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The Reducing Effect of Relaxing Music on the Increase in State Anxiety over Time, when Controlled for the Influences of Trait Anxiety and Liking of Sound

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Abstract

Background and aim: Although it is common knowledge that music can have an influence on us, this influence is, at least in the case of anxiety, insufficiently examined. The aim of the current study was to investigate if listening to relaxing music can influence the level of anxiety after being confronted to a stressor, when corrected for the influence of trait anxiety and how much the participants liked the sound.

Method: A non-clinical sample of 44 participants, 33 (75%) of which were women and with a mean age of 23.45 (*SD* = 5.99), were asked to fill out the State-Trait Anxiety Inventory and to enter in an experiment in which they watched an anxiety-inducing film clip of a car crash while listening to relaxing music, white noise or silence.

Results: Results showed that in the overall model, there was a main effect of time, but no main effect of condition or interaction effect. When trait anxiety was considered as a covariate, there were no significant effects. When how much the participant liked the sound was considered as a covariate, there was a main effect of condition, revealing that the participants experienced significantly less state anxiety in the white noise condition in comparison to the music condition. There was also a main effect of time and an interaction effect between time and how much the participant liked the sound, indicating that how much the participant liked the sound is a significant covariate, but no interaction effect between time and condition.

Conclusion and discussion: The major strength of the current study is the addition of the new white noise control condition, adding something new to the existing literature. There are influences of sound on anxiety, but not the influences that would have been expected. New knowledge is obtained in the current study, but there are still blank spaces. In future research, one has to consider the mentioned suggestions in order to fill in these blank spaces and to find out what is really the influence of music on anxiety.

Keywords: state anxiety; music; white noise; silence; trait anxiety; liking of sound

Preface

For me, conducting a research on the influence of music on anxiety brought together two of my favourite subjects. I would like to thank dr. Henk Schut for encouraging me to take the leap of faith and to hand in my own research proposal. I would not have done this without your encouragement.

I also would like to thank my supervisor dr. Sibe Doosje for advising me during the process, Macha Tarasenko for working out the experiment together and for testing the participants with me, and all of my friends and family for supporting me throughout the process, in every possible way.

Introduction

In the book Our Creative Brain (*Ons Creatieve Brein*), the Dutch neurobiologist Dick Swaab (2016) mentions that music can have a rewarding effect and can cause a decrease in stress, anxiety and pain. Although it is common knowledge that music can have an influence on us, this influence is, at least in the case of anxiety, insufficiently studied.

According to Spielberger (1966), anxiety can be seen in two different ways, state and trait anxiety. State anxiety is a transitory state or condition which fluctuates over time and involves physiological variables such as changes in respiration rate and systolic blood pressure, whereas trait anxiety is defined as a stable personality characteristic. Anxiety disorders have a lifetime prevalence of 28.8%, making them the most common class of disorders. For Generalized Anxiety Disorder, the lifetime prevalence is 5.7% (Kessler et al., 2005).

The meta-analysis by Pelletier (2004), shows that, among other music assisted relaxation techniques, passive listening to music has a significantly, medium effect on the decrease in arousal due to stress (Gravetter & Wallnau, 2013). The participants with musical experience were more effected by music assisted relaxation techniques than participants without musical experience. The benefit of music was greater when the participants were tested alone than when they were tested in groups. In the systematic review by Nilsson (2008), the effect of music on the anxiety and pain of surgery patients was evaluated. In 50% of the articles measuring anxiety, music interventions had a significant effect on the reduction in anxiety. Also, in 13 of the 22 studies measuring pain, the intervention had a significant effect on the reduction in pain. In 47% of the studies that measured analgesic use, the intervention caused a reduction in the use of analgesics. According to the article, literature suggests that the tempo of therapeutically used music has to be slow and flowing, with around 60 to 80 beats per minute, the music should be instrumental, contain mostly strings and minimal brass or percussion, consist mainly of low tones (Nilsson, in Nilsson, 2008) and have a volume level of 60 to 70 decibel (Staum & Brotons, 2000). The meta-analysis by Kühlmann et al. (2018) also studied the effect of music interventions on the anxiety and pain in adult patients undergoing surgery. They as well reported a significant decrease in anxiety and pain when a music intervention was applied, with the largest effect on the decrease in anxiety when the music intervention took place before surgery.

According to a randomized controlled study, a group of patients with Alzheimer's type dementia who listened to music they chose themselves showed significantly more improvement in the levels of anxiety than the control group of patients who did not listen to

music (Guétin et al., 2009). This study also shows that this effect persists over time, since the difference in levels of anxiety were significantly different at six months after the start of the intervention. In the study of White (1992), patients who were diagnosed with acute myocardial infarction and who's state anxiety was above average were assigned either to listen 25 minutes to relaxing music or to spend 25 minutes uninterrupted in silence. This study showed that the patients who listened to music had a decreased state anxiety, that the patients who reported higher trait anxiety reported higher state anxiety prior to the intervention and that patients who reported higher trait anxiety had less reduction in state anxiety after the intervention. In another study, elderly patients undergoing cataract surgery were assigned to listening to relaxing suggestions, such as 'The operation is going well, everything is going smoothly', white noise, Operation Room noise or relaxing music. It turned out that the patients in the music condition were more satisfied than the patients in the other conditions, which was measured by asking questions about the satisfaction with the operation and the tape and about the sounds in the operation room (Cruise, Chung, Yogendran, & Little, 1997).

Besides the effects of relaxing music on people with mental or physical illnesses, it is also shown that playing relaxing music can reduce the increase in anxiety when a healthy person is presented with a cognitive stressor (Knight & Rickard, 2001). Relaxing music is defined by these authors as having a slow pace, a repetitive rhythm, gentle contours and strings as instruments. In the study, participants had to prepare an oral presentation in a small group of 6 to 12 participants without speaking to each other. Half of the participants listened to relaxing music during the preparation, while the other half prepared in silence. The group of participants who listened to relaxing music reported significantly less subjective anxiety than the group of participants who prepared in silence. The conclusion of this study, that relaxing music can reduce state anxiety, is consistent with previous research (Stoudenmire, 1975).

The overall idea seems to be that the playing of relaxing music interferes with the formation of anxiety, which seems to lead to a reduction of the induced anxiety. One explanation of the anxiety-reducing effects of music is that listening to relaxing, slow music can make the body synchronize with the slow rhythm of the music, which may slow down heart rate (Marwick, in Mok & Wong, 2003). Another explanation is that through music, people shift their attention from stressful events to something pleasant and soothing (Nilsson, 2008). It may be possible that this shifting of attention away from the stressful event causes an interference with the formation of the anxiety, which may lead to lower levels of anxiety. When this last explanation is the case, it can add to our knowledge of how anxiety comes

about and might be used to support other anxiety-reducing therapies. Since the degree of preference of the music is highly correlated with relaxation (Stratton & Zalanowski, in Wolfe, O'Connell and Waldon, 2002), it is important to account for this in the current study.

As stated before, anxiety disorders are the most common class of disorders (Kessler et al., 2005), indicating that the state anxiety of many people is above average, even when it does not reach the threshold of an anxiety disorder. That is why it is important to learn more about how to influence it. Most of the studies done on the subject are relatively old, so it is meaningful to find out if what was true then is still true. This study also aims to add something new to the existing literature, since a new control condition is added: white noise. Now the distinction can be made if the effect is caused by the relaxing effects of the music or by the distraction of the sound itself. If the last situation is the case, then the effect would be the same for the music and the white noise condition.

The question asked in this study is: can listening to relaxing music influence the level of anxiety after being confronted to a stressor? The hypotheses are that (1) listening to relaxing music significantly reduces the increase in anxiety due to a stressor (Davis & Thaut, 1989; Knight & Rickard, 2001; Pelletier, 2004; Stoudenmire, 1975; White, 1992), (2) this effect is influenced by the trait anxiety of the participant, since having higher trait anxiety causes less reduction in state anxiety (White, 1992), (3) the effect is stronger when the participants like the music they are listening to (Davis & Thaut, 1989; Stratton & Zalanowski, in Wolfe, O'Connell, & Waldon, 2002) and (4) the effect of listening to relaxing music is significantly greater than the effect of listening to white noise. The conceptual model of the research question can be found in figure 1.

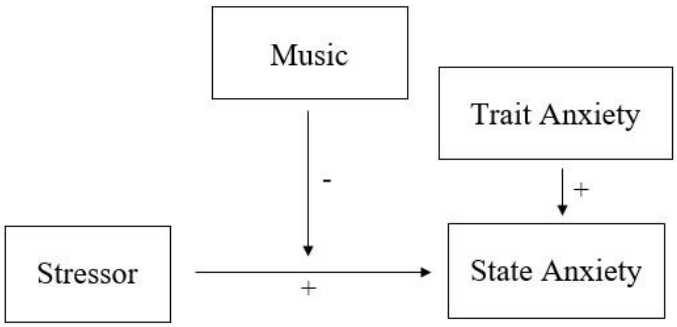

Figure 1. Conceptual model of the research question.

Method

Design

The study had an experimental, mixed design. The study had both a within and between subjects design, since all participants were tested twice on the STAI-State and were randomly assigned to one of the three conditions, the music, white noise or silence condition. The white noise and silence conditions were the control conditions, making the experiment a Randomized Controlled Trial.

Participants

In the current study, healthy participants of at least 18 years old could participate. According to the power analysis conducted through Version 3.1 of GPower (2007), 42 participants were needed to obtain a power of .80 with the α error probability of .05. A total of 45 participants participated in the study. One participant decided not to participate after reading the information letter, because she was afraid the stressor would bring back memories. The results of one participant had to be excluded from the study due to technical problems. After the film clip had already started, the plug of the headphone turned out not to be completely in the computer, which caused the music to be played through the speakers of the computer instead of through the headphone. After fixing the sound, the clip had to be restarted, but the participant already saw the clip without listening to music, which made the data from this participant useless. This resulted in a total of 44 participants, 33 (75%) of which were women. The highest level of education ranged between VWO and Master, VWO being the most common. One participant stated 'Other, namely', but did not specify what other level of education. The mean age was 23.45 (*SD* = 5.99). Most of the participants were single (65.9%) or in a relationship (31.8%), with the exception of one, who was married. Two of the participants (4.5%) had seen the clip before.

Since musicians may respond differently to musical stimuli than non-musicians because of their broad music training (Hodges, in Davis & Thaut, 1989), the participants were asked how much musical training they had, if they played an instrument and if they were professional musicians, which enables the researcher to see if musical knowledge and experience served as covariates. A total of 27 participants (61.4%) were having or had music lessons. From these participants, the mean amount of years was 5.63 (*SD* = 3.75). 16 participants (36.4%) played an instrument, 2 participants (4.5%) were professional musicians and 8 participants (18.2%) perceived themselves a being someone with a lot of music knowledge.

Instruments

State Trait Anxiety Inventory (STAI)

The STAI (Spielberger, 1983; Dutch translation: Van der Ploeg, 1982) consists of two subscales: State Anxiety and Trait Anxiety. Both subscales consist of 20 statements: 10 of the items were positive phrased, 10 were negative phrased. There were four answer categories. The Dutch STAI has a good internal consistency for State Anxiety (men: $\alpha = .90$, women: $\alpha = .91$) and Trait Anxiety (men: $\alpha = .91$, women: $\alpha = .90$) for students and a good test-retest reliability for State Anxiety for men ($r = .73$) and Trait Anxiety (men: $r = .84$, women: $r = .88$), but an insufficient test-retest reliability for State Anxiety for women ($r = .30$; Van der Ploeg, 1982).

In the current study, the Cronbach's α's were comparable to those found in previous studies, ranging between good and excellent (George & Mallery, in Gliem & Gliem, 2003). Because statement 6 (*'Ik ben in de war'*; *'I am confused'*) had no variance, it was removed from the scale by SPSS.

Procedure

Participants were recruited through posters, flyers, personal communication and calls on social media and Sona Systems. Participants were tested individually. First, the participant had to read the information letter before signing the informed consent form. After that, the participant was asked to fill out the demographic data, namely age, gender, level of education, marital status, whether they have (had) music lessons and how long, whether they play an instrument, whether they are professional musicians and whether they see themselves as being someone with a lot of musical knowledge. They also filled out the full STAI to serve as a baseline measure. All the questionnaires were answered on the basis of self-report. After this, the participant was randomly assigned to either the test condition or one of the two control conditions. There were 14 participants in the music condition, 15 in the white noise condition and 15 in the silence condition. In the test condition, relaxing music was played while creating the lab-induced anxiety. The music piece which was played is Five Variants on Dives and Lazarus (Vaughan Williams, 1939), since it is shown to give a high score on self-reported relaxation (3.42 on a scale of 4) with non-musicians. It is also shown that participants do not have to know the piece in advance for it to be relaxing, since 85% of the participants in that study did not know the piece (Wolfe, O'Connell, & Waldon, 2002). In the first control condition, white noise was played, while in the second control condition, the room was silent.

In all the conditions, the participants wore headphones for the conditions to be comparable. In this study, there was no relaxation induction condition, as in the study of White (1992). These suggestions are not purely sound and have meaning to the patient, because what is said can also relax the patient. This is not the intention of this research. The white noise condition was included, since it can demonstrate if it is the music which leads to less anxiety, or the distraction by the sound, whether it is relaxing and meaningful or not. After the experiment, the participants again filled out the State subscale of the STAI. They also rated how much they liked the music, the sound or the silence and how much distress they felt on a scale of 1 to 10 and indicated if they had seen the film clip before. Afterwards, they were given a debrief to explain what the real aim of the study was.

Anxiety induction

In the study, anxiety was induced by presenting the film clip PSA Texting While Driving UK (nick1111341, 2009). In the clip, one sees three girls in a car. The girl driving the car is texting, which causes them to get into an accident, in which two of them die. The people in the other cars involved are also wounded or dead. The clip also shows the aftermath of the accident, when the emergency workers help the injured. According to Arnaudova and Hagenaars (2017), the clip causes distress and/or anxiety. The clip is staged and freely assessable on YouTube. The clip is used to make people aware of the dangerousness of using a mobile phone while driving. The goal of the makers is to make the clip part of the core schools programme across Wales, the United Kingdom and eventually across the world (nick1111341, 2009).

Statistical Analysis

The obtained data was imported in SPSS 24. First, a Pearson correlation was conducted between state and trait anxiety. Then, a repeated measures ANOVA with mixed design was completed to measure the relationship between the condition, time and state anxiety. First, the general relationship between the condition, time and the state anxiety was measured. After that, the same analysis was conducted, but corrected for the influence of the covariates trait anxiety, how much the participant liked the sound, musical knowledge and being a professional musician.

Results

The mean total score of the pre measure of the State subscale of the STAI was 29.09 (*SD* = 6.36, range: 19-44). The mean total score of the post measure of the State subscale of the STAI was 36.23 (*SD* = 9.44, range: 20-60). The mean total score of the Trait subscale of the STAI was 34.39 (*SD* = 7.79, range: 21-57).

One participant failed to rate 3 statements on the pre measure of the State subscale, which led to 3 missing data for this participant. After analysing, it turned out that the score of the participant could not be considered an outlier and removing the participant from the dataset did not significantly change the results. For these reasons, it was decided not to remove the participant from the dataset. Another noteworthy result is that every participant reported a 1 on the sixth statement of the pre measure of the STAI-State, indicating that no one felt even a little bit confused.

Looking at the influence of musical knowledge and being a professional musician did not appear to be relevant, since the groups of participants who perceived themselves as being someone with a lot of musical knowledge and who were professional musicians were too small to obtain a sufficient power. Therefore, the conclusions regarding these analyses would not be reliable, causing them not to be included in the results section.

Correlations

The correlation between the pre measure of the State subscale and the Trait subscale was .57 ($p < .001$). The correlation between the post measure of the State subscale and the Trait subscale was .54 ($p < .001$).

Assumptions

The assumptions of normality, linearity, homogeneity, multicollinearity, independence and sphericity were met.

Mixed Design ANOVA

The first hypothesis was that listening to relaxing music significantly reduces the increase in anxiety due to a stressor (Davis & Thaut, 1989; Knight & Rickard, 2001; Pelletier, 2004; Stoudenmire, 1975; White, 1992). When looking at the overall model, there was no significant main effect of condition, $F(2, 41) = 1.13$, $p = .333$. There was a significant main effect of time, $F(1, 41) = 33.94$, $p < .001$. There was no significant interaction effect between

time and condition, $F(2, 41) = 0.21$, $p = .813$. In table 1, the mean state anxiety scores in each condition at both time points are presented. The hypothesis is rejected.

Table 1

Mean state anxiety scores in the three conditions, at both time points

Time points	Music	White noise	Silence
Time point 1	30.93	28.07	28.40
Time point 2	39.00	35.33	34.53

The second hypothesis was that the effect is influenced by the trait anxiety of the participant, since having higher trait anxiety causes less reduction in state anxiety (White, 1992). When trait anxiety was considered as a covariate, there was no significant main effect of condition, $F(2, 40) = 0.31$, $p = .737$. There was also no significant main effect of time, $F(1, 40) = 0.02$, $p = .897$. There was no significant interaction effect between time and condition, $F(2, 40) = 0.14$, $p = .871$. There was no significant interaction effect between time and trait anxiety, $F(1, 40) = 1.27$, $p = .266$. In table 2, the corrected mean state anxiety scores in each condition at both time points are presented. The hypothesis is rejected.

Table 2

Mean state anxiety scores in the three conditions, at both time points, when corrected for trait anxiety

Time points	Music	White noise	Silence
Time point 1	29.63	29.01	28.67
Time point 2	37.18	36.66	34.91

The third hypothesis was that the effect is stronger when the participants liked the music they were listening to (Davis & Thaut, 1989; Stratton & Zalanowski, in Wolfe, O'Connell, & Waldon, 2002). When how much the participant liked the sound was considered as a covariate, there was a significant main effect of condition, $F(2, 40) = 4.16$, $p = .023$. Pairwise comparisons of condition revealed that there was a significant difference between the music and white noise conditions, $p = .019$, when adjusted for multiple comparisons by the Bonferroni correction, indicating that the participants experienced significantly less state anxiety in the white noise condition in comparison to the music condition, when controlled for the covariate. There was also a significant main effect of time, $F(1, 40) = 20.55$, $p < .001$. There was no significant interaction effect between time and condition, $F(2, 40) = 1.07$, $p =$

.354. There was a significant interaction effect between time and how much the participant liked the sound, $F(1, 40) = 6.54$, $p = .014$. In table 3, the corrected mean state anxiety scores in each condition at both time points are presented. The hypothesis is partly accepted.

Table 3

Mean state anxiety scores in the three conditions, at both time points, when corrected for how much the participant liked the sound

Time points	Music	White noise	Silence
Time point 1	31.57	26.40	29.47
Time point 2	40.70	30.88	37.40

The fourth hypothesis was that the effect of listening to relaxing music is significantly greater than the effect of listening to white noise. In the overall model and when considering trait anxiety and how much the participant liked the sound as covariates, there were no significant interaction effects between time and condition. The hypothesis is rejected.

Discussion

In the current study, the effect of music on the increase in state anxiety was studied. When looking at the overall model, it appears that there was a significant increase in state anxiety over time. There was no significant difference in state anxiety scores between the conditions. The condition the participant was in had no significant effect on the increase in state anxiety over time. Since this last effect was not significant, the first hypothesis, that listening to relaxing music significantly reduces the increase in anxiety due to a stressor, is rejected. When controlled for the influence of trait anxiety, there was no significant difference in the state anxiety scores between the conditions and no significant increase in state anxiety over time. The condition the participant was in had no significant effect on the increase in state anxiety over time. Trait anxiety was not a significant covariate, which causes the second hypothesis, that the reduction of the anxiety by listening to relaxing music is influenced by the trait anxiety of the participant, since having higher trait anxiety causes less reduction in state anxiety, to be rejected. When controlling for the influence of how much the participant liked the sound, there was a significant increase in state anxiety over time and a significant difference in the state anxiety scores between the conditions. Pairwise comparison revealed that there was a significant difference between the state anxiety scores of the participants in the music and the white noise condition, indicating that there was significantly lower state

anxiety in the white noise condition than in the music condition. Overall however, the condition the participant was in had no effect on the increase in state anxiety over time. How much the participant liked the sound has a significant influence on the increase in state anxiety over time and on the differences of state anxiety between the conditions, but there was no interaction, causing the third hypothesis, that the reduction of the anxiety by listening to relaxing music is stronger when the participants like the music they are listening to, to be partly accepted. How much the participant liked the sound is a significant covariate, as shown by the significant interaction between the increase in anxiety and how much the participant liked the sound, but the observed influence was opposite from what was expected. Since all of the performed analysis indicated that the condition the participant was in had no significant effect on the increase in state anxiety over time and it was shown that, when corrected for the influence of how much the participant liked the sound, participants in the white noise condition reported significantly less state anxiety than participants in the music condition, the fourth hypothesis, that the effect of listening to relaxing music is significantly greater than the effect of listening to white noise, is being rejected.

The results are inconsistent with previous research, which found significant effects of listening to relaxing music on the decrease in state anxiety (Davis & Thaut, 1989; Knight & Rickard, 2001; Pelletier, 2004; Stoudenmire, 1975; White, 1992), that having higher trait anxiety leads to less reduction in state anxiety (White, 1992) and that the degree of preference is an important factor in the relaxing effect of the music (Davis & Thaut, 1989; Stratton & Zalanowski, in Wolfe, O'Connell, & Waldon, 2002).

Since the results of the current study contradicts the results from previous research, there have to looked at possible explanations of these differences. An explanation may be the relationship between the film clip and the music. Some participants reported after the experiment that they found the clip to be a bit dramatic in combination with the music, even though the clip by itself caused distress and/or anxiety (Arnaudova & Hagenaars, 2017) and the music was shown to give a high score on self-reported relaxation (Wolfe, O'Connell, & Waldon, 2002). This unintended effect may have had an influence on the participants in this condition, which caused the state anxiety to rise instead of to decrease. A possible explanation for the findings regarding the influence of the liking of the sound can be found in the magnitude of the contrast between the sound and the anxiety-inducing clip. Through completing an independent t-test, a significant difference was found between the rating of pleasantness of music and white noise and of silence and white noise, with white noise being rated as less pleasant, but no significant difference between the rating of music and silence.

The clip was also not considered as being pleasant, as shown by the significant increase in anxiety over time in all conditions. There can be said that the contrasts between the clip and the music or the silence are larger than the contrast between the clip and the white noise. This larger contrast may cause a strengthened effect, making the participant to increase even more in state anxiety. This contrast was smaller between the clip and the white noise, causing a weakening effect, leading to a smaller increase in state anxiety. So in this experiment, causing a person to be less anxious did not involve playing relaxing music, but presenting them with a non-pleasurable sound, white noise. Listening to white noise seemed to interfere with the induction of the anxiety, causing someone to become less anxious. A possible explanation for this can be found in taxing the working memory as seen in Eye Movement Desensitization and Reprocessing (EMDR). During EMDR, an emotional memory is evoked, causing it to enter the working memory, which has a limited capacity. At the same time, a seemingly meaningless task which requires working memory capacity, such as following the fingers of the EMDR therapist with your eyes from left to right, is performed. This task causes less space for the emotional memory in the working memory. In EMDR, the emotional memory will become less vivid and emotional (Van den Hout & Engelhard, 2012). In the current experiment, there is also a seemingly meaningless task, namely listening to white noise. Following the line of thinking of EMDR, listening to white noise causes the working memory to be too ‘full’ to pay attention to the anxiety-inducing stimuli. In working memory, small pieces of information stay active during the time one pays attention to it. For the information to be remembered, it has to be stored in the long term memory (Kessels, Eling, Ponds, Spikman, & van Zandvoort, 2012). When there is not enough room in the working memory for the anxiety-inducing stimuli to enter, it may not be stored in long term memory, which may lead to a smaller increase in anxiety. In the study by Hornsveld et al. (2010), performing eye movements caused significantly more reduction in emotionality than listening to relaxing music. The results indicate that the eye movements, which are seemingly meaningless, have more effect on the reduction in emotionality than listening to relaxing music, which may indicate that a seemingly meaningless task takes up more capacity of the working memory than listening to relaxing music. This may explain why in the current study only the seemingly meaningless listening to white noise and not the listening to relaxing music led to significantly less state anxiety, when corrected for the liking of the sound.

The major strength of the current study is the addition of a new control condition, white noise, which adds to the existing literature. The main finding can be found in this condition, since, when corrected for the liking of the sound, participants reported significantly

less state anxiety in the white noise condition in comparison to the music condition. In the future, research has to be done on the taxing of the working memory in this specific situation, to find out if listening to white noise just takes up capacity in the working memory, or if it also has something to do with the low rating of pleasantness, since listening to white noise only caused significantly less state anxiety when corrected for the rating of pleasantness. This can be done by exploring what the influence of varying with the unpleasantness of the stimulus is. The limitations of the current study also have to be taken into account in future research, which can be achieved by considering the following suggestions. Firstly, in this study, the items about having musical knowledge and being a professional musician were scored dichotomously. In future research, the items have to be scored on a scale of 1 to 10, since then they can be considered as a covariate. Secondly, more people with musical knowledge and professional musicians have to be incorporated in the study. This can be done by creating approximately equal groups of participants with a lot and little musical knowledge and professional and no professional musicians, making it possible to compare the groups. Only then the real influence of these constructs can be found out. Thirdly, the combination of the relaxing music and the film clip has to be considered, to avoid possible unintended effects of the relaxing music and the clip on the increase in anxiety. What is made clear in this study is that there are influences of sound on anxiety, but not as would have been expected. Since there are contradictions in the results of previous studies and the current study, questions have risen on the influence of music that have to be explored in future research. In this study, new knowledge is obtained, but there are still lots of blank spaces. It is necessary for future research to fill in these blank spaces by considering the suggestions. Only then there can be found out what is really the influence of music on anxiety.

References

Arnaudova, I., & Hagenaars, M.A. (2017). Lights … Action: Comparison of Trauma Films for Use in the Trauma Film Paradigm. *Behaviour Research and Therapy, 93*, 67-77. doi: 10.1016/j.brat.2017.02.007

Cruise, C.J., Chung, F., Yogendran, S., & Little, D. (1997). Music Increases Satisfaction in Elderly Outpatients Undergoing Cataract Surgery. *Canadian Journal of Anaesthesia, 44*(1), 43-48.

Davis, W.B., & Thaut, M.H. (1989). The Influence of Preferred Relaxing Music on Measures of State Anxiety, Relaxation, and Physiological Responses. *Journal of Music Therapy, 26*(4), 168-187. doi: 10.1093/jmt/26.4.168

Gliem, J.A., & Gliem, R.R. (2003). Calculating, Interpreting, and Reporting Cronbach's Alpha Reliability Coefficient for Likert-Type Scales. *Proceedings of the Midwest Research to Practise Conference in Adult, Continuing, and Community Education*, 82-88.

GPower (3.1) [Computer software]. (2007). Retrieved from http://www.gpower.hhu.de/en.html.

Gravetter, F.J., & Wallnau, L.B. (2013). *Statistics for the Behavioral Sciences* (9th edition). Boston: Wadsworth Cengage Learning.

Guétin, S., Portet, F., Picot, M.C., Pommié, C., Messaoudi, M., Djabelkir, L., Olsen, A.L., Cano, M.M., Lecourt, E., & Touchon, J. (2009). Effect of Music Therapy on Anxiety and Depression in Patients with Alzheimer's Type Dementia: Randomised, Controlled Study. *Dementia and Geriatric Cognitive Disorders*, *28*(1), 36-46. doi: 10.1159/000229024

Hornsveld, H.K., Landwehr, F., Stein, W., Stomp, M.P.H., Smeets, M.A.M., Van den Hout, M.A. (2010). Emotionality of Loss-Related Memories is Reduced After Recall Plus Eye Movements but not After Recall Plus Music or Recall Only. *Journal of EMDR Practice and Research, 4*(3), 106-112. doi: 10.1891/1933-3196.4.3.106

Kessels, R., Eling, P., Ponds, R., Spikman, J., & van Zandvoort, M. (2012). *Klinische Neuropsychologie*. Amsterdam: Uitgeverij Boom.

Kessler, R.C., Berglund, P., Demler, O., Jin, R., Merikangas, K.R., & Walters, E.E. (2005). Lifetime Prevalence and Age-of-Onset Distributions of DSM-IV Disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry, 62*, 593-602. doi: 10.1001/archpsyc.62.6.593

Knight, W.E.J., & Rickard, N.S. (2001). Relaxing Music Prevents Stress-Induced Increases in Subjective Anxiety, Systolic Blood Pressure, and Heart Rate in Healthy Males and Females. *Journal of Music Therapy, 38*(4), 254-272. doi: 10.1093/jmt/38.4.254

Kühlmann, A.Y.R., De Rooij, A., Kroese, L.F., Van Dijk, M., Hunink, M.G.M., & Jeekel, J. (2018). Meta-Analysis Evaluating Music Interventions for Anxiety and Pain in Surgery. *British Journal of Surgery, 105*, 773-783. doi: 10.1002/bjs.10853

Mok, E., & Wong, K.-Y. (2003). Effects of Music on Patient Anxiety. *Aorn Journal, 77*(2), 396-410. doi: 10.1016/S0001-2092(06)61207-6

nick1111341. (2009, 25 Augustus). *PSA Texting while Driving U.K. Ad [HD]* [Video file] Consulted on 18 October 2017, from https://www.youtube.com/watch?v=R0LCmStIw9E.

Nilsson, U. (2008). The Anxiety- and Pain-Reducing Effects of Music Interventions: A Systematic Review. *Aorn Journal, 87*(4), 780-807. doi: 10.1016/j.aorn.2007.09.013

Pelletier, C.L. (2004). The Effect of Music on Decreasing Arousal Due to Stress: A Meta-Analysis. *Journal of Music Therapy, 41*(3), 192-214. doi: 10.1093/jmt/41.3.192

Spielberger, C.D. (1966). *Anxiety and Behavior*. Nashville, Tennessee: Academic Press.

Spielberger, C.D. (1983). *Manual for State-Trait Anxiety Inventory*. Palo Alto, CA: Consulting Psychologists Press.

Staum, M.J., & Brotons, M. (2000). The Effect of Music Amplitude on the Relaxation Response. *Journal of Music Therapy, 37*(1), 22-39. doi: 10.1093/jmt/37.1.22

Stoudenmire, J. (1975). A Comparison of Muscle Relaxation Training and Music in the Reduction of State and Trait Anxiety. *Journal of Clinical Psychology, 31*(3), 490-492. doi: 10.1002/1097-4679(197507)31:3<490::AID-JCLP2270310328>3.0.CO;2-E

Swaab, D. (2016). *Ons Creatieve Brein. Hoe mens en wereld elkaar maken*. Amsterdam/Antwerpen: Uitgeverij Atlas Contact.

Van den Hout, M.A., & Engelhard, I.M. (2012). How Does EMDR Work? *Journal of Experimental Psychopathology, 3*(5), 724-738. doi: 10.5127/jep.028212

Van der Ploeg, H.M. (1982). De Zelf-Beoordelings Vragenlijst (STAI-DY). De ontwikkeling en validatie van een Nederlandse vragenlijst voor het meten van angst. *Tijdschrift voor Psychiatrie, 24*, 576-588.

Vaughan Williams, R. (1939). Five Variants of Dives and Lazarus [Recorded by S. Kanga & London Philharmonic Orchestra].

White, J.M. (1992). Music Therapy: An Intervention to Reduce Anxiety in the Myocardial Infarction Patient. *Clinical Nurse Specialist, 6*(2), 58-63.

Wolfe, D.E., O'Connell, A.S., & Waldon, E.G. (2002). Music for Relaxation: A Comparison of Musicians and Nonmusicians on Ratings of Selected Musical Recordings. *Journal of Music Therapy, 39*(1), 40-55. doi: 10.1093/jmt/39.1.40