

Institution: University of Southampton		
Unit of Assessment: 04 Psychology, Psychiatry and Neuroscience		
Title of case study: 04-01 LifeGuide – Developing Internet-based Support for Healthcare		
Period when the underpinning research was undertaken: 2009 – 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:
Lucy Yardley	Professor of Health Psychology	September 1999 – present
Leanne Morrison	Lecturer in Health Psychology	October 2011 – present
Judith Joseph	Senior Research Enterprise Fellow	May 2008 – present
Laura Dennison	Lecturer in Health Psychology	April 2007 – present
Adam Geraghty	Associate Professor	January 2010 – present
Ingrid Muller	Lecturer	June 2008 – present
Rosie Essery	Research Fellow	June 2012 – September 2013; October 2016 – present
Sarah Kirby	Associate Professor	May 2005 – present
Sascha Miller	Senior Research Assistant	September 2008 – January 2012; June 2020 – present
Elaine Douglas	Research Fellow	January 2010 – March 2011
Sarah Tonkin-Crine	Research Fellow	January 2008 – October 2014
Alison Rowsell	Research Fellow	September 2005 – present
Period when the claimed impact occurred: August 2013 – December 2020		
Is this case study continued from a case study submitted in 2014? N		
1. Summary of the impact		
<p>The LifeGuide platform, developed at the University of Southampton, is a unique set of open-source internet-based software tools that allow researchers to flexibly create, modify and evaluate internet-based behavioural change interventions. Such interventions cost-effectively provide 24/7 personalised support for health management. Since August 2013, the impact of the LifeGuide research programme has been at three levels:</p>		
<p>1) The programme has enabled a large international community of behavioural researchers to flexibly and efficiently create, modify and evaluate digital health interventions in ground-breaking large-scale clinical trials, not previously possible without LifeGuide software.</p>		
<p>2) Dissemination of effective, evidence-based interventions to over 200,000 patients and members of the public through NHS, public, and private sector partnerships has supported timely and sustained self-management of health, including to prevent the spread of COVID-19. This demonstrates positive engagement with outputs enabled by the programme.</p>		
<p>3) NHS care pathways have changed to improve patient management and efficiently provide more effective care.</p>		
2. Underpinning research		
<p>Professor Lucy Yardley initiated and led the development of a unique set of internet-based software tools known as LifeGuide that allow researchers to flexibly create, modify and evaluate digital behaviour change interventions to support sustained self-management of health. The interactive technology means that the particular situation, concerns and preferences of each individual are used as the basis for an intensive support programme that can deliver members of the public and healthcare professionals with personalised guidance and feedback, help with planning, automated reminders by text and email, and opportunities for communication. The development of LifeGuide interventions has been shaped by systematic analysis of the needs of users, using a process of developing and optimising digital interventions that is now known and disseminated as the LifeGuide team's distinctive and highly successful 'Person-Based Approach' to intervention development.</p>		
<p>As Principal Investigator, Yardley obtained initial funding for the LifeGuide research programme from the ESRC in 2008-2011 [G1] and further funding from the EPSRC in 2011-2015 [G2].</p>		

Yardley led the co-design of the software, working closely with Dr Mark Weal (Associate Professor, Web and Internet Science, UOA 11), Dr Leanne Morrison, Dr Judith Joseph and Dr Laura Dennison. From 2013 to 2020, in collaboration with numerous colleagues, most notably Professor Paul Little (Professor of Primary Care Research, UOA 2), Yardley secured funding totalling more than GBP50million from providers including the NIHR, MRC, DoH, EU and medical charities to use the LifeGuide software tools to efficiently develop and evaluate digital interventions for a wide range of health problems. As part of the 2014-2019 DIPSS project [G3], additional support was developed to facilitate more complex clinician patient communication within the LifeGuide platform. The research programme extended the functionality of the platform, facilitated new types of intervention development, and improved the effectiveness of the delivery, trialling, deployment and analysis of interventions.

The development process and funding were used to build up a body of knowledge and expertise about how best to develop effective digital behaviour change interventions, drawing on in-depth analyses of how users engaged with the interventions. The LifeGuide team was able to demonstrate the capabilities and achievements of their approach through a series of major clinical trials, leading to multiple publications in the top medical journals such as the Lancet [3.1-3.6]. Their expertise has been shared widely with the research community to enable other research teams to also create effective digital interventions.

LifeGuide interventions include preventive interventions for the general public, tackling high priority public health problems such as smoking [3.6] and dementia (the trial of an intervention to support physical activity and brain training is ongoing). For example, the LifeGuide team developed the first online intervention worldwide to promote hygienic behaviour to reduce transmission of respiratory infection (currently being used to reduce the spread of COVID-19) and reduce the need for antibiotics [3.1]. There are also LifeGuide interventions to help patients and health professionals manage numerous common and serious health problems better, including interventions for hypertension, cancer [3.4], asthma, dizziness [3.5], back pain, and diabetes. In addition, the LifeGuide software has been used with international collaborators to create and modify interventions for use in different countries, from Poland to Taiwan [3.2, 3.3].

3. References to the research

- 3.1** Little P, Stuart B, Hobbs F, Moore M, Barnett J, Popoola D, Middleton K, Kelly J, Mullee M, Raftery J, Yao G, Carman W, Fleming D, Stokes-Lampard H, Williamson I, Joseph J, Miller S, Yardley L (2015). An Internet-delivered handwashing intervention to modify influenza-like illness and respiratory infection transmission (PRIMIT): a primary care randomized trial. *The Lancet* 386, 10004, 1631-1639. [https://doi.org/10.1016/S0140-6736\(15\)60127-1](https://doi.org/10.1016/S0140-6736(15)60127-1)
- 3.2** Little P, Stuart B, Francis N, Douglas E, Tonkin-Crine S, Anthierens S, Cals JWL, Melbye H, Santer, M, Moore M, Coenen S, Butler C, Hood K, Kelly M, Godycki-Cwirko M, Mierzecki A, Torres A, Llor C, Davies M, Mullee M, O'Reilly G, van der Velden A, Geraghty AWA, Goosens H, Verheij T, Yardley, L on behalf of the GRACE consortium. (Yardley L senior author) (2013). Effects of internet-based training on antibiotic prescribing rates for acute respiratory-tract infections: a multinational, cluster, randomised, factorial, controlled trial. *Lancet*, 382 (9899) 1175-1182. [https://doi.org/10.1016/s0140-6736\(13\)60994-0](https://doi.org/10.1016/s0140-6736(13)60994-0)
- 3.3** Muller I, Rowsell A, Stuart B, Hayter V, Little P, Ganahl K, Muller G, Doyle G, Chang P, Lyles C, Nutbeam D, Yardley L (2017). Effects on Engagement and Health Literacy Outcomes of Web based materials promoting physical activity in people with diabetes: An international randomized trial. *Journal of Medical Internet Research*. 19(1) e21. <https://doi.org/10.2196/jmir.6601>
- 3.4** Foster C, Grimmett C, May C M, Ewings S, Myall M, Hulme C, Smith P W, Powers C, Calman L, Armes J, Breckons M, 2016. A web-based intervention (RESTORE) to support self-management of cancer-related fatigue following primary cancer treatment: a multi-centre proof of concept randomised controlled trial. *Supportive Care in Cancer*, 24(6) 2445-2453. <https://doi.org/10.1007/s00520-015-3044-7>
- 3.5** Geraghty A, Essery R, Kirby S, Stuart B, Turner D, Little P, Bronstein A, Andersson G, Carlbring P, Yardley L (2017). Internet-based vestibular rehabilitation for older adults with

chronic dizziness: A randomized controlled trial in primary care. *The Annals of Family Medicine*. 15 (3). <https://doi.org/10.1370/afm.2070>

- 3.6** Brown J, Michie S, Geraghty AWA, Yardley L, Gardner B, Shahab L, Stapleton JA, West R (2014). Internet-based intervention for smoking cessation (StopAdvisor) in people with low and high socioeconomic status: a randomized controlled trial. *The Lancet Respiratory Medicine*, 2:997-1006. [https://doi.org/10.1016/S2213-2600\(14\)70195-X](https://doi.org/10.1016/S2213-2600(14)70195-X)

Grants

G1 Development and evaluation of a Behavioural Intervention Grid (BI-Grid). PI Yardley, ESRC RES-149-25-1069, National Digital Social Research programme, GBP669,515, 2008-2011

G2 UBhave: ubiquitous and social computing for positive behaviour change. PI Yardley, EPSRC C-DIP EP/I032673/1, GBP1.52m, 2011-2015

G3 DIPSS: Integrating Digital Interventions into Patient Self-Management Support. PI Yardley. NIHR RP-PG-1211-20001, GBP2m, 2014-2019

4. Details of the impact

The LifeGuide software tools allow researchers to iteratively create, modify and reuse digital interventions in a way that was not previously possible. This process of iterative development improves efficiency, by avoiding the costly duplication of effort and resources when developing new digital interventions, and reduces costs by avoiding the need to buy in expensive web programming support. At the University of Southampton, development of the LifeGuide software tools has enabled the creation and modification of digital interventions for a wide range of illness management and public health applications in the UK and internationally.

Enabling the efficient creation of interventions with the LifeGuide software, coupled with applying a successful method for developing interventions using the 'Person-Based Approach' pioneered by the LifeGuide team and endorsed by Public Health England in 2018 [5.1], attracted substantial funding. This funding has supported the subsequent dissemination of effective digital health interventions by the LifeGuide team to well over 100,000 patients, health professionals and members of the public.

Additionally, the LifeGuide software tools and Person-Based Approach have been disseminated widely, free and open-source, to a range of users in the public sector (e.g. NHS, PHE), third sector (e.g. Cancer Research UK) and private sector (e.g. Cigna Insurance) [5.2]. The 'LifeGuide Community' website [5.3] which provides support for disseminating LifeGuide software use has over 3000 members who have used the software to develop interventions. This demonstrates that access to the software has not just benefitted researchers at the University of Southampton, but members of the research community across the UK and internationally (in over 20 countries). For example, the charity Macmillan worked with the University of Southampton, using LifeGuide to develop and trial the 'Restore' intervention to help cancer patients with their fatigue symptoms. The trial (published December 2015) [3.4] demonstrated that Restore helped patients feel more confident to cope with their fatigue and so Macmillan now make this intervention directly available to patients via the Macmillan website [5.4]. A second example is the work carried out with the University of Ulster to develop an intervention to help maximise sexual wellbeing for people living with prostate cancer, in partnership with the charity Prostate Cancer UK. The trial demonstrated that the intervention helped to improve self-perceived knowledge and understanding of managing sexual issues and the resource has been made publicly available, including on the Prostate Cancer UK website [5.11]. The Ulster team's testimonial describes the significant impact of this project: "These established programmes, that we built through the LifeGuide platform, are essential elements of the Prostate Cancer UK/Movember TrueNTH efforts to meet the needs of this population. The potential reach of the programmes is substantial, and using the local, national and international links we've established, the resources will have a profound impact on the experience of the growing cohort of men/partners who are coping with the long term side-effects of prostate cancer treatments." [5.11].

Further examples of the concrete impact from LifeGuide interventions developed at the University of Southampton are described below.

LifeGuide interventions to combat infection and the rise of antimicrobial resistance

Yardley and the LifeGuide team have developed a series of interventions that have effectively reduced antibiotic use. These interventions will prevent the continued growth in antimicrobial resistant infection identified by the UK Parliament Health and Social Care Committee as a Top Five Policy Priority.

Yardley, Little, Miller and Joseph developed an MRC-funded LifeGuide intervention to promote handwashing to reduce the spread of respiratory infection in the home (particularly seasonal and pandemic flu) which was trialed in 20,000 UK adults. There was a 15% reduction in episodes of infection, including reduced frequency and severity of illness, and reduced consultations and antibiotic prescriptions (Lancet, 2015) [3.1]. This was the first digital intervention worldwide to effectively reduce infection transmission in the home. Preventing the spread of infection is an important method of reducing the need for antibiotics as well as reducing illness and healthcare demand; respiratory infections lead more than a quarter of the population to visit their GP each year and are the source of 60% of all antibiotic prescribing.

The resulting 'Germ Defence' website was endorsed and made available by NICE as a recommended resource to support antimicrobial stewardship in the general population [5.5]. In March 2020 Yardley obtained funding from UKRI to update Germ Defence for the prevention of COVID-19 (by including all methods of reducing infection in the home) and disseminate nationally and internationally. Germ Defence was rapidly translated into over 20 languages and disseminated to over 100,000 users worldwide [5.6]. A clinical trial disseminating Germ Defence to all primary care patients was selected for national prioritisation as an NIHR Urgent Public Health COVID-19 Study to help prevent a second wave of infections in autumn 2020.

Digital interventions for healthcare professionals also have the potential to reduce antibiotic usage. Yardley, Little, Douglas and Tonkin-Crine worked on the EC-funded development of a LifeGuide intervention to reduce unnecessary antibiotic prescribing across Europe. Online training provided GPs with motivation, skills training and resources to engage patients with lower respiratory tract infection in self-management without antibiotics, when appropriate. The intervention reduced prescribing rates by 20% in 246 GP practices (4,360 patients) in the UK, Spain, Poland, Belgium and the Netherlands (Lancet, 2014) [3.2]. Working with the LifeGuide team, the digital intervention has been provided as a national education resource to Belgium and the team have described the value of our collaboration in their testimonial: "Our collaboration enabled us to rapidly develop, trial and disseminate multiple versions of our intervention in different languages and we could not have carried out this work without Professor Yardley's team and LifeGuide [5.12]. The resource has also been adapted and trialed successfully for use in Australia (by Dr Magin Parker, trial published in Family Practice, 2017), and for children with respiratory tract infection in the Netherlands (by Dr Anne Dekker, trial published in Journal of Antimicrobial Chemotherapy, 2018). More recently, Yardley has led the development of a LifeGuide intervention to reduce unnecessary antibiotic use in hospitals (in collaboration with University of Oxford). A feasibility trial suggested that this intervention could substantially increase rates of stopping antibiotic use when no longer needed. The intervention is now being trialed in 36 hospitals and has already been adopted and rolled out nationally by the British Society for Antimicrobial Chemotherapy [5.7].

LifeGuide interventions to support patient and public self-management of health

Yardley co-led the development of a self-guided DVD/booklet intervention that used breathing exercises to improve outcomes for patients with asthma. The intervention improved quality of life in a trial of 655 patients in 34 GP practices [5.8]. This evidence was identified as high quality (grade 1++) in the updated national guidance for asthma management produced by the British Thoracic Society and Scottish Intercollegiate Guidelines Network [5.9 section 6.2.14, p 60], which on the basis of this trial alone concluded for the first time that this was a useful treatment to offer patients. On publication of the trial in 2018, LifeGuide was used to offer digital access to the intervention for health professionals and patients; it has had over 10,000 users. The LifeGuide team is currently working with Asthma UK to make a version available adapted for young people.

Yardley, Geraghty, Essery and Kirby developed a LifeGuide intervention to support people with dizziness due to vestibular (inner ear) problems to carry out balance retraining exercises which

help symptoms improve [5.10]. A study of 296 patients in 54 GP practices showed that the intervention was effective, and it was made available to clinicians worldwide via a link in the paper abstract [3.5]. Following active dissemination through the national and local media, and other routes (e.g. National Institute for Health Research Collaboration for leadership in Applied Health Research and Care, NIHR CLAHRC; invited talk to the Inaugural International Conference of Vestibular Rehabilitation, Chicago, August 2018), and between going live in February 2017 to December 2020, the intervention had 6,295 registered users. A successful trial of a LifeGuide-based Dutch version of the website in 322 patients was published in the British Medical Journal (van Vugt, 2019) [5.13]. The testimonial from the team in the Netherlands describes the importance of this research and our partnership: “This could potentially decrease dizziness symptoms for thousands of patients with chronic dizziness in the Netherlands, which would never have been possible without the LifeGuide team.” [5.13] The LifeGuide team are working with them to disseminate the intervention to patients in Dutch and the original English version.

5. Sources to corroborate the impact

- 5.1 The PHE Behavioural Strategy to improve people’s health (2018) recommends the Person-Based Approach (p. 28) and the LifeGuide software (p.32) as useful tools for public health practitioners: <https://www.gov.uk/government/publications/improving-peoples-health-applying-behavioural-and-social-sciences>
- 5.2 A 2019 paper by global healthcare company Cigna describes how they used the Person-Based Approach to successfully develop an e-health employee wellbeing intervention that has been rolled out by multinational companies to 20 countries. <https://doi.org/10.1177/2055207619852856>
- 5.3 <https://www.lifeguideonline.org>
- 5.4 This website demonstrates how Macmillan continue to make available to people with cancer the Restore intervention developed and trialled using LifeGuide: <https://web.archive.org/web/20201126195029/https://www.macmillanrestore.org.uk/>
- 5.5 Germ Defence is an endorsed resource on the NICE website: <https://web.archive.org/web/20201118162514/https://www.nice.org.uk/guidance/ng63/resources/endorsed-resource-germ-defence-4359029869> Link to the original version of Germ Defence: <https://www.lifeguideonline.org/player/play/germDefencev1>
- 5.6 Link to the version of Germ Defence adapted for COVID-19: <http://www.germdefence.org>
- 5.7 Link to the British Society of Antimicrobial Therapy website nationally disseminating the Antibiotic Review Kit for hospitals developed by the University of Southampton LifeGuide team: <https://web.archive.org/save/http://bsac-vle.com/ark-the-antibiotic-review-kit>
- 5.8 A 2018 paper detailing an effective breathing retraining intervention to improve quality of life for patients with asthma. [https://doi.org/10.1016/S2213-2600\(17\)30474-5](https://doi.org/10.1016/S2213-2600(17)30474-5)
- 5.9 The British Thoracic Society and Scottish Intercollegiate Guidelines Network refer to our evidence as high quality: <https://www.brit-thoracic.org.uk/document-library/guidelines/asthma/btssign-guideline-for-the-management-of-asthma-2019>
- 5.10 Menieres Society UK and VEDA (American Vestibular Disorders Association) both feature links to Balance Retraining on their websites: Menieres Society: <https://web.archive.org/web/20201130210732/http://www.menieres.org.uk/information-and-support/treatment-and-management-vestibular-rehabilitation>; VEDA: <https://web.archive.org/web/20200427113540/http://vestibular.org/diagnosis-treatment>
- 5.11 Testimonial letter from Professor Eilis McCaughan and Dr Carrie Flannagan, Ulster University. They used LifeGuide to develop and disseminate an intervention to maximise sexual wellbeing for people living with prostate cancer, in partnership with Prostate Cancer UK: <https://web.archive.org/web/20201208151631/https://prostatecanceruk.org/about-us/projects-and-policies/truenth>
- 5.12 Testimonial letter from Professor Sibyl Antheierens at the University of Antwerp.
- 5.13 Testimonial letter from Dr Otto Maarsingh, Vrije Universiteit Amsterdam, The Netherlands. Their team translated the LifeGuide Balance Retraining intervention into Dutch for a research study now shown to be effective and published in British Medical Journal.