

International Journal of Work Organisation and Emotion

ISSN online: 1740-8946 - ISSN print: 1740-8938

<https://www.inderscience.com/ijwoe>

A review on impact on human emotion while listening and reciting Quran

Nur Asyiqin Amir Hamzah, Nur Hasanah Ali, Ervina Efzan Mhd Noor, Azlan Abd Aziz, Noor Ziela Abd Rahman

DOI: [10.1504/IJWOE.2022.10052304](https://doi.org/10.1504/IJWOE.2022.10052304)

Article History:

Received:	07 October 2021
Accepted:	06 August 2022
Published online:	10 April 2023

A review on impact on human emotion while listening and reciting Quran

Nur Asyiqin Amir Hamzah*, Nur Hasanah Ali,
Ervina Efzan Mhd Noor, Azlan Abd Aziz and
Noor Ziela Abd Rahman

Faculty of Engineering and Technology,
Multimedia University, Malaysia
Email: asyiqin.hamzah@mmu.edu.my
Email: hasanah.ali@mmu.edu.my
Email: ervina.noor@mmu.edu.my
Email: azlan.abdaziz@mmu.edu.my
Email: ziela.abdrahman@mmu.edu.my
*Corresponding author

Abstract: The objective of this study is to systematically review on the brain response towards the activity of listening and reciting the Quran. We adopted PRISMA guidelines to ensure comprehensive coverage of all related publications. The study focuses on the emotion classification available in the three major electronic databases from their first date to the end of our literature review duration, 30 April 2019. It centred on utilising electroencephalogram (EEG) since EEG is the most efficient way to analyse the state of emotion via brain activity. Two hundred thirty-one related records were collected and filtered stage-by-stage, yielding only nine considered for the extended review. From the review study, it can be deduced that listening and reciting Quran does have a favourable impact on human emotion. Evidence were found to prove some of the verses in the Quran claiming that listening or reciting may heal negative emotion and give calmness to human.

Keywords: electroencephalogram; EEG; brainwaves; Quran listening; Quran reciting; emotion.

Reference to this paper should be made as follows: Hamzah, N.A.A., Ali, N.H., Noor, E.E.M., Aziz, A.A. and Rahman, N.Z.A. (2023) 'A review on impact on human emotion while listening and reciting Quran', *Int. J. Work Organisation and Emotion*, Vol. 14, No. 1, pp.89–100.

Biographical notes: Nur Asyiqin Amir Hamzah received her degree in Electronics Engineering and Master's in Engineering Science at Multimedia University. Her fields are including telemedicine, biomedical engineering, telecommunication and signal processing.

Nur Hasanah Ali is a Lecturer in the Faculty of Engineering and Technology at Multimedia University, Melaka. She is interested in the field of image processing, medical image analysis, and machine learning. More specifically, her focus is in the area of multispectral neuroimages using machine learning techniques for segmentation and classification of stroke.

Ervin Efzan Mhd Noor received her PhD in Materials Engineering (Advanced Materials) from the Universiti Sains Malaysia. Her research is focused primarily to soldering, intermetallic and alloys, aluminium foam and nanostructured metal fabricated by powder metallurgy, mechanical alloying, nanomaterial and solar energy. Her research interest also covers metal joining and soldering techniques.

Azlan Abd Aziz currently works at the Faculty of Engineering and Technology, Multimedia University. He has been in telecommunication industry for more than 15 years and has vast industrial and academic networking. His current research is in IOT, PHY layer wireless security and aerial base station in mobile communications.

Noor Ziela Abd Rahman received degree in Electronics from Multimedia University in 2007 and Master degree from University of Technology Malaysia in 2013. She is presently pursuing her PhD, involving radio network planning tools and algorithm that focussing on broadband fixed wireless access.

1 Introduction

Over hundreds of years, researchers have learned much about the brain, including the numerous methods of estimating the effect of certain activities on emotion (Didar et al., 2021). According to Islamic teaching, the Quran has a positive impact on human emotion and curative power to heal negative emotional states.

Feeling stressful or being under pressure are the among emotion conditions that individuals always wish to avoid or at least if they had one, to immediately get it rid. People attempt to get away from bad emotions with many ways and one of it is to listen to music. Some people listen to any kind of their favourite music melody; jazz, R&B, rock etc. They believed that music that have relaxation and calmness tones are capable to heal bad feelings. On contrary, Muslim community has another alternative that is similar to this routine; listening or reading their religious holy book; The Quran. Quran is Allah's divine words which are revealed to the Prophet Muhammad (PBUH) in the 7th century. The revelation was then ultimately for us human to benefit it in our daily life. This is as stated by one of the noteworthy verse in Quran which goes, "This is the Scripture in which there is no doubt, containing guidance for those who are mindful of God, who believe in the unseen." Hence, we aimed to study the effects on human emotion when one listening or reciting Quran.

Several studies found a conclusive positive impact on human emotion when listening to music (Lippi et al., 2010; Kim et al., 2008; Erkkilä et al., 2011; Lin et al., 2010; Baumgartner et al., 2006; Lee et al., 2020; Daly et al., 2020). On the other hand, limited studies have been conducted to observe when the Quran is applied instead (Ismail and Sharif, 2017; Alsolamy and Fattouh, 2016; Zulkurnaini et al., 2012; Fattouh et al., 2016; Al-Galal et al., 2016; Alshaikhli et al., 2014; Al-Galal et al., 2017; Alhouseini et al., 2014; Kamal et al., 2013). We anticipated the effect should be comparatively the same. Indeed, there were attempts to compare the emotional impact when listening/reading the Quran and music (Zulkurnaini et al., 2012; Al-Galal et al., 2016; Alshaikhli et al., 2014; Al-Galal et al., 2017). They concluded that the Quran also has a considerably significant influence on the brain.

The study presented a review of the existing literature and work done by other researchers that examined the effect on emotion when listening to or reciting the Quran. The systematic literature review (SLR) technique was applied to ensure a comprehensive study. The focus is on the usage of electroencephalogram (EEG) signals as a means to evoke human emotions. The study was conducted to answer the following main research question:

“Many verses from the Quran claim that listening or reciting may heal and give calmness to humans. Is there any scientific evidence to prove this statement, specifically in emotion study?”

2 Methods

A comprehensive literature review was conducted in a systematic manner in accordance with the guidelines offered by Moher et al. (2009). We adhered to the following criteria:

- 1 the study conducted must involve subjects who can recite and are familiar with Quran
- 2 the activity must include either listening or reciting Quran
- 3 the outcome must classify the activity into positive or negative impact.

The review consisted of English-written manuscripts, with the other critical criteria included:

- 1 studies with primary data collection
- 2 results quantitatively described and measured, with any number of participants.

The excluded criteria are

- 1 narrative reviews
- 2 publications without primary data
- 3 duplicate literature.

We conducted the publication searching strategy based on electronic database searches. As mentioned above, three major electronic databases were referred from their first date to the end of our literature review duration, 30 April 2019; Institute of Electrical and Electronics Engineers (IEEE), Science Direct Database and Scopus Database. For each database, we used the following search terms to search in the title/abstracts/keywords:

- 1 combination of ‘listening’ and ‘emotion’ or ‘brainwave’ or ‘EEG’
- 2 combination of ‘reading’ and ‘emotion’ or ‘brainwave’ or ‘EEG’
- 3 combination of ‘recitation’ and ‘emotion’ or ‘brainwave’ or ‘EEG’
- 4 combination (1) and ‘Quran’
- 5 combination (2) and ‘Quran’
- 6 combination of (3) and ‘Quran’

- 7 combination (1) and ‘meditation’
- 8 combination (2) and ‘meditation’
- 9 combination of (3) and ‘meditation’.

Out of a total of 231 collected papers, there were 48 duplicates identified and were omitted in the screening stage. From the title screening of 183 literature, 38 were identified as relevant to our scope of studies. A further abstract screening to the remaining 38 literature, the number was reduced to ten relevant studies. After a meticulous study on the remaining records, one was excluded, resulting in nine publications used in our study. Figure 1 depicts the flowchart of the literature selection.

The details of the activity of each of the stages are described as below:

- Identification (one reviewer) – Titles screening to identify relevant papers based on search terms. If there were uncertainty about the title relevance, the reviewer would just include.
- Screening (two reviewers) – In the case of uncertainty, the article would be included. If any case of disagreements, it would be solved by discussion to agree to a decision.
- Eligibility (two reviewers) – Full texts of the selected articles were then assessed and appraised independently.

For data extraction, we designed a form that contain the following information: author, year of publication, no. of testing subjects, methods and data collection steps and results and outcome. The data extraction was carried out by one reviewer and cross-checked by the second and third reviewer.

Two reviewers performed quality assessment separately in which they must consider the following criterion: a clearly stated aim, the inclusion of number of testing subjects, prospective collection of data and endpoints appropriate to the aim of the study. The literature was ranked as high-, medium-, and low-quality groups.

Figure 1 Flowchart of the literature selection using SLR technique (see online version for colours)

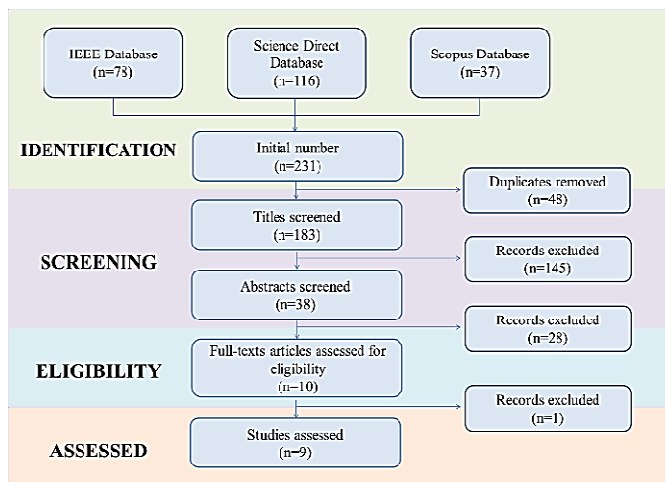


Table 1 Summary of Quran impact on human emotion

<i>Author (publication year)</i>	<i>Objective</i>	<i>Method</i>	<i>Results</i>
Ismail and Sharif (2017)	To analyse the alpha and beta waves of EEG signals when listening to Al-Mulk and Al-Hasyr verses.	Signal: EEG from 22 subjects (six males, 16 females), 19–28 years old (G-Mobilab). Analyse the alpha and beta bands from the left and right brain by comparing the magnitude level of the waveforms. The study examined the mean and correlation using statistical analysis software SPSS. The data collection experiment conducted followed the following steps: 1 Listen to Al-Mulk verse – closed eyes (EEG recorded). 2 Rest time – open eyes and rest (no EEG recorded). 3 Listen to Al-Hasyr verse – closed eyes (EEG recorded).	Scientific outcome: listening to Al-Hasyr verse could potentially remedy stress emotion since alpha and beta band levels during the activity showed an increment. The increment helped to improve the balance between both brain hemispheres. Table 1 summarised the average value of the bands. Motivational outcome: <ul style="list-style-type: none">• When subjects listened to Al-Hasyr, the results showed that listening to the verse have a more relaxing effect than Al-Mulk.• This was because while listening to Al-Mulk, subjects focused on the familiarity of the verse compared to the unfamiliar verse, Al-Hasyr – Al-Hasyr was rarely brought into practice in the Muslim community.• Besides, the meaning of the verse is softer – containing the names of Allah; than Al-Mulk – about power of Allah.
Alsolamy and Fattouh (2016)	To study the emotion estimation based on EEG power spectral density (PSD) features while listening to the Quran.	Signal: EEG from 14 subjects (Emotiv). The study categorised two types of emotions: 'happy' and 'unhappy' while listening to the Quran by extracting the PSD as features and classifying using a support vector machine (SVM). Radial basis function kernel was employed since it could cater to nonlinear relations between the features and labels. The training and testing process proceeded after. The EEG signal collection conducted followed the following steps: 1 Silent period – 10 seconds (EEG recorded as baseline). 2 Recite verse – 60 seconds. 3 End session – subjects report his emotion level from 0–100. 4 Repeat the steps until six or seven trials.	Scientific outcome: from 3,904 samples (see Table 2), 57.2% were categorised as 'happy' and 42.8% as 'unhappy'.

Table 1 Summary of Quran impact on human emotion (continued)

<i>Author (publication year)</i>	<i>Objective</i>	<i>Method</i>	<i>Results</i>
Zulkurnaini et al. (2012)	To compare the effects on human brainwaves when listening to the Quran and listening to classical music.	<p>Signal: EEG from 28 subjects (20–28 years old) (Waveaware).</p> <p>Analyse the 28 samples of alpha bands from the left and right brains for both activities by examining the average value and correlation coefficient using statistical analysis software SPSS.</p> <p>The procedure of EEG signal capture:</p> <ol style="list-style-type: none"> 1 Before listening to music (five minutes) – closed eyes (EEG recorded). 2 Rest (one minute). 3 During listening to music (five minutes) – closed eyes (EEG recorded). 4 Rest (one minute). 5 After listening to music (five minutes) – closed eyes (EEG recorded). 6 End of session (five minutes) – rest (no EEG recorded). 7 Repeat steps 1–6 on another day for Quran listening activity. <p>Signal: EEG from 17 male subjects, 16–45 years old (Emotiv).</p>	<p>Scientific outcome: the correlation coefficient between left and right brainwaves showed a 12.67% increment when listening to the Quran (Yassin verse) and 9.96% for classical music (Canon D Major by Palchelbel). Table 3 details the results obtained.</p> <p>Motivational outcome: compared to classical music, the Quran has a higher potential to offer a relaxing feeling and even increased the alertness of listeners.</p>
Fattouh et al. (2016)	To investigate the possibility of emotional state recognition of EEG brainwaves while listening to Surahs from the Quran.	<p>The researchers calculated the arousal-valence model using the Higuchi algorithm to classify two emotional states of subjects – ‘happy’ and ‘unhappy’. The arousal value was calculated as the fractal dimension of the raw EEG signals from electrode FC6. Similarly, the valence value was taken as the difference between electrode AF3 and F4.</p> <p>The experiment procedure to collect EEG signals was rather simple – after ensuring the Emotiv was well-connected with the subject’s head, the subject have to select and listen to it. Next, the subject reported his emotion using self-assessment manikin (SAM) measure.</p>	<p>Scientific outcome: from a total of 108 feature vectors, 63.9% were classified as ‘happy’ and 36.1% as ‘unhappy’.</p> <p>Motivational purpose: future work is needed to include more emotion types and a larger number of subjects.</p>

Table 1 Summary of Quran impact on human emotion (continued)

<i>Author (publication year)</i>	<i>Objective</i>	<i>Method</i>	<i>Results</i>
Al-Gaial et al. (2016)	To study the impact on human emotions when listening to the Quran and relaxing music.	Signal: EEG from 13 subjects (eight males, five females), using BCI.	Scientific outcome: from 13 recordings, only seven were considered (28 samples). The other five recordings were omitted since they showed no change for both Quran and music listening activities. All seven recordings showed a transition to a happy or calm emotion for both the Quran and music listening.
	The researchers calculated the arousal-valence to classify four emotional states of subjects – ‘happy’, ‘fear’, ‘sad’ and ‘calm’. Several emotional stimuli were used to evoke the emotions by showing the subjects pictures from affective picture system (IAPS) database. Participants listened to readings from the Quran and relaxing music.	For EEG capture, the experiment followed the steps below: 1 Eyes closed (one minute) then eyes open (one minute). 2 Stimulus using IAPS/IADS (international affective picture system/international affective digitised sound) – happy, fear, sad and calm (one minute each). 3 Quran listening with eyes closed (Yassin, Al-Inshirah and 3Quls) – one minute each. 4 Music listening with eyes closed (Mozart Music K448, new age and jazz) – one minute each.	Motivation outcome: the results showed that listening to Quran recitations and music tracks changed the valence from negative to positive emotions. However, the arousal calculation did not show a significant change during both activities.
Alshaikhi et al. (2014)	To analyse the impact on EEG and ECG signals while listening to the Quran and music.	Signal: EEG and ECG from three male subjects, 22–26 years old (Bimec and ECG machine). The features of EEG were extracted using Kernel-smoothing density estimation (KDE). While for ECG, some filters were used. Both signals were classified into ‘happy’, ‘fear’, ‘sad’, and ‘natural’ categories using a machine learning multi-layer perceptron (MLP) algorithm. The procedure for the signal capture was divided into: Part 1 Eyes open and closed test for one minute each. Part 2 Stimuli test – subjects focus on a monitor for pictorial stimuli (happy, sad, fear and calm). Part 3 Listen to Quran (Al-Furqan verse) and listen to hard music (death and the healing by Wintersun) for three minutes each.	Scientific outcome: EEG and ECG signal classification results showed that subjects felt more relaxed and calmer while listening to the Quran than hard music. Motivation outcome: the authors recommended conducting thorough analysis and interpretation. Also, additional research is needed to determine the relationship and correlation between heartbeats and brainwaves.

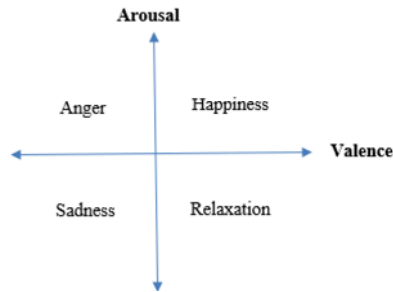
Table 1 Summary of Quran impact on human emotion (continued)

<i>Author (publication year)</i>	<i>Objective</i>	<i>Method</i>	<i>Results</i>
Al-Galal et al. (2017)	To analyse the impact on EEG and ECG signals while listening to the Quran and relaxing music.	Signal: EEG and ECG from 25 subjects (15 male, 10 females) using BCI and ECG machine. EEG and ECG features were extracted using Mel-frequency cepstral coefficients (MFCC). Both signals were classified into 'happy', 'fear', 'sad' and 'natural' categories using MLP machine learning algorithm. The study followed the procedure of EEG data collection in Al-Galal et al. (2016).	Scientific outcome: <ul style="list-style-type: none"> Listening to Quran recitation had positively impacted all subjects (calm and happy) as the experiment indicated positive valence for both signals. Relaxing music also showed a positive change in the valence of EEG. However, analysis in ECG indicated a negative change for most of the tracks used.
Alhouseini et al. (2014)	To investigate different aspects of human emotions when listening to the Quran.	Signal: EEG from five subjects (Emotiv). The average alpha band from all subjects' EEG while listening to the five selected Quran verses was extracted and examined. The verses used were Al-Baqarah (verses 255), An-Nour (verses 35-43), Yasin (verses 1-20), Al-Fath (verses 4-23) and Al-Insyirah (verses 1-8). The procedure to collect EEG involves three main sessions: before, during (five sessions) and after reciting Quran. Each of the sessions lasted for two minutes and followed by resting session for one minute.	Scientific outcome: good alpha band values for subjects 1-3 when they listened to Surah Yasin and for subject 4 was Al-Fath and Al-Insyirah for subject 5. In general, all subjects showed calmness in the alpha band values when they listened to Surah Yasin.
Kamal et al. (2013)	To compare EEG signals while reciting the Quran and reading a book.	Signal: EEG from ten male subjects, 22-24 years old (BCI). The PSD of the signals was calculated using fast Fourier transform (FFT). Next, the PSD average value for the alpha band was calculated. The study collected the signal in four different conditions; before reciting the Quran (Az-Zumar verse 20-31), before reading a book (Jendela Hati by S. Aisyah), during reciting the Quran and during reading a book.	Scientific outcome: EEG power spectrum and FFT analysis showed higher alpha band values during Quran recitation than reading a book. The highest PSD value obtained is at the P3 (Quran recitation) and for each of P4 and Pz electrodes, PSD for Quran recitation was higher than reading a book. Motivation outcome: in future work, more subjects need to involve and different text material genres should be used in reading activity.

3 Results

The following section summarised the literature included in this review (Table 1).

Figure 2 The arousal-valence model reference employed in studies (see online version for colours)



Source: Fattouh et al. (2016), Al-Galal et al. (2016) and Alshaikhli et al. (2014)

Given that the objective of the study is to answer the main research question, it was discovered the Quran listening and recitation has the ability to give positive impact to human brain. However, we observed that only small number of testing subjects used in each of the study. The records documented that the minimum number of testing subjects collected was three (Lee et al., 2020) and the maximum was 28 (Erkkilä et al., 2011). The analysis implied the possibility of the influence of testing subjects toward the performance of the recognition. Therefore, increasing the number of testing subjects in the current study is recommended to ensure an absolute and indisputable result.

Table 2 Alpha and beta average value during listening to Al-Mulk and Al-Hasyr

	<i>Alpha (left)</i>	<i>Beta (left)</i>	<i>Alpha (right)</i>	<i>Beta (right)</i>
Al-Mulk	3.7947	3.4641	3.8988	3.6030
Al-Hasyr	4.1741	3.6866	4.2811	3.7791

Source: Ismail and Sharif (2017)

Table 3 Number of samples of each category of classification observed in study

<i>Category</i>	<i>Samples</i>
Happy	2,233
Unhappy	1,671

Source: Alsolamy and Fattouh (2016)

As the main concerns of this study is the scientific evidence to prove verses statements from the Quran claiming that listening or reciting may heal and provide emotions attributed to calmness. The Quran stated that “... truly it is in the remembrance of God that heart finds peace” [13:28] – The word ‘remembrance’ in this verse also includes reciting Quran according to Muslim scholars. From the review, an observation was established that listening or reciting the Quran leads to peace of mind. A comparison study conducted in Erkkilä et al. (2011) even suggested that listening to Quran could

bring human mood into a more relaxed and increase alertness compared to classical music. A similar study was carried out to compare the emotional impact of reciting the Quran and reading a book in Alsolamy and Fattouh (2016) also proves that the former offered calmness to the human mind.

Table 4 Left and right brainwaves' alpha band average value (AVG) and correlation coefficient between both activities (CORR) in study

<i>AVG</i>		<i>Before</i>			<i>During</i>	<i>After</i>
<i>Activity</i>	<i>Music</i>	<i>Quran</i>	<i>Music</i>	<i>Quran</i>	<i>Music</i>	<i>Quran</i>
Left	1.55	1.95	1.35	1.48	1.36	1.34
Right	1.28	1.96	1.47	1.38	1.34	1.37
<i>CORR</i>			<i>Before</i>		<i>During</i>	<i>After</i>
Music			0.843		0.927	0.889
Quran			0.821		0.925	0.822

Source: Zulkurnaini et al. (2012)

Table 5 Average alpha value when subjects listened to each of the five verses obtained in Alhouseini et al. (2014)

<i>Verse/subject</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
1	4.317022	4.313014	4.309395	4.312982	4.316093
2	4.319152	4.332258	4.320981	4.317349	4.319582
3	4.332258	4.319152	4.320981	4.317349	4.319582
4	4.292168	4.278325	4.274913	4.279667	4.2846
5	4.309719	4.314767	4.317938	4.316522	4.323195

4 Conclusions

All the existing studies under review concluded that either the activity of listening or reciting the Quran, or both could positively impact a person's state of mind. This includes the meditation activity. However, since all the studies used only a limited number of testing subjects, the discovery is still debatable. Although, we hypothesise that increasing the number of testing subjects has no significant impact on the recognition's performance, it is highly recommended to find out the effect of the performance using a larger number of the testing subjects, which will substantiate the current results. Our study will continue to further examine the impact of the size of the testing subjects on the emotion classification. In conclusion, existing studies showed that the Quran could evoke emotions of peace to individuals as music did. Evidence found in the literature supported some of the verses in the Quran claiming that listening or reciting Quran may heal negative emotions and encourage calming emotions.

Reference

- Al-Galal, S.A.Y., Alshaikhli, I.F.T. and Rahman, A.W.B.A. (2017) 'Automatic emotion recognition based on EEG and ECG signals while listening to quranic recitation compared with listening to music', *Proceedings – 6th International Conference on Information and Communication Technology for the Muslim World, ICT4M 2016*, pp.269–274 [online] <https://doi.org/10.1109/ICT4M.2016.55>.
- Al-Galal, S.A.Y., Alshaikhli, I.F.T., Rahman, A.W.B.A. and Dzulkifli, M.A. (2016) 'EEG-based emotion recognition while listening to Quran recitation compared with relaxing music using valence-arousal model', *Proceedings – 2015 4th International Conference on Advanced Computer Science Applications and Technologies, ACSAT 2015*, pp.245–250 [online] <https://doi.org/10.1109/ACSAT.2015.10>.
- Alhousseini, A.M.R.A., Al-Shaikhli, I.F., Rahman, A.W.B., Alarabi, K. and Dzulkifli, M.A. (2014) 'Stress assessment while listening to Quran recitation', *International Conference on Computer Assisted System in Health*, pp.67–72 [online] <https://doi.org/10.1109/CASH.2014.14>.
- Alshaikhli, I.F.T., Yahya, S.A., Pammusu, I. and Alarabi, K.F. (2014) 'A study on the effects of EEG and ECG signals while listening to Qur'an recitation', *The 5th International Conference on Information and Communication Technology for The Muslim World (ICT4M)*, pp.1–6 [online] <https://doi.org/10.1109/ICT4M.2014.7020590>.
- Alsolamy, M. and Fattouh, A. (2016) 'Emotion estimation from EEG signals during listening to Quran using PSD features', *Proceedings – CSIT 2016: 2016 7th International Conference on Computer Science and Information Technology*, pp.3–7 [online] <https://doi.org/10.1109/CSIT.2016.7549457>.
- Baumgartner, T., Esslen, M. and Jäncke, L. (2006) 'From emotion perception to emotion experience: emotions evoked by pictures and classical music', *International Journal of Psychophysiology: Official Journal of the International Organization of Psychophysiology*, Vol. 60, No. 1, pp.34–43 [online] <https://doi.org/10.1016/j.ijpsycho.2005.04.007>.
- Daly, I., Williams, D., Malik, A., Weaver, J., Kirke, A., Hwang, F., Miranda, E. and Nasuto, S.J. (2020) 'Personalised, multi-modal, affective state detection for hybrid brain-computer music interfacing', *IEEE Transactions on Affective Computing*, Vol. 11, No. 1, pp.111–124, DOI: 10.1109/TAFFC.2018.2801811.
- Didar, D., Wei Wei, G. and Ee Xion T. (2021) 'EEG-based emotion recognition: review of commercial EEG devices and machine learning techniques', *Journal of King Saud University – Computer and Information Sciences* [online] <https://doi.org/10.1016/j.jksuci.2021.03.009>.
- Erkkilä, J., Punkanen, M., Fachner, J., Ala-Ruona, E., Pöntiö, I., Tervaniemi, M. and Gold, C. (2011) 'Individual music therapy for depression: randomised controlled trial', *The British Journal of Psychiatry: The Journal of Mental Science*, Vol. 199, No. 2, pp.132–139 [online] <https://doi.org/10.1192/bjp.bp.110.085431>.
- Fattouh, A., Albidewi, I. and Baterfi, B. (2016) 'EEG-based emotion recognition of Quran listeners', *2016 3rd International Conference on Computing for Sustainable Global Development (INDIACom)*, pp.1338–1342.
- Ismail, N.S.B. and Sharif, Z.B. (2017) 'The comparison between listening to Surah Al-Mulk and Surah Al-Hasyr using EEG', *Proceedings – 2016 IEEE International Conference on Automatic Control and Intelligent Systems, I2CACIS 2016*, October, pp.28–33 [online] <https://doi.org/10.1109/I2CACIS.2016.7885284>.
- Kamal, N.F., Mahmood, N.H. and Zakaria, N.A. (2013) *Modeling Brain Activities During Reading Working Memory Task: Comparison Between Reciting Quran and Reading Book*, pp.83–89, Elsevier [online] <https://doi.org/10.1016/j.sbspro.2013.10.207>.
- Kim, J., Wigram, T. and Gold, C. (2008) 'The effects of improvisational music therapy on joint attention behaviors in autistic children: a randomized controlled study', *Journal of Autism and Developmental Disorders*, Vol. 38, No. 9, pp.1758–1766 [online] <https://doi.org/10.1007/s10803-008-0566-6>.

- Lee, M., Shin, G. and Lee, S. (2020) 'Frontal EEG asymmetry of emotion for the same auditory stimulus', *IEEE Access*, Vol. 8, pp.107200–107213, DOI: 10.1109/ACCESS.2020.3000788.
- Lin, Y., Wang, C., Jung, T., Wu, T., Jeng, S., Duann, J. and Chen, J. (2010) 'EEG-based emotion recognition in music listening', *IEEE Transactions on Biomedical Engineering*, Vol. 57, No. 7, pp.1798–1806 [online] <https://doi.org/10.1109/TBME.2010.2048568>.
- Lippi, D., Roberti di Sarsina, P. and D'Elia, J.P. (2010) 'Music and medicine', *Journal of Multidisciplinary Healthcare*, Vol. 3, pp.3–137, DOI: 10.2147/JMDH.S11378.
- Moher, D., Liberati, A., Tetzlaff, J., Altman, D.G. and Group, P. (2009) 'Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement', *PLoS Med*, Vol. 6, No. 7, p.e1000097.
- Zulkurnaini, N.A., Kadir, R.S.S.A., Murat, Z.H. and Isa, R.M. (2012) 'The comparison between listening to Al-Quran and listening to classical music on the brainwave signal for the alpha band', *Proceedings – 3rd International Conference on Intelligent Systems Modelling and Simulation, ISMS 2012*, pp.181–186 [online] <https://doi.org/10.1109/ISMS.2012.60>.