

Worlds in Collision: Music and the Trauma of War

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TRANSCRIPT

Music as a tool for improving sleep in post-traumatic stress disorder – Kira Vibe Jespersen

KIRA VIBE JESPERSEN: Thank you. So I'll talk a little bit more about the application of music and more specifically with regard to trauma because I'm doing a PTSD project on the impact of music and sleep, and music as a tool for improving sleep in post-traumatic stress disorder. First I'll give you a little bit of background and then I'll present the study that we did with traumatised refugees and draw some conclusions from that.

But first about sleep. It is a fundamental biological need for all living beings and as human beings, we actually sleep around one third of our lives, so that's, in an average lifetime, that's quite a lot of years, maybe 25 or even 30 years, so there's plenty of reasons to be interested in sleep. Nevertheless, sleep problems are highly prevalent in modern society with around one third of the general population experiencing insomnia symptoms, such as difficulties falling asleep or frequent awakenings during the night or early morning awakenings or non-restorative sleep. And persisting sleep problems can have a negative impact on very important aspects of our functioning, such as cognitive abilities, with the impaired memory function, attention and concentration, which can be quite serious. For instance a relationship has been found between lack of sleep and an increased risk of accidents, both work-related and traffic accidents. And emotional aspects are also affected by lack of sleep, with consequences for your mood, dysphoria or increased irritability as many of us may have experienced. Sleep is also related to general health and studies show that lack of sleep results in impaired immune system functioning, and sleep disorders are related to a number of diseases such as diabetes, neurological disorders, chronic pain, cardiovascular disorders, and also a number of psychiatric diseases. This leads us to the relationship between trauma and sleep. Because sleep can be severely disrupted following exposure to traumatic events, especially the experience of nightmares is frequent, and some researchers even call sleep disturbances the hallmark of post-traumatic stress disorder.

So this close relationship is also reflected in the fact that sleep disorders are mentioned in the diagnosis of post-traumatic stress disorder, nightmares in the intrusive or re-experiencing clusters and insomnia symptoms in the hyperarousal cluster. More than two thirds of persons with post-traumatic stress disorder experience sleep disturbances, and furthermore, a relationship between impaired sleep and the severity of the PTSD symptoms has been found so it is quite an important aspect. Also some studies have found that sleep disturbances may be an early predictor of the development of PTSD. In a study with traffic accidents, they found that the persons experiencing sleep disturbances one month after the accidents had a significantly higher risk of having developed PTSD one year after the accident,

compared to the group of people who did not have sleep disturbances one year after the accident. So attention to sleep problems in relation to trauma is quite important. And it has also been argued that a focus on sleep problems should be incorporated into treatments of post-traumatic stress disorder.

So when talking about how to target or how to work with sleep problems in relation to trauma, why look at music? It seems that there is some kind of common sense connection between music and sleep, as witnessed by the music genre of lullabies, for instance, with parents all over the world singing for their children to calm them and make them fall asleep, but also as Nigel mentioned there is a clear connection between music and physiological arousal which has been documented in numerous studies and this is just to give you an example, in this study by Bernardi and his colleagues, they organised the music of different channels but they organised it by tempo and they found a clear relationship between the musical tempo and the heart rate measured reflecting arousal. This is one of the most consistent findings with regard to music. And with sleep problems in relation to trauma, this, as we saw in the diagnostic criteria of PTSD diagnosis, this is quite important, because hyperarousal is one of the core features of post-traumatic stress disorder. Another aspect that points to the relevance of music is the ability of music to distract our attention. That music can attract attention. And as we saw in one of the other core features of post-traumatic stress disorder, the intruding thoughts or memories or re-experiencing symptoms may sustain a high level of anxiety, and if we can introduce a stimulus like music that is neutral or maybe even pleasant, as Morten talked about, this may be relevant for sleep and sleep quality and the ability to actually fall asleep.

Finally, just like Morten, and Nigel mentioned, the impact of music on emotion is also very well documented, and music can both induce positive emotional states but also reduce negative emotional states. These are just results from a very recent randomised controlled trials with severely ill persons, critically ill, admitted to intensive care units, and they had three conditions. One group of people listened to music, another group of people had noise-reducing headphones, and the last group had care as usual. And there was a clear effect of the music on anxiety. There was a clear reduction of anxiety during the days the persons were admitted, but no change in the other groups. So it seems relevant to study the impact of music and sleep and this has been done for the last 20 years, not many studies but a few, and these are not all, but just to give you a short impression of the controlled trials in this field, and as you can see, various populations have been studied, with different kinds of music, and also with different designs and intervention periods, but in general the studies find a positive effect of the music on sleep quality. But the effect of music on sleep quality in traumatised persons had not been studied and at this time, I was working with traumatised refugees so from the clinical perspective I also found it highly relevant to see, okay, is this a tool that we can use?

So we designed a study to test two hypotheses. The first is that music listening can improve sleep quality in traumatised refugees with sleep problems, and the second hypothesis was that improvement of sleep quality would reduce trauma symptoms and improve general well-being. So in order to investigate these hypotheses, we designed an experimental study with one intervention group and one control group and the intervention group had music playing, it was specially designed to be used in bed, and they were instructed to listen to the music every night, when they went to bed, for one

hour, and they had also an ergonomic pillow, because then the control group had only the ergonomic pillow and no music. And we divided the participants by a quasi randomisation procedure based on gender, and we had 20 participants but a few dropped out, so we ended up having 15 participants. Then we did a three-week intervention. We measured sleep quality, trauma symptoms and well-being before and after the intervention. Furthermore we measured sleep quality once a week, both to get a more nuanced measure of how sleep quality developed and also to ensure compliance to the protocol because the traumatised refugees were quite a difficult group to work with from a science perspective.

One of the major questions when designing the study was what music to choose. We decided we wanted to use the same music for all the participants. So we looked at analyses of lullabies, and we found that they were characterised by three aspects: one was a slow tempo, another one was stable dynamics and the last aspect was a simple structure. These three aspects were all supported by the studies of music and arousal. We decided to choose the music based on these three parameters. Another aspect was that the refugees we were working with were from a lot of different cultures and had very different musical backgrounds so we wanted to make sure that they actually experienced this music that we chose as relaxing. So we tested the music in a language school/class with people from all sorts of different countries as well and refugees that did not participate in the study. As you can see around 84% of these persons experienced the music as relaxing. So we were happy with that. I will just give you a little bit.

[Music plays]

This was a compilation of specially-designed music called Music Cure, that was made for relaxation purposes. It suited our demands of slow tempo, it has a stable tempo of 52 beats-per-minute. It has stable dynamics with no major changes in loudness and no sudden onsets of sound. It has a simple structure with a lot of repetitions. This is what they listened to.

What did we find? We found a significant improvement of sleep quality and well-being in the group that listened to music, but no change in the control group. This graph shows the results for the sleep quality and as you can see unfortunately the randomisation procedure produced a slight difference in sleep quality prior to the intervention. But this questionnaire measures a degree of sleep problems. So a higher score indicates more sleep problems. The cut-off score for good sleep quality is a score of five, below five you have good sleep quality. All participants had quite severe disturbance of their sleep, so there was plenty of room for improvement for all groups. Contrary to expectations we found no change to trauma symptoms in either of the groups. We wondered about this, but we thought OK this may be due to a relatively short intervention period compared to the severity of the traumas in the participants. So you may need a longer period and more intervention to target trauma symptoms.

So, based on this with regard to the first hypothesis that music listening can improve sleep quality in traumatised refugees with sleep problems, our conclusion was a clear yes, this is what we found and is supported by our study. With regard to the second hypothesis that improvement of sleep quality will reduce trauma symptoms and

improve well-being, the results are bit more ambiguous. With regard to well-being we did find that music listening can improve general well-being, but the causal relationship between sleep quality and well-being cannot be clarified from this study. And with regard to trauma symptoms, our study did not support the hypotheses that improvement of sleep quality will reduce trauma symptoms, as I mentioned there may be good reasons for this. So we had some results but there is still a lot of work to do and right now we are planning larger randomised control trials, including objective measures of sleep and with the Danish veterans with PTSD also. So these are our plans for the future right now. In the end I would just like to thank my supervisors and the people I collaborated with on this project and thank you for your attention.

NIGEL OSBORNE: I wanted to say how encouraging it is for me to see this work developing in this way, so thank you very much. Also very well expressed and Kira, fantastic presenting in English, I know you speak the language very well, but with such clarity, it's quite something, thank you. So we have got ten minutes questions, nine minutes maybe? Any questions? I am going to ask one then. On the conditions of looking for music to help with sleep, obviously you have the conditions of slow tempo, you have stability, a lack of turbulence and I wonder also whether you have worked with harmonicity, the extent to which it conforms to harmony? In the piece you played it was entirely harmonic apart from one leading note towards the end, the rest of it could have been basically a harmonic series, is that of interest to you?

KIRA VIBE JESPERSEN: Definitely, this has been investigated also in some studies both on arousal, mostly with regard to emotion. Like you said harmony is related to relaxation, but mostly sometimes when you study emotion you look at the arousal dimension and you look at valence, and harmony is more related to valence, to positive emotions than to arousal in itself.

NIGEL OSBORNE: There are two considerations, on the one hand there is all the work that people like John Sloboda have done on harmonic progression and expectation and so on, then there is the moment in time, the harmonicity of the moment that seems to be quite important. That seems to be an important area.

FLOOR: In your graph showing the impact of the music on your intervention group, I presume that was an average of the group? Did you find great variation within that group?

KIRA VIBE JESPERSEN: Yes we did find some variation. In that way I do not believe that music is not like a wonder-cure because to some it was really effective, some almost achieved and came close to the cut-off score for good sleep quality, others experienced a reduction but not very much. So there are definitely some individual differences at play also.

MORTEN KRINGELBACH: I think this point about individual variability is a very important one, because of the heterogeneous nature of the sample there is no magic bullet, as it were, no one piece of music will help everybody. So I think as we come to understand these effects and their effects on the brain, I should say as part of this new study, the randomised control trial we are doing, we are planning to actually scan their brains, and to look at those networks that I showed to find out what it is that is -

as opposed to sticking an electrode into people's brains - that is singing the mind electric, to borrow a quote from Whitman.

HUGH McMANNERS: Of course, no composers would want to write this music for you, because they will get a reputation for sending people to sleep!

NIGEL OSBORNE: The voluntary nature of this is in its favour. People saying there is no magic bullet for this so it is bad, no, it is good. The thing that a human being individual can sense to respond to, that is the great thing about music, you can't force it down anybody's throat, it will only have this effect if you want it to. I regard that as a strength of music therapy not a weakness.

FLOOR: Hi, I was actually speaking to Kira before we came in and before I realised what had she did and what she was studying etc. I was asking her about the timings of the study, specifically relating to the military and PTSD. So your study starts once you have diagnosed the PTSD, but are there any mechanisms or studies prior to that because when they sign on the dotted line is there anything that takes a measure at that point so that you have a starting point when you come to take any further measures?

KIRA VIBE JESPERSEN: I think that is maybe regarding the brain – if you do it longitudinally, if you test them before they are deployed?

MORTEN KRINGELBACH: Currently there are no studies of this. But I think early intervention is clearly key here. As Hugh rightly pointed out, if it takes 13 years to self-report and yet of course the relatives can see these things happening very early, I think early intervention would be absolutely key. It is easier to show a large effect later on. Just as we've seen when I showed you the deep brain electrodes, at the moment they only operate after about ten years, but there is now very good evidence and in fact although it is risky to do anything to the brain if we did it after two years we would probably get much better results long-term.

HUGH McMANNERS: The underlying principle with controlling pain, if you recall that quadrant diagram with all aspects of it, the earlier the correct intervention takes place the less likely you are to proceed to chronic pain of any sort, I think that principle applies across the board.

FLOOR: I noticed you used electronic music, I wondered if you'd experimented in the difference between music played on an instrument with human expression, and the expressionlessness of electronic music?

KIRA VIBE JESPERSEN: Right now we haven't done any studies on that, but we are also planning a study more into the musical features, to look into what parameters are most important, and also taking into account familiarity, how well do you know the music, and also preferences, how well do you like the music? To address also the individual differences and to be able to look more into musical and acoustical features.

FLOOR: The music you used there had birds and waves with it. Now it seemed to me that they were presenting not just entirely music but something that could produce

a picture. I was thinking of Stefan Koelsch's thing, I don't know if he's here, about how if another thing is presented – a picture or another medium – is presented with the music it actually makes a difference to the response. And actually increases the response. So I wondered if there was – I'm not questioning your study at all, I think it is great – but I just felt that there was that factor which might actually affect the results.

KIRA VIBE JESPERSEN: Yes, I believe you are right, there were nature sounds in this music and there are also results showing a close link between music and imagery so this may also be of importance here especially with regard to the distractive effects of the music that if you can engage both the auditory and the visual, even though you may be lying with your eyes closed to fall asleep, this may reinforce the effect of the music.

NIGEL OSBORNE: On the pictures I showed of North Uganda, the boy soldier I was working with, I was actually using musical sounds to stimulate movement of the charcoal he was using, that's a time honoured method in art and music therapy going back to people like Freidl Dicker in Theresienstadt who were already experimenting with this in the 1930s.

FLOOR: My question really follows on from those last few comments, about the use of voice. Did you consider when you were choosing purely vocal music - no words, but using the sound of the human voice?

KIRA VIBE JESPERSEN: No, for this we chose instrumental music to avoid words but yes, with regard to, for instance, lullabies are often sung, so yes, with the voice. So that would be interesting to look further into definitely.

MORTEN KRINGELBACH: But, of course, the whole neuroscience field of looking into the voice, what it is like to sing, is still hampered by the fact that most people have to lie down in an environment which goes "ring, ring, ring" but we have ways of exploring this in the future.