

Institution: University of Edinburgh		
Unit of Assessment: UoA 33: Music, Drama, Dance, Performing Arts, Film and Screen Studies		
Title of case study: Musical Improvisation for Improving Health and Wellbeing		
Period when the underpinning research was undertaken: 2012-2020		
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:
Raymond MacDonald	Professor of Music Psychology and Improvisation	2012-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 <p>Research through and about musical improvisation as an intervention in health and social contexts has resulted in impact through:</p> <ol style="list-style-type: none"> 1. bringing about growth, change and new collaborations in organisations that have adopted musical improvisation to help people with impairments to improve their communications skills and self-esteem in social and educational settings; and 2. developing new strategies that improve gait among people with physical disabilities worldwide. <p>The work has helped organisations in the USA and Scotland to develop methods and programmes for improving health and wellbeing in children and adults with physical and learning disabilities or mental illness. The research has influenced treatment methods which use physical therapy, including the creation of music designed to improve gait. The music has been licenced as part of a Gait Trainer treadmill system used in 100 facilities in Europe, the US and China, which has treated an estimated 500,000 patients since its launch in 2017.</p>		
2. Underpinning research <p>Raymond MacDonald (Professor of Music Psychology and Improvisation) has conducted extensive investigations into the application of musical improvisation as a non-invasive and economically viable intervention in health and social care contexts. MacDonald's research has focused on how music can improve both psychological and physiological health and wellbeing, and on how to increase access to beneficial musical activities for particular groups. This work was complemented by the founding of the Scottish Music and Health Network (MacDonald and Overy, Carnegie Trust, GBP32,000) in 2014, alongside researchers from Glasgow Caledonian University.</p>		

Musical improvisation as communication in social and educational settings

A major thrust of MacDonald's work has been the development and evaluation of experimental techniques using musical improvisation to improve communication and social skills. The funded project *Community Music Workshops for Social Integration among Individuals with Impairments* (Scottish Government/European Social Fund, GBP42,000, 2017-2018) provided access to music activities for adult participants in Scotland who are disadvantaged by cognitive impairments (in particular those on the autistic spectrum) and evaluated the social benefits these activities might offer them. The study recorded positive outcomes for participants, such as increased self-confidence, better ability to interact with unfamiliar situations and people, as well as quantitative outcomes, such as participating in social activities for greater periods of time [3.1]. It was followed by a subsequent project, *Music as Social Innovation*, which took the form of a partnership between the University of Edinburgh and Limelight Music (Scottish Government/European Social Fund, GBP146,000, 2018-2019).

Musical improvisation as an intervention in clinical healthcare

The study of improvisation as an intervention in healthcare is part of an ongoing collaboration with the University of Melbourne, which began in 2012. The focus is on the development of a music therapy programme to improve and enhance a sense of identity for individuals with severe brain injuries. One study in particular used song writing as a therapy for individuals who have experienced significant physical injury causing changes to their identities [3.2]. Approaches included improvisatory songwriting, where participants created new lyrics for existing songs, and frameworks where completely new songs were written. Using targeted activities such as these to consider six 'domains' of self – physical, personal, social, family, work, and moral – [3.3] the study identified the potential of songwriting as an activity that can enhance mental and physical wellbeing following illness or injury, and used songwriting to address perceptions of past, present and future selves to help participants address changes to their identities following injury [3.4].

Research along both lines above underpins a co-authored book, published in April 2020 [3.5], focusing on group musical improvisation. This book reports numerous therapeutic benefits of engaging in improvisation and includes new models that explain the beneficial effects of improvisation. The book frames group improvisation as an important artistic, educational, and therapeutic process, and investigates the mental, individual, and social processes involved. Using qualitative and quantitative methods developed via ongoing empirical investigations [3.6], the book shows that group improvisation can improve health and wellbeing and produce psychological improvements. It also provides a new framework for describing and analysing improvisation methods in general, and provides evidence for links between musical engagement and social and psychological development.

3. References to the research

3.1 Wilson, G. and MacDonald, R. *The Social Impact of Musical Engagement for Young Adults With Learning Difficulties: A Qualitative Study*. Frontiers in Psychology, 10, 2019. Peer-reviewed journal article.

<https://doi.org/10.3389/fpsyg.2019.01300>

3.2 Baker, F. and MacDonald, R. Reauthoring the Self: Therapeutic Songwriting in Identity Work. In *Handbook of Musical Identities*, MacDonald, R., Hargreaves, D. and Miell, D. Eds., Oxford University Press, 2017. (Can be supplied by HEI on request)

<https://doi.org/10.1093/acprof:oso/9780199679485.001.0001>

3.3 Tamplin, J., Baker, F., MacDonald, R., Roddy, C. and Rickard, N. *A Theoretical Framework and Therapeutic Songwriting Protocol to Promote Integration of Self-concept in People with Acquired Neurological Injuries*. Nordic Journal of Music Therapy, 25(2):111-133, 2016. Peer-reviewed journal article.

<https://doi.org/10.1080/08098131.2015.1011208>

3.4 Baker, F., Tamplin, J., MacDonald, R., Ponsford, J., Roddy, C., Lee, C., and Rickard, N. *Exploring the Self through Songwriting: An Analysis of Songs Composed by People with Acquired Neurodisability in an Inpatient Rehabilitation Program*. Journal of Music Therapy, 54(1): 35-54, 2017. Peer-reviewed journal article.

<https://doi.org/10.1093/jmt/thw018>

3.5 MacDonald, R. and Wilson, G. *The Art of Becoming: How Group Improvisation Works*. Oxford University Press, New York, 2020. (Can be supplied by HEI on request)

<https://doi.org/10.1093/oso/9780190840914.001.0001>

3.6 Wilson, G., and MacDonald, R. *Musical Choices During Group Free Improvisation: A Qualitative Psychological Investigation*. Psychology of Music, 44(5): 1029-1043, 2015. Peer-reviewed journal article.

<https://doi.org/10.1177%2F0305735615606527>

4. Details of the impact

The research has led to improved health and wellbeing for thousands of children and adults with physical and learning disabilities, and those experiencing mental illness or social disadvantage. The impact of the work can be found in: 1. **bringing about growth, change and new collaborations in organisations** that have adopted musical improvisation to help people with impairments to improve their communications skills and self-esteem in social and educational settings and 2. **developing new strategies that improve gait** among people with physical disabilities worldwide.

1. Bringing about growth, change and new collaborations in organisations:

The 2018-2019 *Music as Social Innovation* partnership directly benefited Limelight Music, a Scottish music training and production company that specialises in high quality training and developmental opportunities for people with impairments. The partnership led to the creation of educational strategies and workshops that provided musical activities to groups often denied access to them. Limelight stated that a 20% growth in the company can be attributed to MacDonald's involvement with the company in both strategic development and workshop design [5.1]. Limelight has been able to employ six musicians from the disabled community on a project basis, as well as provide additional work for core staff [5.1]. The project has also helped Limelight develop new partnerships with the NHS in Scotland and with a Music Therapy group in Texas, USA.

Limelight confirmed that MacDonald's *"research and ideas on improvisation have changed the way in which we deliver our activities by giving the work an explicit focus upon interpersonal and group communication"* [5.2]. They emphasised that *"improvisation by definition opens up musical involvement and interaction that allows for an inclusive, all-embracing and supportive approach,"* and that *"there is no other musical activity which gives as much scope for involvement."* [5.2] They identified adults with autism, children and adults who feel marginalised and have low self-esteem, and disabled adults who have difficulty communicating, as groups that Limelight is now better able to work with to deliver innovative programmes with social benefits [5.2]. Through its collaboration with MacDonald, Limelight states that the company was able to work with an additional 80 adults from the disabled community in music training; 300 adults in music workshop settings; and 850 children in Nursery and Primary School settings [5.1]

MacDonald has a long working relationship with the Center for Music Therapy in Austin, Texas, and has collaborated with them on activities which use musical improvisation to improve health outcomes. He was instrumental in introducing musical improvisation therapies to the Center – training and literature in this area was 'extremely limited' in the USA prior to his involvement [5.3]. In May 2017 Macdonald contributed to the Movement Tracks project, which used improvisatory musical composition as a therapy for those living with the effects of stroke, Parkinson's disease, cerebral palsy, and head injuries. The Center stated that *"The specific beneficiaries of Raymond's work were myself, my staff (more than 225 therapists and interns), and our clients (more than 130,000 people). His books are still among the most consistently requested books at the Center."* [5.3].

2. Developing new strategies that improve gait:

Beyond its application for improvement in psychological health and wellbeing, MacDonald's work with the Center for Music Therapy led to the creation of the first musical recordings as a targeted physical therapeutic tool [5.3]. Through collaborative free improvisation, sonic experiences were developed to activate the parts of the brain that facilitate gait and improve balance for people who, owing to neurological or other health problems or injuries, walk extremely slowly at 4-39 steps per minute/beats per minute (spm/bpm) [5.4]. The Center explained that *"the significance of creating auditory outputs at 4-39bpm is historic and profound"* and that prior to these recordings it had been believed that music recordings of this speed were too slow to activate the brain's motor coupling benefits from musical improvisation. This research proved that this was not the case [5.5].

They also confirmed that electronic medical records and data from biomedical devices support *"faster, higher outcomes in gait when patients use this new music 'Smarter Steps Volume 1' incorporated in their PT [physical therapy] training"* [5.3]. Beyond specific projects such as Movement Tracks, the Center estimated that from 2014, musical improvisation techniques have served as a key component of the therapeutic programmes of 25% of its clients – around 1,500 patients annually [5.3] – meaning these therapies reached approximately 1,800 people through the Center up to October 2019 (4.75 years).

As a result of the Movement Tracks project, the Center for Music Therapy produced a commercial recording of sub-40spm/bpm music. In 2017, this recording, Smarter Steps Volume 1 was licensed to the medical company Biodex for integration with its Gait Trainer 3 treadmill system, which is used in hospitals and rehabilitation centres worldwide. They stated that *"Since 2017 it is estimated over 500,000 patients have successfully used Smarter*

Steps Vol. 1 stems in their gait rehabilitation" [5.5] and that "100 facilities per year in Europe, the US and China now have Smarter Steps Volume 1 music to facilitate their movement that can match their heel strike from 5bpm/spm to 39spm/bpm and beyond." [5.3]. Each facility purchasing the recordings has trained its full physical therapy team in its use [5.5]. The Centre for Music Therapy estimated that each facility would treat around 375 patients per month on average, with some – including three Italian hospitals which use a daily 15-20min treadmill session with Smarter Steps as a standard treatment protocol – treating much higher numbers of patients [5.3].

The opportunities for commercial development from the Movement Tracks project were such that the team went on to develop a new audio product – BioMedical Music™ – using the biofeedback from gait training, which improved patients' walking speed and balance. In 2018, the company Biomedical Music Solutions was founded, which researches and develops ways in which artificial intelligence, gait analysis and BioMedical Music can be used together in a system called SoundSteps™ which stimulates the regions of the brain which improve gait and balance and helps prevent falls. The system is currently in use in the US, Italy, France, Germany, Switzerland and the UK, treating around 500,000 patients each year, and 100% of independently published research studies document faster improvements in walking and balance than in other systems [5.5].

5. Sources to corroborate the impact (indicative maximum of 10 references)

5.1 Statement from Limelight Music, Glasgow, October 2020

5.2 Statement from Limelight Music, Glasgow, October 2019

5.3 Statement and email from the Center for Music Therapy, Austin, Texas, October 2019

5.4 Movement Tracks Project – Scotland – Improvisation and. Centre for Music Therapy produced video

5.5 Email statement from the Center for Music Therapy, Austin, Texas, December Collaboration 2020