Institution: University of Essex		
Unit of Assessment: 24 - Sport and Exercise Sciences, Leisure and Tourism		
Title of case study: Surveillance and evaluation through health-related fitness assessment practices influences the development of strategies enhancing the health and wellbeing of youth.		
Period when the underpinning research was undertaken: 2008 - 2015		
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:**
Gavin Sandercock	Professor	2006 – Present
Valerie Gladwell	Professor	2000 – Present
Matthew Taylor	Senior Lecturer	2008 – Present
Period when the claimed impact occurred: 2014-2020		
Is this case study continued from a case study submitted in 2014? N		

1. Summary of the impact

University of Essex research provided the benchmarking data and protocols to assess health-related fitness in youth. These benchmarks were essential in establishing Fitmedia Ltd. (a fitness assessment business which evaluates health and wellbeing in youth). Fitmedia's award winning assessment programmes work with over 50 schools and community organisations, assessing over 8,000 children and directly influencing charities. Within this impact case are two examples of how this work enhances the activities of two youth charities, London Playing Fields Foundation and Rackets Cubed (R^3). Fitmedia informs public debate by providing evidence (underpinned by this research) supporting the importance of child fitness assessment to five working parties of the All-Party Parliamentary Group (APPG) for a Fit and Healthy Childhood.

The research has influenced local practice directly at Active Essex and Essex County Council, supporting the development of new assessment methods in the area of physical activity, changing evaluation practices (thus facilitating more effective use of public money) and enabling the Council to access GBP10,000,000 funding to transform the delivery of physical activity locally.

Internationally, the research has influenced policies in education and public health in Bogota, Columbia, directly enabling accurate fitness assessment of over 95,000 children and informing new health and fitness recommendations to improve the physical capacity and muscular fitness of the schoolchildren.

2. Underpinning research

Essex's Health, Exercise and Active Lifestyle (HEAL) research group produces theoretical and applied research relating to health, exercise and activity. This research is then used to inform progress in health behaviours, especially in children's health and wellbeing.

Despite being the most powerful indicator of children's health, aerobic fitness is not routinely monitored in the UK. A series of reviews (2006-7) showed downward trends in fitness based on data gathered in children from 53 countries. No data were available for England due to total absence of any published research. This led Sandercock to undertake two large childhood fitness surveys in England. In 2008, Sandercock assessed fitness of a representative sample of volunteer schools providing a sample of over 300 children aged 9 to 11 years old. Comparing test scores from the Chelmsford Children Fitness and Activity Survey (CCFAS, 1998) with data collected in 2008, it was established that both physical capacity [R1] and muscular fitness [R2] had declined. Furthermore, the 9% decline reported in physical capacity was double the global rate of decline reported previously [R1].

Sandercock (aided by Gladwell and Taylor) followed up the CCFAS with a seminal study on older children: the East of England Healthy Hearts Study (EoEHHS). This was the first large-scale evaluation of fitness providing much-needed reference data for multiple elements of physical fitness in English children aged 10-16 years [R3, R4]. EoEHHS produced the first data on English children's fitness and the first open access data of this kind when deposited on the UK Data Service [R5]. This enabled detailed international comparisons and investigation of potential

correlates.

The CCFAS demonstrated the sensitivity of multiple indices of fitness [R1, R2] when used as an objective outcome measure of children's physical health. The EoEHHS demonstrated how large-scale assessments of children's fitness were feasible and could be cost-effective [R3, R4, R5]. These messages were clearly set out in [R6]; a battery of simple fitness tests in children could be both cost effective *and* informative for governments and educational providers to understand the benefits of PA programmes on health and wellbeing. Furthermore, understanding the context of different settings, including barriers and facilitators (for example the importance of play environment in schools in PA levels [R7]), is crucial to enabling stakeholders to embed evaluation and thus gain learning and insight from PA programmes in youth.

3. References to the research [can be supplied by HEI on request]

The following articles are published in highly respected peer-reviewed journals or held in reputable data archives.

R1 Sandercock, G, Voss, C McConnell, D & Rayner P (2010) Ten year secular declines in physical capacity of affluent English children are largely independent of changes in body mass index. *Arch. Dis. Child* **95** (1): 46–47. http://dx.doi.org/10.1136/adc.2009.162107

R2 Cohen, D, Voss, C, Taylor, M, Delextrat A and Sandercock G (2011) Ten year secular declines in muscular fitness in English Schoolchildren. *Acta Pediatrica*. **100** (10): 175-177. https://doi.org/10.1111/j.1651-2227.2011.02318.x

R3 Sandercock G, Voss, C & Gladwell V (2008) Twenty-metre shuttle run test performance of English children aged 11-15 years in 2007: Comparisons with international standards. *J. Sports Sci* **26** (9): 953-957. https://doi.org/10.1080/02640410801910301

R4 Sandercock G, Voss C, Cohen D, Taylor M & Stasinopoulos D (2012) Centile curves and normative values for the twenty metre shuttle-run test in English schoolchildren*. J. Sports Sci* **30** (7): 679-687. https://doi.org/10.1080/02640414.2012.660185

R5 Sandercock, G (2014) *East of England Healthy Hearts Study: Cross-Sectional Data, 2006-2011* [data collection]. UK Data Service. SN: 7456, http://doi.org/10.5255/UKDA-SN-7456-1

R6 Cohen, D, Voss, C & Sandercock, G (2015) 'Fitness testing' for children: let's mount the zebra! *J Phys Activity & Health* **12** (5): 597-603. https://doi.org/10.1123/jpah.2013-0345

R7 Wood, C, Gladwell V and Barton, J (2014) 'A repeated measures experiment of school playing environment to increase physical activity and enhance self-esteem in UK school children.' *PLoS ONE*, **9** (9). https://doi.org/10.1371/journal.pone.0108701

G1 Development of an assessment framework to quantify the impact of the school PE and sports premium on delivery and attainment in Essex, ESRC IAA and Active Essex, 01 Apr 2015 - 31 Mar 2017, GBP8,000 and GBP8,000 (Sandercock).
G2 Secondment to Essex County Council (HEAL) ESRC IAA 01 Mar 2017 - 31 Dec 2017; GBP14,935.510 (Gladwell)

4. Details of the impact

A. Fitmedia: fitness assessment in children [S1, S2, S3a,b, S4, S5, S6a,b]
Four areas where the University of Essex's research [R1-5] achieved impact through Fitmedia:

(i) Impacts on the economy: a new business has established its viability [S1, S2, S3a,b]
The company Fitmedia was established in 2013 for the commercial exploitation of the fitness assessment protocols in children developed by Sandercock and his collaborator (Cohen) in [R1-R5]. Although the company was initially set up in February 2013, nearly all of its activity was in the period 2014-2020. Sandercock is one of the four founding Directors and is Fitmedia's Director of Testing. According to the Director of Strategy and Operations at Fitmedia, Essex Research *"provided the foundations of the company. Without the research work, there would be no reference data*. W*ithout the reference data, there would be no ability to provide benchmarking protocols, to accurately assess children's fitness and physical aptitude. Without the benchmarking protocols, Fitmedia as a company would not be able to provide its products and services*. *Without Fitmedia, schools and children across England would not have information about their fitness and physical*

abilities" [S1].

The Company is a microbusiness set up without loans or investment funding to ensure that the business model and growth could remain under the Directors' control and the aims of the company would not be compromised by external or conflicting interests. It has proved its viability during the period 2014-2020 as evidenced by [S1]: turnover for the period 2018-2019 double that achieved for the period 2013-2014, employment for six part time trainers; running 59 separate assessment events totalling over 8,000 children across the South and South East (Boroughs or Local Authorities including Devon, London, Hertfordshire, Bedfordshire and Essex) to a diverse clientele including; primary, secondary and SEN schools, community organisations, and charities. In 2015, Fitmedia was a finalist for the Sports Technology Awards as the "Best Technology to Promote Participation in Sport". In 2019, it was awarded Global Health and Pharma magazine's "Leading Providers of Children's Fitness Analysis & Assessment – UK" [S2], and in 2020 they awarded Fitmedia "Best Children's Fitness Analysis and Testing Specialists – UK". In 2020 it was named "Global 100" magazine's "Leading Provider of Children's Fitness Analysis & Testing" [S1].

(ii) Impacts on public policy: informing policy debate with research evidence [S3a,b]

The All-Party Parliamentary Group (APPG) for a Fit and Healthy Childhood was formed to promote evidence-based discussion and produce wide-ranging reports on all aspects of childhood health and wellbeing to assist policymakers to reach decisions based on best evidence. Fitmedia, utilising Essex research, were part of the working group that contributed to five APPG reports: Healthy Patterns for Healthy Families (Oct 2014); Early Years (Nov 2014); National Obesity Framework (Jan 2016); Physical Education (Oct 2016); and PE and Sport Premium (Feb 2019). Particularly relevant excerpts from the reports include: a recommendation "*to encourage Local Authorities to undertake fitness assessments on the children in schools in their area*" [S3a] and "*Fitmedia Ltd undertook an intensive evaluation of an intervention financed by the PESS Premium at a school in North London in 2013-14; the assessment methods used indicated that the money had been well spent and in a subsequent Ofsted testing, the school rating of 'Outstanding' was augmented by the fact that the inspectors specifically praised the assessment of attainment in the PE programme*" [S3b].

(iii) Impacts on improving wellbeing and influencing a charity (LPFF) [S4, S5]

The London Playing Fields Foundation (LPFF) was one of the UK's first sporting charities (established 1890). According to LPFF's Chief Executive their vision is to create a "*happier, healthier, more cohesive London through protection, provision and promotion of playing fields*" [S4]. Coppermile is a project based on The Daily Mile, delivered by LPFF and Coppermill primary school, Waltham Forest. The Chief Executive states "*to measure the impact of the project we decided to evaluate changes to the children's physical fitness and psychological wellbeing. Fitmedia Fitness was recommended to us because of their research into child fitness testing and expertise in evaluating other areas of a child's development such as wellbeing and self-efficacy"* [S4].

The evaluation showed improved fitness levels in the children [S5] and it also increased academic outcomes: "*The school believes that the Coppermile also contributed to excellent academic outcomes; overall the majority of pupils in both year groups made better than expected progress. In addition, during SATs week all Year 6 pupils completed the Coppermile every day before sitting each test. The results they achieved, in meeting the end of key stage 2 expectations in all areas of English and maths, was significantly above the estimated Waltham Forest and national standards*" [S5, p10].

LPFF concluded that "*Fitmedia Fitness's work on this project strengthened LPFF's commitment towards evaluating the impact of physical activity interventions. It reinforced our belief in the importance of providing independent and objective evidence to prove the value of such interventions*" [S4]. As a result of working with Sandercock and Fitmedia, LPFF are wishing to "*share the experience of the Coppermile project with other schools and playing field providers so that they can implement something similar in their own setting*" [S5, p12].

(iv) Impacts on improving wellbeing and influencing a charity (Rackets Cubed) [S6a, b]

Rackets Cubed (R^3) is a charity that runs integrated Squash, Tennis, Education Maths and Nutrition Programmes for children at local schools in areas of High Deprivation. In 2018, R^3 began

a year-long educational and physical activity intervention at one Primary School in Roehampton. The intervention was targeted at pupils from Years 4 and 5 to help improve their health, fitness and basic maths skills. R^{3}'s founder [S6a] explains that Fitmedia were engaged to carry out an evaluation of the impact of the project on the children's physical literacy and fitness. Fitmedia's evaluation showed that the programme was successful in improving the physical fitness of the participants (fitness improved more in Year 4 than in Year 5, and slightly more in boys than girls). As a result of that evaluation study, R^3 were allocated increased funding and expanded their charitable work, to run intervention projects in seven areas across England [S6a]. The project was expanded to look at the children's self-efficacy and confidence and due to run over the academic year from September 2019 to July 2020 [S6a]. Fitmedia was again engaged to assess the impact across each project. Initial baseline assessments were taken in Sept/Oct 2019, but due to the COVID-19 health crisis, and the closure of schools, the project was terminated and final assessments in July 2020 were not available. However, the charity responded to COVID-19, aided by Fitmedia's evaluation: "*The experience of Rackets Cubed from their previous work and the evaluation of Fitmedia enabled Rackets Cubed to run a 5 week pilot project, for children aged 9-11.The project provided physical activity programmes for children from three selected primary schools in Roehampton. Fitmedia evaluated the impact on the children's physical fitness and personal self-efficacy across three areas (doing sport, activity outside school, and learning and concentrating)*." [S6a]. Using the findings from Fitmedia the founder of R^3 stated that "*Fitmedia's evaluation showed that the project had a significant impact on agility. Agility improved significantly for both genders and across all three age groups. The project also had a positive effect on the children's personal self-efficacy. Across the entire cohort, the increased confidence was much more prevalent among the boys than the girls[…]. The findings have led Rackets Cubed to run an adapted COVID Recovery Programme and run a larger COVID Recovery Impact study beginning in September 2020 (see https://twitter.com/RacketsCubed/status/1297872462273810434). In summary, had it not been for the research, which you undertook at the University of Essex, the benefits outlined here could not have been achieved"* [S6a, S6b].

B. Active Essex and Essex County Council (ECC) [S7, S8]
Impacts on public policy and health: research used to change current processes or services and identify new services to be provided.

Active Essex is the Sport and Physical Activity Partnership for Essex County Council (ECC). Active Essex's Strategic Lead for Education and Skills stated that their "*collaboration with you [Sandercock] and your fellow researchers [Gladwell] at the University of Essex began in 2013*" [S7] and continued through 2014-2020. "*We were aware of your research into child fitness assessment [R3, R4] focussing on fitness levels and obesity in young people. We also knew of your expertise in evaluating other areas of a child's development such as wellbeing, self-efficacy and so chose to collaborate with you on numerous projects*" [S7].

In 2016 Sandercock worked [G1] with Active Essex and ECC to evaluate the school-based interventions aimed at promoting physical activity (including the Primary PE and School Sport Premium). Sandercock worked with ECC first, to: *"develop and deploy a measure of children's physical self- efficacy, self-esteem and wellbeing*" then *"evaluate the impact of the … Premium on teaching efficacy in primary school teachers across Essex*" [S7]. This work promoted stakeholder collaboration within ECC because it "*dovetailed with the work that the County Sports Partnership is doing to support schools in their delivery of the Primary PE & Sport Premium."* The scale and objectivity of these evaluations all stakeholders to *"make the most effective use of the funding"* [S7].

Sandercock's assessment and evaluation programme "*has provided schools with insight that has informed future planning. This is particularly the case with two schools which required a School Improvement Plan in line with OFSTED determination*" [S7]. Sandercock impacted policy of a local authority as he "*significantly influenced Active Essex's decision to recommend that schools evaluate the impacts of the Golden Mile and Daily Mile on pupils' physical and mental wellbeing*" [S6]. Furthermore "*Active Essex's attitude towards evaluating the impact of physical activity interventions for children has been influenced by your [Sandercock] research and we now recognise its importance and benefits. We feel that our collaboration exemplifies how a university can work with a county organisation for the betterment of the county"* [S7].

Gladwell built on these ongoing collaborations, and the Head of Commissioning for Public Health and Wellbeing writes because of her "*expertise in evaluating areas of development such as wellbeing [and] self-efficacy*"[R7] [S8] she was seconded to ECC in 2017 [G2]. Gladwell was based at County Hall in Chelmsford one day a week to "*build on the innovative work undertaken by the University of Essex to inform how we use the considerable resources, in pursuit of improving the physical emotional and spiritual wellbeing of the Essex population*." [S8]. Working with ECC and Active Essex, Gladwell and her team explored "*evaluating more of [their] physical activity services/programmes and to embed more behavioural change training within [their] offer*" [S8]. This culminated in ECC being one of the twelve consortia awarded GBP10,000,000 to implement Sport England's local delivery pilot schemes to transform "*the delivery of physical activity locally*". Gladwell was "*a key partner in assisting ECC to win this award*" [S8]. "*Further, due to the evaluation work carried out, these projects originally funded by ECC or Local Delivery Pilot have now gained funding from other sources to support continuation or new projects that they are running helping to provide additional benefits to residents of Essex"* [S8].

C. Fitness assessment in Columbian school children [S9, S10]
Impacts on public policy and health: research used to identify a new service to be provided, which led to proposals for new health and fitness guidelines in children.
In 2014, based on the research of Sandercock [R2, R4, R6], the Secretary of State for Education in Bogota incorporated fitness assessment into a regional health study, the Prueba Bar Survey: "*Evaluando Nuevas Formas de Aprender: Bienestar físico, ciudadanía y convivencia"* (Evaluating New Ways to learn: physical wellbeing, citizenship and living together"). The Secretary of Education for Bogota acknowledged [S9] the "*important role [our] research played in influencing our policy on assessing the physical health of schoolchildren in Bogota*." In particular [S9], "*The publication of your data from the East of England Healthy Hearts Study regarding the importance of assessing children's cardiovascular [R4] and muscular [R2] fitness and your appraisal of the importance and cost-effectiveness of fitness assessment in health monitoring [R6] helped us to choose which tests to perform in our surveys. In Bogota, our survey team collected data … using methodologies similar to those used by yourself and Dr. Cohen in the East of England Healthy Hearts Study [R6] and the Chelmsford Children's Fitness and Activity Study*" [R2].

Data was collected on 41,173 children in 2014 and 55,856 in 2015 [S9, S10]. The detailed fitness results were published in a report by the Superior Mayor of Bogotá [S9]. Based on the data collected and consequent concerns about the future health and wellbeing of the children tested, recommendations were made to education institutions to improve the physical capacity and muscular fitness of the children. Most notably these included specific recommendations for: the integration of physical activity into normal lessons and the implementation of active breaks between class of 5 to 10 minutes to include stretching, vertical jumps and walking around the room [S10].

5. Sources to corroborate the impact

Fitmedia

[S1] Director of Strategy and Operations, Fitmedia
[S2] Global Health and Pharma Fitness and Nutrition Awards (2019), p. 14
[S3] APPG 'A Fit and Healthy Childhood' reports: **a.** Healthy Patterns for Healthy Families, p. 10. **b.** The primary PE and Sport Premium p. 30.
[S4] Chief Executive, London Playing Fields Foundation
[S5] Copper Mile report, p. 10 and p. 12
[S6] **a.** Founder, Rackets Cubed. **b.** archived Rackets Cubed tweet https://twitter.com/RacketsCubed/status/1297872462273810434

Active Essex

[S7] Lead for Education and Skills, Active Essex
[S8] Head of Commissioning for Public Health and Wellbeing, Essex County Council

Columbia

[S9] Secretary of Education for Bogota (English and Spanish)
[S10] The Prueba Bar Survey: "*Evaluando Nuevas Formas de Aprender: Bienestar físico, ciudadanía y convivencia"* (Evaluating New Ways to learn: physical wellbeing, citizenship and living together").