

Institution: Trinity Laban Conservatoire of Music and Dance		
Unit of Assessment: 33		
Title of case study: Dance Science and Health: Transforming Practice		
Period when the underpinning research was undertaken: 2012-2020		
Details of staff conducting the underpinning research from the submitting unit:		
Name(s): Clark, Quin, Rafferty, Redding, Stancliffe, Wakeling	Role(s) (e.g. job title): Head of Research, ex- and current- Programme Leader for MSc, BSc; Postdoctoral Fellows (x2)	Period(s) employed by submitting HEI: 2008-; 2010-2015; 2005-; 2017-; 2014-17.
Period when the claimed impact occurred: 1 August 2013 - 31 Dec 2020		
Is this case study continued from a case study submitted in 2014? No		
1. Summary of the impact		
<p>Trinity Laban's research into dance health has changed practice within dance training and among dance educators and practitioners worldwide. We have seen a large growth in the body of scientific research concerning the physiological, biomechanical and psychological considerations of dance practice. Our research has examined the science of dancing, developed new models of practice for both those who train professionally, and those who participate recreationally, and has embraced and extended methodologies for evaluating the way in which dance improves health and wellbeing.</p>		
2. Underpinning research		
<p>Trinity Laban is one of the pioneers of dance science as a field of teaching and research in the world. This research has raised consciousness of the importance of safe dance practice, dancer health and dance for health and has led to the development of new curricula in dance science in higher education, both in the UK and overseas. There are now many university and professional development courses and qualifications for teachers within the UK and internationally in the area of dance science and health. Importantly, our research has raised awareness of the necessity to apply scientific knowledge to dance training to prevent injury through practicing safely and effectively as well as spotlight the benefits of dance through nuanced more progressive methods of understanding those benefits among the wider population.</p> <p>In the last decade, over 50 peer-reviewed journal papers were published by Trinity Laban faculty and over 150 conference presentations delivered internationally, specifically focused on these topics. This underpinning research includes studies into the biopsychosocial contributing factors of injuries in contemporary and Irish dancers [R1], the prevalence of injuries among over 800 young talented dancers [R4], work-load and energy intake and expenditure among vocational contemporary dance students [R2] and the cardiorespiratory fitness capacities of dancers alongside various experimental studies exploring the effect of supplementary strength and conditioning, new methods of warm-up and balance training and recommendations for safer practising [R3].</p> <p>Our research into dance for health includes both experimental and ethnographic studies [R6] [R7] including those with physical and learning differences such as acquired brain injury and dementia [R8]. Research into optimal dance learning environments also sits within our portfolio of studies including papers on the role of the reflective practitioner within participatory arts practice. The research reveals a number of important findings. First, in relation to dancer training, discrepancies exist within the formal training of dancers, relating to debilitating habitual practices and injuries [R1] [R2] [R3] [R4] [R5]. This highlights a need for improved methods of training for enhancing and monitoring dancer health and educational resources for teachers so that every dancer's potential is optimised. The research in this area, led by Professor Emma Redding, with groups of dance science researchers, post-docs, and PhD students has included observational, cross-sectional and experimental studies with over 1000 dancers including those from pre-vocational, vocational-</p>		

conservatoire and professional populations.

Secondly, our research demonstrates the importance of facilitating learning environments that foster creativity and participant agency. Research has shown how creative practitioners have developed a range of diverse reflective practices to engage and nurture older participants which has important implications for understanding how we enhance participant experience [R6]. Ethnographic and phenomenological research demonstrates the need for nuanced approaches to understanding participant experience [R7]. Ethnographic methods also inform our search for alternative and more ethical ways to capturing and disseminating the active ingredient of dance in arts for health settings and employing dance to disseminate research findings.

3. References to the research

- [R1] Cahalan, R., Kearney, P.E., Bhriain, O.N., McLaughlin, L.C., Redding, E., Quin, E., & O'Sullivan, K. (2018). Dance load, well-being and injury in collegiate Irish and contemporary dancers: A prospective study. *Physical Therapy in Sport*.
- [R2] Brown, M.A., Howatson, G., Quin, E., Redding, E., & Stevens, E.J. (2017). Energy intake and energy expenditure of pre-professional female contemporary dancers. *PLOS ONE Journal* (Open Access).
- [R3] Quin, E., Rafferty, S., & Tomlinson, C. (2015). *Safe Dance Practice. An Applied Dance Science Perspective*. Champaign, Ill, USA: Human Kinetics.
<http://www.humankinetics.com/products/all-products/Safe-Dance-Practice>
- [R4] Steinberg, N., Aujla, I., Zeev, A. & Redding, E. (2014). Injuries among talented young dancers: Findings from the UK Centres for Advanced Training. *International Journal of Sports Medicine*, 35(03): 238-244.
- [R5] Nordin-Bates, S.M., Quested, E., Walker, I.J., & Redding, E. (2012). Climate change in the dance studio: Findings from the UK Centres for Advanced Training. *Sport, Exercise and Performance Psychology*, 1(1), 3-16.
- [R6] Wakeling, K. (2015). 'We're all on the path ourselves': The 'reflective practitioner' in participatory arts with older people. *Journal of Arts and Communities*, 6 (2–3) pp.189–203
- [R7] Wakeling, K. & Clark, J. (2015). Beyond health and well-being: Transformation, memory and the virtual in older people's music and dance. *International Journal of Ageing and Later Life*, 9(2), pp.7–34. doi: 10.3384/ijal.1652-8670.15262

4. Details of the impact

The impact of our research includes new curricula and professional development in the area of dance and dance for health for dancers, teacher-practitioners and a range of participatory arts activity that has brought about change. Trinity Laban's Masters programmes (MSc Dance Science and MFA Dance Science) were the first degrees in dance science in the world. Trinity Laban continues to be both a pioneer and catalyst in this area. These programmes offer dancers and teachers a viable means to study issues around safe dance practice and dancer health. To date, over 250 people have graduated from Trinity Laban with an MSc or MFA in Dance Science, many of whom have gone on to create new modules and programmes in dance science and/or are lecturing at institutions nationally and internationally. Examples include: University of Bedfordshire, Bird College for Performing Arts, Canterbury Christchurch University, University of Chichester, Roehampton University, Bath Spa University, New Bucks University, University of Calgary, Canada, University of Bern, Germany, Texas A&M, Houston, USA. Our body of research continues to initiate consultancy with other HE institutions such as Rutgers University, USA to assist development of their new BFA Dance Science and Beijing Dance Academy, China to assist in the development of their new BA Dance Science programme. One international leader in the area stated, as an observer of the impact of, e.g. [R1-5]: "Trinity Laban is one of the leading institutions in dance science and health. The research papers produced by Trinity Laban are referred to by students, graduates and faculty of the Beijing Dance Academy and Chinese dance science community more widely" [1].

Our small team of dance science research faculty deliver talks at national and international arenas addressing issues of dancer health and safe practice **[R3]** regardless of dance style and genre. Examples include various One Dance UK annual conferences, *The Acrobatics Training and Health Symposium*, National Centre for Circus Arts, London, *Swing Dance Championships*, London, *Safe Practice Day* for teachers at Rosella Hightower Conservatoire, Cannes, France and *DANscienCE Festival*, Queensland Australia. A further 80 plus presentations have been delivered in the last decade at the annual conferences of the International Association for Dance Medicine and Science (IADMS) and a special *Day for Teachers* was created by Trinity Laban colleagues for the IADMS conference in Pittsburgh, USA.

A substantial focus of our research is screening and profiling to gather important physiological data regarding dancers' cardiorespiratory fitness capacities, joint range of motion and muscular endurance as a means of enhancing performance potential. We have offered our screening to professional dancers in several companies such as Studio Wayne McGregor, Mimbire, Boy Blue, Far from the Norm and Akram Khan Dance Company providing them with recommendations for effective training and health support.

In terms of teacher resources that have been created from our research, the textbook *Safe Dance Practice* (Quin et al, 2015) continues to appear on the reading lists of many universities worldwide and the International Association for Dance Medicine & Science *Bulletin for Dancers and Teachers*, a peer reviewed bi-annual journal founded by researchers at Trinity Laban, that applies dance medicine and science theory and research to practical problems in dance education, continues to grow with a readership of 1000+ individuals/organizations over the 1-year span of 14 Nov 2019-13 Nov 2020 with 5969 electronic page views **[2a]**. We convey many of our research findings into user-friendly resource papers, which are freely available on the International Association for Dance Medicine and Science website. Our Resource Paper entitled, *Dance Fitness*, has become the most popular of IADMS' Resource Papers, in the number of views over this time, and also in the year 14 Nov 2019-13 Nov 2020, with 6258 page views known (web page version) and presumably a similar number of un-countable direct PDF downloads. *Dance Fitness* has the greatest reach of any of IADMS' resource papers, having been translated into the greatest number of languages: English, French, German, Greek, Italian, Greek, Mandarin, Portuguese, and Spanish and is currently the most downloadable paper on the website **[2b]**.

Safe in Dance International is an organisation which has developed the international benchmark standard for Healthy Dance Practice for teachers working with dancers and endorses good and best Healthy Dance Practice in organisations and colleges. These certificates and courses were written by Trinity Laban dance science colleagues and are directly informed by research conducted by Trinity Laban. Maggie Morris, the Co-Founder of Safe in Dance stated as an impact observer: *"Trinity Laban's research in dance science and health has had a significant impact within the dance sector. This research has directly informed the development of new industry certificates and professional development education courses for private dance teachers accessed by those in the UK and also overseas. The research has raised consciousness within the sector of the importance of safe dance practice and has resulted in new methods of teaching and learning dance. Trinity Laban is known as one of the world's leading institutions in dance science and health and its research is far-reaching"* **[3]**.

Other national and international professional organisations such as One Dance UK, Council for Dance, Drama and Musical Theatre, Healthy Dancer Canada utilise Trinity Laban's dance science research as part of their advocacy and educational work. The Imperial Society of Teaching of Dancing (ISTD) conducts 250K examinations in 40 countries per year and the impact of the incorporation of the SiDI certificate within the ISTD teaching qualifications demonstrates further the non-academic impact of our research. Karine Rathle, Director of Healthy Dancer Canada, spoke as an observer of Trinity Laban's impact: *"thanks to their example, more universities and conservatoires are integrating Dance Science into their programmes"* **[4]**.

Trinity Laban's research has helped initiate more affordable access to first class dance specific

healthcare and dance science support services across the UK through co-founding the National Institute for Dance Medicine and Science. Andrew Hirst, the Chief Executive of One Dance UK, stated as an impact observer of e.g. [R1-5]: *“The research produced by Trinity Laban in the area of dance science and dance health has contributed significantly to the development of the field, globally. Evidence of this growth include new curricula and educational programmes in Higher Education and for the professional dance sector, additional and enhanced dance for health participatory opportunities for other populations and the formation of national networks and organisations such as the National Institute for Dance Medicine and Science and Healthy Conservatoires. As one of the leaders in the field of dance science, Trinity Laban’s research has also impacted upon the way in which many professional training schools train and support dancers, for example through injury prevention screening work and through improved methods of physiological preparation for the demands of performing”* [5].

Trinity Laban’s research into the benefits of dance on older people’s lives is cited by Chief Executive of the Arts Council, Darren Henley [6]. Our research informs practitioner delivery [R6] and the holistic approach of our arts for health work is celebrated by the Arts Manager at Lewisham and Greenwich NHS Trust who observed the tangible impact of a 10-week Singing for Lung Health pilot targeting participants with chronic lung conditions, stating: *“The positive impact that Singing for Lung Health had on our patients surpassed expectations and brought some wonderful benefits which we did not foresee. It soon became clear that as well as the physiological improvements the participants were reporting we were witnessing some really special, more holistic benefits. We know this has a tangible impact on both the health and wellbeing of those involved. Due to the success of Singing for Lung Health we have committed to more singing as a part of our arts programme next year”* [7]. The success of the pilot and participants’ self-reported improvement in their breathing, fitness levels and psychological wellbeing [8] led to an expanded programme of activities delivered in collaboration between Trinity Laban and the Lewisham and Greenwich NHS Trust. The project also emphasised how methodologies originally developed within the dance science grouping could be applied to other art forms, such as music.

Our progressive model of practice seeks to embrace more nuanced and humanising parameters in how participatory arts are appraised. Our research calling for a shift towards more flexible evaluation strategies, the need for qualitative evidence, and a stronger platform for participants’ reflections [R7] is cited by King’s College London as a significant methodological shift [9]. *Beyond the Walls* [R8] sought to reimagine an arts for health project evaluation as a living, breathing, multi-sensory encounter and conjure the lived experience of being present at a care home arts programme for people living with dementia. Described as a *“must see show”* by reminiscence arts organisation Age Exchange [10a], *Beyond the Walls* has been seen by more than 200 stakeholders including practitioners, funders, and participatory arts/arts and health professionals. A Professor of Social Sciences described the work as *“a lesson in how powerful a performative approach to dissemination can be”* [10b] and the CEO of community dance organisation People Dancing stated that the approach to dissemination *“is exemplary and should be ‘bottled’ and taken up by arts organisations around the country”* [10c].

Trinity Laban’s research provides credibility and legitimacy to forms of practice that can be marginalised—notably arts practice with older people and other settings where creativity is sometimes assumed to be impaired. Collaborative research with King’s College London has transformed public understanding and helped to dispel stereotypes around the creative capacity of people with acquired brain injury [11]. Two creative outputs emerged from this research, the dance films *Switch & Shift* and the award-winning *Porcelain* that foreground participants’ creativity [12]. The relationship between research and practice is highly iterative, with research findings feeding into practice and vice versa. Professional development programmes have shaped pedagogical and professional practices leading to secondary impact. A neuro-physiotherapist supporting dance classes for people with an acquired brain injury reported becoming freer, more experimental and adventurous when working with their clients [13]. In recognition of the specialist nature of dance and health practice, a pilot professional development programme targeting early career professionals was described as confidence-building and evaluation indicated that the programme led to a greater sense of empowerment amongst participants [13]. The evaluation findings had

secondary impact leading to the collaborative research project *Dance, Health and Wellbeing: Debating and moving forward methodologies* funded by the Wellcome Centre Cultures and Environments of Health Transformative Research Awards at Exeter University which commenced in November 2019.

Trinity Laban colleagues have given presentations about this work to ministers including three visiting representatives from the French Ministry of Culture in 2018. Trinity Laban's research into the value of arts for health and wellbeing has gained attention in the field of science and features on *The Naked Scientists: Award-winning science podcasts and science radio shows*. Our dance for health research was also presented as part of *Salsa Dancing: How Dancing Keeps you Happy and Healthy*, The Royal Institution, (2017) and at the Cheltenham Science Festival (2017) *Strictly Sciencing* [14]. Our work was featured in The Guardian / The Observer article (2018). *Raising the Barre: How Science is Saving Ballet Dancers* and in the BBC 2 *Incredible Medicine: Dr Weston's Casebook* series 1, episode 4 (2017) [15].

5. Sources to corroborate the impact

- [1] Email to Head of Dance Science from Prof Wen Rou, Director of Scientific Research Department, Beijing Dance Academy, [available on request].
- [2a,b] Bulletin for Dancers and Teachers, main page @ <https://www.iadms.org/page/243>
Resource Page: Dance Fitness @ <https://www.iadms.org/page/303>
- [3] Email to Head of Dance Science [available on request].
- [4] Email to Head of Dance Science [available on request].
- [5] Email to Head of Dance Science [available on request].
- [6] Henley, D. (2016) *The Arts Dividend: Why Investment in Culture Pays*. London: Elliott and Thompson, p. 83-84.
- [7] Email to Postdoctoral Fellow [available on request].
- [8] Trinity Laban Evaluation Report for *Singing for Lung Health*.
- [9] Wakeling and Clark (2015) cited in *The creative role of research: Understanding research impact in the creative and cultural sector* (King's College London, 2017).
- [10a] Must see show: <https://www.age-exchange.org.uk/beyond-the-walls-must-see-radiql-performance-piece-performed-by-trinity-laban-conservatoire-of-music-and-dance/>
- [10b] Email to Postdoctoral Fellow [available on request].
- [10c] Email to Postdoctoral Fellow [available on request].
- [11] White, C., & Wakeling, K. (2017). *Dancing for Health: A pilot research study*. King's College London & Trinity Laban Conservatoire of Music and Dance.
https://www.trinitylaban.ac.uk/sites/default/files/dancing_for_health_kcl_tl_research_report_dec_2017.pdf
- [12] Roswitha Cheshier (2017) *Porcelain* [dance film]. VitaFilms. <https://vimeo.com/219156202>
<http://www.vitafilms.co.uk/porcelain.html>
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- [14] Redding, E. (2018) *The Physiology of Dancing* [interview] available at <https://www.thenakedscientists.com/articles/interviews/physiology-dancing>
Salsa Dancing: How Dancing Keeps you Happy and Healthy. The Royal Institution, England, (2017) with James Gallagher, Sarah Houston, Edel Quin and Merritt Moore.
<http://www.rigb.org/whats-on/events-2017/july/public-salsa-science> *Strictly Sciencing*. The Cheltenham Science Festival (2017) with Emma Redding, James Gallagher, Edel Quin and Bronwyn Tarr <file:///Users/emmaredding/Downloads/12272.pdf>
- [15] Article in The Guardian / The Observer article (2018). *Raising the Barre: How Science is Saving Ballet Dancers*. <https://www.theguardian.com/stage/2018/jul/15/raising-the-barre-how-science-is-saving-ballet-dancers>