

Airing Pain Programme 74: Music

Tune in and turn down the volume on pain.

Could music be a key resource for managing pain? The results of a survey on music and chronic pain are promising, according to psychologist and musician Prof Raymond MacDonald. Meanwhile, most of us are already using music to influence our own psychological wellbeing.

We don't need to wait until the research is in, says Dr Don Knox – people in pain can already 'build music into their everyday pain management strategies'. He explains why whether it's Tchaikovsky or the Ramones, our own tunes make the biggest impact on pain.

Finally, Producer Paul Evans gets a singing lesson from composer Gareth Williams, who explains why most of us are not breathing well and how vocal exercises can help.

Paul Evans: This is ***Airing Pain***, a programme brought to you by ***Pain concern***, the UK charity providing information and support for those of us living with pain and for healthcare professionals.

I'm Paul Evans and this edition has been supported by grants from the Sylvia Waddilove Foundation and the Scottish Government.

Now, everyone listens to or at least hears music, well not everyone, actually, there is a neurological condition called amusia, where a symphony – described in the late Oliver Sachs excellent book *Musicophilia* – a symphony sounds like the clattering of pots and pans. That's not relevant to what we are talking about now, because such is the power of music to affect the way we behave, that it's used in the retail industry to help us part with our money, on the battlefield – the so-called psychological operations to wear down the enemy – and even as an instrument of torture. So could music be used for our health and wellbeing rather than our destruction?

The Scottish Music and Health Network is a collaboration between Edinburgh and Caledonian Universities. I went along to their second 'mapping the future of music and health research in Scotland Conference, where I met Professor of Music Psychology and Improvisation, Head of the Reed School of Music and saxophonist Professor Raymond McDonald.

Professor Raymond McDonald: The network is funded by the Carnegie Trust. The goal is to bring together researchers, clinicians, teachers, music therapists, musicians, community musicians, anybody with an interest in the relationship between music and health and wellbeing. And we want to bring people together to discuss their work, discuss their ideas and talk about the effects that musical participation can have on health. And today's focus is on developing new research, so it's a big challenge for the area because there's been a real huge growth and interest around the relationship between music and wider health parameters, but there's a real need for research, robust reliable research that can shed light

upon the process and outcomes of music interventions that are focused upon health and wellbeing.

Evans: Well, you see, it doesn't take an academic genius to know that music *can* make you feel better and can make you feel worse.

McDonald: I think that's a really good point. We all have an intuitive feeling, if you like, that music *can* in the right circumstances, make us feel better. When you're in the car, you can pick a piece of music to listen to, when you select that piece of music, you're making a number of very sophisticated psychological assessments. How do I feel right now, how do I want to feel in five minutes, what music is going to help me reach those goals, do I want to change the mood I'm in, do I want to enhance the mood I'm in?

So yes, we are all very sophisticated users of music and we use music to regulate our moods. But in terms of using music for wider, more specific benefits, so, for example, can doctors use music to alleviate the symptoms of depression? Can listening to music and performing music, help slow down cognitive deterioration for people with Alzheimer's disease? Can listening to music reduce our pain perceptions? While, you're absolutely right, there's lots of anecdotal evidence that people feel very passionate about their music, there's not so much reliable scientific evidence, that allows us to, on the one hand, predict the outcomes of listening to music interventions and, on the other hand, tailor particular interventions to target specific needs.

And that's one of the aims of the research network and that is to develop a body of research that is investigating the relationship between music listening and health outcomes so that we can predict more reliably what the outcomes of music might be in particular situations.

Evans: Well, you took part in a survey to look into the effects of music and chronic pain?

McDonald: Uh huh.

Evans: What did you find?

McDonald: The survey found that people who listen to music and *use music* more, listen to their preferred music, have higher quality of life measurements and had reduction in pain perceptions. This work came out of a number of studies looking the effect of music on *acute* pain, because what we found was listening to your favourite music, for example, while undergoing chemodialysis in a hospital environment, listening to your favourite music reduced your feelings of pain in that hospital environment and reduced your feelings of anxiety.

We also had another study where participants put their hands in cold water and what we found was that listening to your favourite music, people felt less pain when they had their hands in cold water. Putting your hands in cold water doesn't sound particularly painful but actually cold water gets painful quite quickly. We just simply asked them to take their hands out of water when it got too painful, but when they listened to their favourite music, they kept their hands in the water for much longer.

Evans: So this was their choice of music, not yours?

MacDonald: Yes, and that's a very important point for all the work we've done, looking at, the effects of music on pain. The most significant results were found are for people picking their own music, listening to their preferred music.

Evans: So, forget about the musician in you, I'll talk to the psychologist in you, what's going on?

MacDonald: Well, I think when we listen to our favourite music, we are cognitively engaged, neurologically engaged. There's research to show now that the brain engages with music, is changed by music. When we listen to our favourite music we may feel more, if you like, psychological control over our environment and when we listen to our favourite music we can be cognitively, emotionally distracted from a particular stimulus or distracted from other thoughts. So I think these key psychological processes are at play when we listen to our favourite music.

Evans: I suppose looking at it from a layman's point of view, you are picking, well, I should hope, you are picking music that you like and that means something to you, whatever that means.

MacDonald: Exactly, that's a key point. So, music is very subjective, no matter what emotion I want to imbue a piece of saxophone music that I'm playing or no matter what intention a composer puts on a piece of music, the listener filters everything they hear through their own preferences, their own listening experiences, their own cultural background, their own family, educational and social experiences. Therefore, all music is essentially ambiguous because we place our own meaning on it.

And, of course, we all have our own very strong attachments to our favourite music. That's why *Desert Island Discs* is such a phenomenally interesting and successful programme, because we can, if you like, display our identity, our personality through our musical choices. Like I say, 'I'm Raymond and I like these types of music', it tells you something about me and I feel very close to my choices of music.

And what's interesting about that is that it's not just musicians or people whose careers are in music, but we all have a very close personal relationship with our music. Therefore, it affects us psychologically, it engages us, it moves us and it's a really important process.

Evans: Raymond MacDonald. Dr Don Knox is an audio lecturer at Glasgow Caledonian University. His background is in audio technology and music analysis and processing and he's been working with music psychologists studying the emotional effects of music on our everyday lives.

Dr Don Knox: There's still some significant disagreement on whether you *feel* genuine emotions through listening to music or we simply recognise the emotion expressed by a piece of music. So there's still some fairly theoretical discussions going on and around that particular topic, but I think what's indisputable is we have an *emotional* connection with our favourite music that makes music a very important part of our lives.

Evans: In what way?

Knox: Well, for a lot of people experience is inextricably linked to their music listening preference, so a major part of why you might prefer particular types of music or artists is

linked to your life associations with that music. There are several what we call musical or extra-musical factors that influence your relationship with it. So, certainly your knowledge or your connection with particular artists or composers would certainly enhance that kind of emotional engagement with music, yes, that's certainly one factor. However, what comes up more often is this concept of a soundtrack to your life. So, there are major life events, there are pieces of music that people will associate with those events, your personal experiences and the music that was around at the time. And also there's the music itself and the content of the music, the musical attributes and we can't disregard that as it's a very important part of our relationship with music.

Evans: A good tune means something on one day, if it's raining one day and sunny the next day, it means something completely different.

Knox: Absolutely and I think that is true also of the individual, between individuals and also within the individual. Different pieces of music can have different effects on different individuals at different times. And this gives the lie towards this concept that there must be one type of music. The Mozart effect is a great example of this, that it will just be inherently calming and relaxing for everyone – and that's just not the case. This personal, complex relationship with music is what counts and that can change from day to day.

Evans: The Mozart effect is one particular piece of Mozart, I can't remember exactly what it's number is but people who are played that become more intelligent, supposedly.

Knox: Well, that's commonly... in the original research's defence, it was *always* misrepresented. So, they didn't make a particular claim that it was Mozart's music per se that had this particular effect, so, Mozart goes out of the window a little bit and the particular effect was something they called 'spatial intelligence'. So it was always one particular cognitive task that people showed an improvement with in a music condition compared with a no music condition. So we might as well say it was the effect of *music* on that particular task and since then it's been blown up out of all proportion.

Evans: What do you mean by cognitive? Just explain what cognitive means.

Knox: A good example is, I guess, things like distraction, so that will come into effect in lots of aspects and studies of music listening. So, for example, I'm particularly interested in the positive effects of music on the effects of pain. Now, what we are talking about there is digging into the mechanisms that are underpinning the positive effects of music. We can demonstrate that listening to music might have a positive effect on certain aspects of the symptoms of pain. However, what are the positive aspects that underpin that. So one might be distraction. Are we focusing on pain? Are we being distracted from pain by listening to our music? How well are we distracted from pain by our music and is that increased by the greater connection we have with a particular piece of music?

Evans: Now pain as we know is very complex and so is music, so what are you finding out?

Knox: Well, some work I've already done at Glasgow Caledonian was look at the content and structure in music that has been found in my colleague's research on acute pain to reduce the overall pain intensity and also increase feelings of control of pain. And, there again, that was in an acute setting and I was very interested in that study, in that the focus of the study was that people preferred the music that they brought along to those studies. And

there's a wealth of evidence out there, that suggests the fact that you like the music is a key factor.

However, we can't throw the content of the music away because the content of a piece of music that you listen to has very direct effects on you. Now, that might be something that influences your preference for music – you might like loud and raucous music – they can have very direct effects on our arousal levels, for example, so things like the startle effect on our autonomic nervous system are directly affected by the intensity of music and music with a very intense tempo. So we need to think about these things in the context of your preference for certain music and how that very complex situation, as you say, might be unpicked so we may better understand its key mechanisms.

Evans: That's Don Knox. Well, it goes without saying that music is not just for listening to but for performing. Since 2013 Gartnavel General Hospital Cystic Fibrosis Service has been collaborating with Scottish Opera to explore whether learning classical music singing techniques can improve the wellbeing of cystic fibrosis patients. Gareth Williams is the composer with the Breathcycles project.

Gareth Williams: Cystic fibrosis is genetic and incurable and it's a disease that causes mucus to build up in the lungs. So you can imagine the kind of health complications that would arise, so we get lung infections are very common, breathing problems, shortness of breath, coughing. And over time, then the lungs tend to scar and get damaged and lead to life threatening complications.

Evans: So where does a composer fit into this?

Williams: Before I came to Edinburgh I was at Scottish Opera. I was the composer in residence there for three years. Before that I was writing a lot of operas, it just seemed to be somewhere I found I could really scratch an itch because I really found it interesting to work with those big, powerful voices.

And there is a tradition when you think of operas, like *La traviata* where Violetta has tuberculosis and her lungs are in terrible condition, but she still soars gracefully, just before her death and her vocal fireworks go off, or Mimi for that matter in *La Bohème*. There is a kind of trope there where these people can rise above their symptoms to create something glorious as a swansong. And I wonder was it that, there is something there that made me think I'd actually like to explore what happens when you put someone with a genuinely fragile voice and a genuine health condition with their lungs in an opera.

Evans: Because singing, requires the lungs, the diaphragm and your breathing part have to be perfect, have to be Formula One.

Williams: Absolutely, I often compare opera singers to almost being like being the professional athletes of breathing and singing. They have that daily ritual of practice, of keeping this instrument in their chest in top health. They can do remarkable things with it, they can fill auditoriums, they don't use microphones and they can cut across massive hundred piece orchestras. It's kind of remarkable, but these voices are something of an artefact from the past aren't they but when you are actually in the same room as one, it's quite staggering.

Evans: It's like standing in the ring next to a boxer.

Williams: Completely, yes.

Evans: So, ok, tell me we have the Formula One of voices on the operatic stages of the world and then on the opposite end we have people with cystic fibrosis, so how do you bridge that gap?

Williams: On our first day of meeting people with cystic fibrosis, before we started on that journey of giving singing lessons and starting to teach some vocal techniques, I ask them all to sing a holding note for as long as they absolutely could. Would you like to try?

Evans: Go on then.

Williams: I'm going to count to three. I'll give you a note. [Sings] Aaaaaaaah. So give me a nice 'aaaaaaaah'.

Evans: [Sings] Aaaaaaaaah.

Williams: And there it is [laughs]. It disappeared like a spirit at the end there and even though you didn't prepare very well.

Evans: [laughs] No I didn't, I'm slouching, I'm leaning on my equipment.

Williams: Your diaphragm was not engaged. I think singing is just beautiful breathing. It's all prepared, that's the secret of the whole thing, it's in your posture and in your diaphragm.

Evans: So posture wise, somebody once told me that if you want to see how breathing should be done, you should look at a new born baby. It's not the chest going out taking up the breath, it's below the diaphragm, it's all controlled from there.

Williams: And we just gradually get terrible at breathing as we grow up and it ceases to be a natural thing. I'm *terrible* at breathing, I think I'm always trying to kind of keep my middle in a little bit when you should really let it all hang out I suppose. I do have a very close friend with cystic fibrosis, she said on a very bad day it feels like she has to remind herself how to breathe altogether and that sounded like a lot of hard work.

Evans: That's a difficult concept to get hold of isn't it?

Williams: Uh huh, it didn't seem in any way like a natural subconscious thing, she always had to be conscious of.

Evans: Ok, we're in the least medical scientific lab I can ever imagine because there's a lovely grand piano in there. You also got your audience in this conference to do some vocal exercises, now there's no way I'm going to do this by myself, so I'm asking Rowena, another musician to help me out with it now.

Williams: Ok, this is easy, this was a little exercise we came up just to get people in starting to sing. It's a call and response, I sing and then you sing that back and it's just to develop a sense of pitching and a sense of timing but also to just to start beginning work on developing lung function and developing your breath. So nice big long breaths.

Evans: So this time I'm going to try not to slouch or lean against anything,

Williams: Yes, sit up straight.

Evans: Head forward, chin in, think about my diaphragm and it'll go okay.

Williams: I hope so, I haven't played this in a while. You ready.

Evans: Yep.

[Williams plays the piano and sings; Paul Evans and Rowena Jacobs sing]

Evans: There's been some great operatic duos in the past. Paul Evans and Rowena Jacobs aren't amongst them [they laugh].

Williams: [Laughs too] I don't know, I'm impressed, I see potential. I think when you go into a clinical space and you bring something kind of warm and fuzzy, there is a huge effect and Dr McGregor and his staff said on the days when they were singing in the wards, things did feel very different and there was a specialness. In doing something like making music together, that's hard to quantify actually.

Evans: So, does increasing people's breath power, if you like, through breathing properly and through singing, does that help their condition?

Williams: From our pilot project, I can tell you that we had some really encouraging results. Most patients showed an improvement in lung function, which is good especially in the marker of the FEV1 marker which is forced expiratory volume, so that's the amount of air you can blow in one second and we found an increase there of 14 per cent on average. Now five per cent would be considered a significant statistical result, so this is *really* encouraging. It's almost too good to be true, we were really shocked by that wonderful result.

I know that they trialled a drug in the hospital round about the same time, which came up with a result of an 11 per cent increase and that was considered a massive success, so we *beat* the drug that cost £200,000 a year, which I was very pleased about [all laughed]. Well I need to reinforce that we've been through this trial with 24 people. For medical results that are significant, we need 330 people now over the next few years with cystic fibrosis to get to the bottom of what's really going on. Also we need to extend out time, we did 12-week blocks and measured at the start and end but I'd like to double that now so we really need 24, so we really get a look and see what happens over a slightly longer journey.

Evans: What's important about your study and what's important about the Scottish Music and Health and Wellbeing Network conference we're at today is that music has a very, very real role in medicine.

Williams: We hope and dream out of this project is that someday, singing and vocal techniques will be part of the way we think about and treat and care for people with cystic fibrosis and it could be part of their daily life. I want music to be as widely recognised as possible for its benefits to everybody's health and wellbeing.

Evans: Composer Gareth Williams. And you read and you can hear more about the Breathcycle project at breathcycle.com.

Don Knox again:

Knox: My particular focus is on people *listening* to music because I think that's gaining, I guess, more importance nowadays where we have what we might call a soundtrack to our lives, where you have large collections of music, thousands and thousands of tracks, access to that kind of music all day every day. And evidence is telling us now that people are listening to music in very different ways. We rarely now sit down in a room and listen to music as a main activity. People are *using* music to accompany other activities in their everyday lives and it's used in a very *goal-orientated* way. So people are making complex decisions about the music they listen to achieve particular goals. That may be mood regulation and to accompany specific tasks.

Evans: Supermarkets have been doing that for an awful long time choosing what we call 'Muzak' – rubbish, if you like – to alter our purchasing moods.

Knox: Yes, [laughs] there's some great examples, David Hargreaves and Adrian North have done some excellent research in that regard. So I think some of their research has shown that if you play louder music, faster music people move through supermarkets more quickly. In clothes shops for young people, the music they play in those settings is about projecting this *identity*, this *lifestyle* you might want to aspire to and that's ingrained in the clothes you might want to buy as well. So that's linked to how you view yourself and how you want to be viewed. And there was a great study by Hargreaves and North that looked at playing archetypically French and German music while there was French and German wine on sale and they noticed a significant effect of the amount of wine from each country that was sold while they were playing music from those countries.

Evans: And maybe a subtle soundtrack of waves breaking on a shore underneath.

Knox: [laughs] Yes, I think it's becoming increasingly important because we are starting to see evidence that music has significant effects on how we feel and how we behave. So the music you encounter in everyday life, in public settings, where the music may not be of your choosing can affect us and it can affect how we act. So people are starting to take an interest in what those affects might be and what the music might be to achieve a certain end.

Evans: That's a good point because in your research, people who bring their own music in that they think is their favourite music is one thing, but if you prescribe *your* music if you like, what you think might help, is there a difference there?

Knox: Well that's really important, that's part of research that I am trying to develop at the moment. This concept of being able to prescribe music to an individual is absolutely not about your preconceptions about what that music should or shouldn't be. It is about that individual's needs and preferences. And again that's a very complex relationship and we do not yet fully understand it. So the things I'm interested in are: their particular preferences, familiarity and associations; but also the content of the music – its acoustical content, how loud, how intense it is etc.; and our emotional engagement with it and the emotion expressed by the music.

So, three very big things in the mix there already that combine to create a very complex and sophisticated relationship and that affects the beneficial effects of music in the studies we've seen.

Evans: And I'm sure it's the same with you as me and with everybody else, the music I bring today may not be the music I bring in tomorrow.

Williams: Exactly, yep, and the range of music, the studies that I analyse the music from a few years back at Glasgow Caledonian it was just an enormous range. And, overall, it was seen to have the same beneficial effects overall on the intensity of pain people felt and their focus on pain and it varied from Tchaikovsky to the Ramones. So, really, really a broad range of music with functionally similar effects on the listener.

Evans: Yes, with me it would be Mahler, Beethoven and Johnny Cash.

Williams: [laughs] There you go.

Evans: But only late Johnny Cash?

Williams: [laughs] Alright, alright – a purist.

Evans: How do you measure people's reaction to music?

Williams: What doesn't happen often is the more physiological responses, so things like your heart rate, and galvanic skin responses. That's something that we're fairly confident... I have to say, it's not discredited in the literature, it really doesn't pin down the causality of the effects of music listening. Having said that, there are some studies look at salivary cortisol, which is a key indicator of levels of stress in the body, so those pseudo-experimental music-listening studies that I've seen certainly have proven that there are physiological indicators like cortisol levels that indicate very clearly, the beneficial effects of music listening.

So we can use physiological direct measurements in that way, but often we might take self-report measures of experienced stress, or self-perceived well-being, mood etc. Which is often quite reliable data, because it comes directly from the participant. And then we can take that another step further and do more qualitative studies where we do very in depth face-to-face interviews and really dig into people's experience of music listening that underpin their experiences of music listening and the beneficial effects it might have had.

Evans: So people with pain conditions, they don't really have to wait for your results to come out, they can try music now – it's not going to hurt.

Williams: Exactly, and I think the key thing is something we can say for sure is that you can listen to a programme of music listening, preferred music of your liking, and it can have direct effects on the pain you may be experiencing or symptoms of that pain. I think what needs working on and, again, this is something I'm particularly interested in, is moving this research on from *acute* pain to looking at how people manage the effects of chronic pain and long term effects, because I think it's a really important part of how people might build programmes of music listening into their everyday existing pain management strategies.

Evans: Don Knox. And I'll just remind you that while we in Pain Concern believe the information and opinions on ***Airing Pain*** are accurate and sound, based on the best judgements available, you should always consult your health professional on any matter related to your health and wellbeing. He or she is the only person who knows you and therefore the appropriate action to take on your behalf.

Don't forget that you can download all the editions and transcripts of **Airing Pain** from Pain Concern's website, which is painconcern.org.uk. And you can read more about the subject of today's edition of **Airing Pain** in issue number 63 of our sister magazine **Pain Matters**. Once again all details are on our website.

And, finally, for this edition of **Airing Pain** let's consider whether GPs and other health professionals would prescribe music for chronic pain patients in the future. Raymond MacDonald.

MacDonald: There already are medical practitioners that are using music in clinical context. Now, they have developed their own way of working, they've developed their own practice, they have their own body of research to support its use. So there is no doubt music is currently being used by medical practitioners in explicitly clinical contexts. Whether or not music becomes used by GPs the way in which specific drugs are prescribed for depression, I think we are a long way off that type of use of music. But I certainly think that in the not too distant future, music will be available for specific types of ailments, depending upon which situation you are in.

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