab as it goes forward and in how that work might be built into a wider public policy roll-out.’* *LifeLab* featured in a 2017 article on university-teacher partnerships in *The Guardian*, with a teacher quoted as saying that *LifeLab* had *‘fired up a passion for science in me again’* [5.10]. It was also a key part of a BBC Horizon episode in June 2016 titled *Why are we getting so fat?* It was watched by 1.82m people and was the 11th highest-rated BBC2 programme for that week. In the programme, presenter and scientist Dr Giles Yeo visited the *LifeLab* facility and stated: *“As a scientist, I love this place, as a parent I love this place.”* [5.11]

Beyond the UK, in 2020 the *LifeLab* team formed a collaboration with Dublin City University (DCU) to apply the *LifeLab* concept to the development of its own *LifeLab* which will have a more in-depth focus on physical education. By the end of the impact period, although the timelines for DCU had shifted as a result of COVID-19, they had held two co-design meetings directly with young people to develop their educational resources with a view to begin delivering to schools in 2021 [5.12]. In 2019 *LifeLab* established two international partnerships, one with Blanquerna-Universitat Ramon Llull

Impact case study (REF3)

(BURL) in Barcelona to apply the LifeLab teaching principles to their comprehensive local science and health programme for students, teachers and families [5.12], the other with Sultan Qaboos University in Oman where they are drawing on LifeLab principles and practices to promote health-related knowledge, attitudes and behaviour among their students [5.12].

Responding to the COVID-19 pandemic by supporting young people to manage their health and wellbeing online and improve their 'science for health literacy'

Visits to the LifeLab facility were suspended following the outbreak of COVID-19 in March 2020. The LifeLab team mobilised young people through connections with local schools and explored how they could be better supported during lockdown. The Teenagers' Experience of COVID-19 (TeC-19) study involved online focus group discussions after which the young people were asked to keep social media diaries and complete assessments of their diet and physical activity and of their mental health and well-being.

Combining insights from Tec-19 and the principles underpinning LifeLab, the research team secured GBP229,614 in funding from the Department of Health and Social Care (DHSC) in September 2020 to develop a 'science for health literacy' programme designed to help reduce COVID-19 transmission by engaging young people in testing and other measures. This formed part of the University's ground-breaking, population-level saliva testing programme in order to extend testing into education settings. This new component of the LifeLab programme sought to build resilience among young people and develop their decision-making skills. It resulted in the co-creation of a novel COVID-19-focused curriculum and materials for 11-14 year olds, an 'Escape from Coronavirus' escape-room themed lesson for primary schools, an extension to the Young Health Champion network in partnership with RSPH and a teacher professional development unit to support the delivery of these education materials. As a direct result of this work, Woods-Townsend's support was requested by DHSC to support development of education materials for national roll-out to support regular mass testing for COVID-19, as part of the NHS Test & Trace programme. This work led to the development of the *storicise* platform, (which has received over 23,000 hits) for use in primary and secondary schools. At the end of 2020, as cases of COVID-19 were increasing again, this platform was launched as part of the DHSC mass testing in schools initiative. At the same time, a parallel workstream initiated by DHSC was to engage the Scout Association to develop activities for the Scouts to support regular mass testing. Woods-Townsend's expertise was also used to advise on these materials. [5.13]

5. Sources to corroborate the impact

5.1 LifeLab Annual Report 2019-20.

5.2 Woods-Townsend, K., Hardy-Johnson, P., Bagust, L., Barker, M., Davey, D., Griffiths, J., Grace, M., Lawrence, W., Lovelock, D., Hanson, M., Godfrey, K.M. and Inskip, H. A cluster-randomised controlled trial of the *LifeLab* education intervention to improve health literacy in adolescents (under review, PDF supplied).

5.3 A selection of impact outcomes for LifeLab.

5.4 Tackling Childhood Obesity in Southampton (2020; key pages: 33 - 35, 45) https://www.southampton.gov.uk/images/tackling-childhood-obesity-in-southampton_tcm63-430655.pdf

5.5 Statement from County Inspector, Health and Wellbeing, Children's Service, Hampshire CC

5.6 Statement from CEO of University Hospital Southampton Foundation Trust.

5.7 Letter of accreditation from RSPH detailing the impact of LifeLab.

5.8 Generation Inactive 2.0 report (2018), UKactive Kids Council (page 25).

5.9 Steve Brine MP on the impact of *LifeLab*: <https://hansard.parliament.uk/Commons/2018-01-16/debates/8ACEA832-7EA4-47FB-8FEF-88562C58714E/JunkFoodAdvertisingAndChildhoodObesity#contribution-238D1347-7BE4-4258-9F43-21525F0A5FD3>

5.10 The Guardian, 'Murder mystery to DNA', March 2017 <https://www.theguardian.com/teacher-network/2017/mar/10/science-schools-universities-research-partnerships>

5.11 BBC Horizon, 'Why are we getting so fat?', June 2016 <https://youtu.be/yxALqcENSes>

5.12 Statements from collaborators at Dublin City University, Blanquerna-Universitat Ramon Llull and Sultan Qaboos University on the impact of LifeLab beyond the UK.

5.13 Reports and letters highlighting the impact of the LifeLab response to the COVID-19 pandemic from Dept. Health & Social Care Track and Trace, storicise.com and the Scout Association.