

Broad responses and attitudes to having music in surgery (the BRAHMS study) – a South African perspective

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Background: Music is played in operating theatres (OTs) throughout the world, though controversy around its use exists. While some clinicians may find background music favourable to the theatre mood and a way to augment surgical performance, there is concern raised over its distracting and noise-creating properties.

Methods: In this prospective observational study, between August and December 2021, 110 surgeons and registrars in South Africa responded to a survey investigating the way they use music, and their perceptions and attitudes towards its effect on the OT environment.

Results: In this cohort, 66% were male, 29% were consultants and the most common age range was 30–39 years old. Eighty per cent of respondents reported that music was played at least “sometimes”, with 74% reporting that they enjoyed it. Easy Listening was the most played and preferred genre followed by Top 40/Billboard hits. Overwhelmingly, respondents reported that background music in the OT improved temperament, focus, mood, and performance, though over a quarter felt it worsened communication. Thirty-one per cent of respondents reported that the choice of music depended on the type of operation, and 70% would turn music down or off during crises. Those who enjoyed music in their spare time were significantly more likely to enjoy music in the OT and perceive it positively.

Conclusion: This study provides a window into the surgeons’ use of and attitudes to intraoperative music in South Africa. While overall, music is viewed positively by this cohort, some concerns remain regarding communication and distractedness. Further interventional and qualitative studies would be useful.

Keywords: music, surgery, operating theatres

Introduction

Music can be ubiquitously heard emanating from operating theatres (OTs) throughout the world.¹⁻³ Commonplace as it is, there is disagreement in the literature regarding the benefits or harms of music in this setting.^{1,2,4} Surgery can be a stressful exercise that warrants expert execution of both technical and non-technical skills (such as communication, teamwork and rapid decision making) under pressure. The feeling of stress and managing its flow-on effect on performance is one that unites all surgeons in their experience.⁵

While it is clear that noise is deleterious to the surgical team,⁶⁻¹² many clinicians found music to be a generally favourable part of the theatre environment,^{3,12,13} with music being seen as reducing stress,^{14,15} and improving calmness,¹ mood, and surgeons’ and overall team performance.³ Following a seminal paper by Rauscher et al. on the “Mozart effect”, there is interest in the interaction between music and task performance.¹⁶ A recent systematic review concluded that having background music may also improve surgical accuracy and speed,⁴ however, opinions differed

when it came to the distracting effect,^{13,14} particularly at times of critical situations.^{1-3,13} Communication is another contentious area, where several studies report no effect or a positive influence with music,^{1,3,15,17} though others finding reduction in auditory speech perception^{11,18} and an increase in repeated request rate.¹⁹

Current literature mostly focuses on the effect of music on various aspects of a patient’s experience in the operating room, but very few address the effect of music from the surgeons’ perspective. Furthermore, this has never been studied in South Africa. This study aimed to specifically assess surgeons’ perceptions of the effect of music on their own experience of stress and mental workload in the South African setting.

Materials and methods

Clinical settings

This study was conducted at the University of KwaZulu-Natal (UKZN) affiliated teaching hospitals in Durban,

KwaZulu-Natal province, South Africa, between August and December 2021. UKZN is the training body responsible for delivering specialist training under the auspices of the College of Surgeons of South Africa.

The study

All surgical staff (consultants, non-training registrars, training registrars, sub-specialist fellows) within the UKZN Department of Surgery, Surgical Training Association of South Africa and the Association of Surgeons of South Africa were invited to participate via their relevant emailing lists. Participants were requested to complete an online, anonymous 5-minute questionnaire. All entries were non-incentivised. The questionnaire collected demographics, music preferences and perceptions of music on aspects of the theatre environment (Table I). Two validated instruments were used as frameworks to assess the parameters of stress: the modified 6-point State-Trait Anxiety Inventory (STAI-6) and the Surgical Task-load Index (SURG-TLX). Using Likert scales, we collected data on participants' perceptions of the effect of music on their intraoperative feelings of calmness, relaxation, contentedness, tenseness, upset and worry (STAI-6) and distractedness, anxiousness/stress, perceived complexity, feeling rushed, mental fatigue and physical fatigue (SURG-TLX). The questionnaire is attached as a supplementary file. Summary statistics were calculated for all outcomes of interest. Tests of proportion were used to compare the proportion of those who felt that music improved a particular attribute versus those who felt it worsened that attribute. Missing data was handled using pair-wise deletion. Analyses were performed using SPSS and $p < 0.05$ was considered statistically significant.

Results

Demographics

Of the 2 079 surgeons and surgical trainees approached, 110 responded, a response rate of 5.3%. Among those respondents, 66.4% were male and the majority were in the 30–49 age range (88%). Senior registrars/fellows comprised 42% of the cohort, followed by consultants (29%) and junior registrars (23%), with 84% working predominantly in the public sector. General surgery (including sub-specialties and trauma) was the biggest responding specialty (77%). The remaining responses came from orthopaedics (5.5%), cardiothoracic/vascular (4.5%) and all other specialties including gynaecology (13%). Almost every three out of four respondents listened to music in their spare time every day or almost every day. The majority of respondents were from South Africa (89%), with respondents also from Zimbabwe, Libya and other African nations. Eight per cent of respondents currently played musical instruments, while a further 29% had previously played a musical instrument. Only two respondents reported a diagnosed hearing impairment.

Use of music

Among the respondents, 8% stated that music was never played in OTs, 12% reported it was “rarely” played, 55% reported “sometimes”, 16% “often” and 9% “always”. Seventy-four per cent of respondents responded positively towards enjoying music in the OT and 56% felt more

Table I: Demographics

		<i>n</i>	%
Gender	Male	71	66.4%
	Female	36	33.6%
Age range	20–29	7	6.4%
	30–39	70	64.2%
	40–49	26	23.9%
	50–59	2	1.8%
	60–69	4	3.7%
	70 +	0	0%
Level of training	Consultant	31	29%
	Senior reg/fellow	45	42.1%
	Junior reg/resident	25	23.4%
	SHO/intern	6	5.6%
Music in spare time	Never	4	3.6%
	Less than once per week	6	5.5%
	Once or twice per week	19	17.3%
	Almost every day	52	47.3%
	Everyday	29	26.4%
Country of practice	Botswana	1	
	Kenya	1	
	Libya	3	
	Mauritius	1	
	Nigeria	1	
	South Africa	98	
	South Sudan	1	
	Zimbabwe	4	

comfortable with music (compared to 10% and 20% responding negatively, respectively.)

Participants reported that the anaesthetists were the group who choose the music most often (49%) followed by senior registrars (12%) and consultants (11%). The majority of respondents (61%) did not feel anxious if they had the responsibility to choose the music. Music was most preferred at an easily audible level (53%) or quietly (28%). Disliked music (music that a respondent would have felt distaste towards) was reportedly never or rarely (52.5%) or sometimes played (42%), though the majority of respondents felt this had no effect on their performance (77%) and either no effect (60%) on their mood or made it a little worse (30%).

With regards to preference of music genre, the most commonly reported music played in the OT was Easy Listening (46%) followed by Top 40/Billboard Hits (37%) and Pop (34%). This correlated with respondents' most preferred genres also being Easy Listening (32%), Top 40/Billboard Hits (26%) and Pop and Classical (25%). Of note, 19% of respondents preferred Jazz, but only 11% reported that it was commonly played. Eighty per cent of respondents preferred familiar music, with 31% reporting that the choice of music depends on the type of operation they are performing. Fifty-seven per cent preferred the background music to be easily audible, and 31% preferred it to be played quietly.

If music was playing, 70% would turn the music down or off during a crisis, 44% during induction/intubation, 37% at critical steps, and 9% during closing.

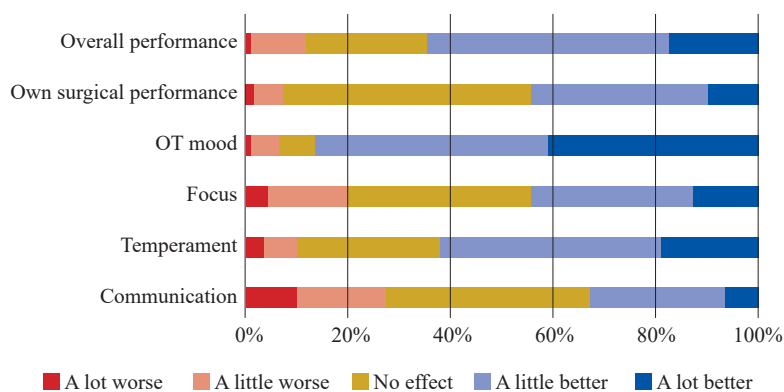


Figure 1: Perceptions of the effect of music on elements of the OT environment

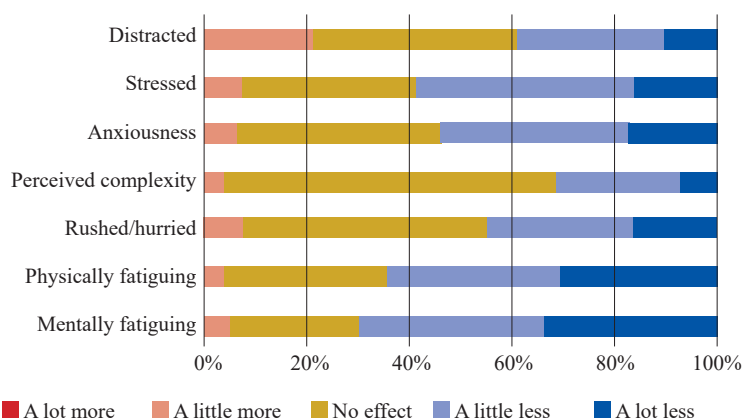


Figure 2: Perceptions of the effect of music on dimensions of the SURG-TLX

The effect of music

Overwhelmingly, respondents reported that they felt background music in the OT improved temperament, focus, mood in the OT, their own and overall team performance (Figure 1). The most controversial effect was on communication, with 27% reporting communication was worsened with music, and 33% reported improvement. The majority also reported feeling moderately or much calmer (60%), relaxed (58%) and content (56%) with music of their own choosing. On the contrary, music also made a few respondents feel moderately or very tense (5%), upset (4%) and worried (8%). With regards to the parameters of the SURG-TLX, overall, the majority of respondents reported that music improved the mental and physical fatigue of an operation, and their stress or anxiety during the operation. The majority felt it had no effect on how complex an operation was perceived. Interestingly, 21% reported feeling a little more distracted with music, though 39% felt a little or a lot less distracted (Figure 2).

statistically significant difference was found for gender or level of training.

Discussion

Music has traditionally been a part of the culture of OTs and the people who work in them.²⁰ This paper represents the first investigation on preferences and perceptions of music in the Southern African region, and one of the largest cohorts of surveys in this topic on surgeons and surgical residents alone.¹² In this study, in line with international experiences, music was commonly played,¹⁻³ and found to be widely viewed as a positive and enjoyable aspect of the OT environment.^{3,12,13} Worldwide survey-based studies have found that music improves concentration,^{15,17} promoted feeling calm or less stressed,^{1,3,14} and improved general mood³ in the OT, similar to the findings in this study.

Our respondents largely felt that music improved their own surgical performance. There are few and small objective studies that have shown music to improve the performance

Surgeons responded that music they disliked was played “sometimes” (42%) and rarely (41%), and while 60% said this had no effect on their mood, 34% reported this made their mood a little or a lot worse.

While the majority of respondents (82%) either never or rarely asked an awake patient what kind of music they liked played, 70% felt that music could reduce a patient’s anxiety levels.

Demographic comparators

A binomial logistic regression was performed to ascertain the effect of gender, age, level of training and the frequency music is listened to in their spare time on the likelihood that a respondent enjoyed music in the OT and felt that music improved (a little or a lot) elements of the OT environment (compared to negative or neutral responses). Respondents who listened to music in their spare time ($p < 0.001$) and younger respondents ($p = 0.035$) were more likely to report enjoying music in the OT. The more frequently a respondent listened to music in their spare time, the more likely they were to believe that music had a positive effect on temperament, focus, mood, their own and the team’s performance ($p < 0.05$). Younger respondents were more likely to believe that music improved the mood in the OT ($p = 0.043$) but was not statistically significant for other elements (Table II). No

Table II: Logistic regression for demographic factors vs whether or not music improves mood in the OT

	B	SE	Wald	df	Sig.	Exp(B)	95% CI for EXP(B)	
							Lower	Upper
Step 1 ^a								
Gender	0.592	1.164	0.259	1	0.611	1.808	0.185	17.706
Age range	-0.908	0.449	4.093	1	0.043	0.403	0.167	0.972
Level of training	0.228	0.455	0.251	1	0.617	1.256	0.515	3.062
Music in spare time	1.396	0.401	12.118	1	<0.001	4.039	1.841	8.865
Constant	-1.656	2.367	0.489	1	0.484	0.191		

a – variables entered on step 1: gender, age range, level of training, music in spare time

of non-surgical tasks,^{21,22} reasoning tasks, the quality of speed and of skin repair,²³ laparoscopic task completion and movement efficiency,²⁴ and simulated performance on a Da Vinci surgical robot.²⁵ Others have even shown a reduction in physiological parameters²¹ and mental workload with these tasks.^{24,26}

A recent systematic review of the effect of music on surgical performance concluded that the overall positive effect of music in increasing speed and accuracy could override the negative effect,⁴ and another suggested that beneficial effects of music in surgical simulations have been observed, however did not have sufficient evidence to meet a definitive conclusion.

There are conflicting reports on whether intraoperative music is distracting. Music was not thought to be overall a distraction,^{14,17} however in times of crisis or critical situations, opinions differed.^{1-3,13} In this study's cohort, while there were polarised opinions on whether music was a distractor, a majority would turn the music down during a crisis, and just under half during induction of anaesthesia. In one study of urologists, authors found a median of 20 distractions per procedure – although in these cases, equipment problems and irrelevant communication were the main sources, and music was not considered distracting, but rather stress-relieving.²⁷

In the literature, perceptions on the effect of music on communication are divided. In the present study, 27% of respondents felt music made communication worse and 33% felt it was improved. This is a similar finding to two studies that sampled the wider theatre team. A New Zealand study found that 30% of respondents felt music worsened communication,³ and an Indian study found that 28% of respondents felt music restricted their communication with other staff members.¹⁵ Recent studies have found, that when music is played, there is a reduction in the correct rate of auditory speech perception in a simulated setting,¹⁸ and an increase in repeated request rate.¹⁹ In contrast, in a study of anaesthetists, Ullman et al. found 63% reported a positive influence on communication.¹ In a recent systematic review, music was regarded to either not affect communication or positively influence it by approximately 60% of 911 respondents.¹²

Easy Listening, Pop and Top 40/Billboard Hits, were the preferred and commonly played genres, perhaps due to the accessibility and familiarity by the majority of staff, a finding reproduced in other studies.^{3,17} In a previous study, we identified a discrepancy between respondents who preferred listening to jazz and the number who reported that it was commonly played (20% vs 3%).³ In this study, we similarly found a “jazz gap” (19% vs 11%). The type of music that is most beneficial is unclear. Some authors propose that the most favourable music to play is familiar music,^{21,23,28} at a low to medium volume.⁴ One study showed a significant effect of improved time to completion with hip-hop,²⁵ however another suggested that music participants found pleasant was better than unpleasant music or silence.²⁹

Study limitations

There are several limitations to this review. In the present study, the response rate was low (5.3%), lower than similar studies.^{1,3} A low response rate may give rise to non-response bias in that we theorise that subjects who were sent the study link but did not take part in it, may be less interested in

the topic, have less strong views or feel less favourably to music, when compared to responders. This could potentially overestimate the perceived positive effect of music found in this study.³⁰ This was a survey of a subset of surgeons in one region of the world, and while similarities were found with international studies, it should be recognised that regional and cultural differences will be present. A significant proportion of general surgical specialists was sampled in this study, so these results do not necessarily represent the practice in other disciplines, such as cardiothoracic or neurosurgery where operations may be of a different nature and length. Secondly, other studies have included anaesthetists, nurses and allied staff, whereas in this paper, the study population was limited to only surgeons and surgical registrars to give a more focused perspective and therefore the views collected here may not represent other theatre staff subgroups. As this was an observational survey-based study, the perspectives and perceptions captured in this data are all subjective. This data should be used to guide future research focused on quality objective outcome measures. Finally, the safety aspect around playing music in the OT during a procedure was not studied. Loud music and noise in the OT can interfere with team communication and result in a potential safety hazard.³¹ Decisions around whether music is played and around the choice of music and its volume are determined largely by surgeons. Discussions between clinicians, managers, patients and governing bodies should be encouraged for the development of recommendations and guidance in respect of playing music in the OT.

Conclusion

Music is used widely and is viewed by this cohort of surgeons as improving a number of elements both within the OT environment, such as mood and team performance, and for the surgeon using the SURG-TLX as a framework. Enjoying music outside the OT is a predictive factor for enjoying music inside the OT (and perceiving its use positively). However, concerns regarding the effect on distractedness and communication remain. Further objective and experimental data in this context would be useful for confirming the effect of music on task performance, the surgeon's experience of stress, and for interrogating the effect on communication and distractedness. Qualitative research may also be useful in understanding individuals' rationale and belief systems that lead to music use in this setting.

Conflict of interest

The authors declare no conflict of interest.

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Ethical approval

Ethical approval for this study was granted by the UHERB Ethics Review Board (Reference: UHERB 009/2021).

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Broad responses and attitudes to having music in surgery (the BRAHMS study) – a South African perspective

Survey on the effect of music on the operating surgeon

Primary investigator: Anantha Narayanan

All responses are kept anonymous and confidential.

Section 1: Prevalence of music in the OT

1. Music is played in the operating theatres while I'm operating.

Never	Rarely	Sometimes	Often	Always
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2. I **ENJOY** having background music playing while I'm operating.

Not at all, I do not enjoy having any background music playing.	Somewhat	Moderately so	Very much so
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3. In the operating theatre(s) that you work in – who **MOST OFTEN CHOOSES** what music is played?

Consultant surgeon	Senior registrar surgeon	Junior registrar surgeon	Anaesthetist
Theatre nurses	Anaesthetic technician	Patient	No music is played in the OT

4. In the operating theatre(s) that you work, who do you think **SHOULD CHOOSE** what music is played?

Consultant surgeon	Senior registrar surgeon	Junior registrar surgeon	Anaesthetist
Theatre nurses	Anaesthetic technician	Patient	No music is played in the OT

5. If music is on while you are operating, what is the **MOST COMMONLY** played music genre (can tick multiple)?

- | | |
|---|---|
| <input type="checkbox"/> Classical | <input type="checkbox"/> Pop |
| <input type="checkbox"/> Top/Billboard Hits | <input type="checkbox"/> Easy Listening |
| <input type="checkbox"/> Jazz | <input type="checkbox"/> No preference |
| <input type="checkbox"/> Rock | <input type="checkbox"/> Other: _____ |
| <input type="checkbox"/> Hip-hop/Rap/RnB | <input type="checkbox"/> Music is never played in the operating theatre |
| <input type="checkbox"/> Folk | |

6. If music is on while operating, what is your **PREFERRED** music genre (can tick multiple)?

- | | |
|---|---|
| <input type="checkbox"/> Classical | <input type="checkbox"/> Pop |
| <input type="checkbox"/> Top/Billboard Hits | <input type="checkbox"/> Easy Listening |
| <input type="checkbox"/> Jazz | <input type="checkbox"/> No preference |
| <input type="checkbox"/> Rock | <input type="checkbox"/> Other: _____ |
| <input type="checkbox"/> Hip-hop/Rap/RnB | <input type="checkbox"/> I don't like music of any kind |
| <input type="checkbox"/> Folk | |

7. Do you feel, in general, that the rest of the OT team finds your musical taste **ACCEPTABLE**?

Not at all adaptive	Slightly adaptive	Moderately adaptive	Very adaptive	Extremely adaptive
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8. What is the **MOST COMMON** way that music is played in the operating theatres in which you work?

Spotify	Apple Music	Other streaming service	CDs
Mp3 player	Radio	Cassette tapes	Vinyl
Other	I don't know how music is played		

9. At what volume would you prefer music to be played in the OT?

Barely audible	Quietly	Easily audible	Loudly	Very loudly
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Section 2: Music's effect on the operating environment (Please circle your answers)

10. Do you think background music makes an operation feel easier?

Not at all	Somewhat	Moderately so	Very much so
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In general terms, do you think background music playing during an operation affects:

11. Your communication with other staff in theatre?

Yes, it is improved	Yes, it is worse	No, It has no effect
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12. Your vigilance?

Yes, it is improved	Yes, it is worse	No, It has no effect
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13. Your temperament?

Yes, it is improved	Yes, it is worse	No, It has no effect
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14. Your focus?

Yes, it is improved	Yes, it is worse	No, It has no effect
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15. Your surgical performance?

Yes, it is improved	Yes, it is worse	No, It has no effect
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16. The mood in the operating theatre?

Yes, it is improved	Yes, it is worse	No, It has no effect
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17. The operating theatre's team overall performance?

Yes, it is improved	Yes, it is worse	No, It has no effect
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Section 3: Unfamiliar music/music turned off

“If music is playing in the operating theatre I would ask for it to be turned down or off during...”

18. Induction of anaesthesia.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
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19. Critical steps of the operation.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
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20. Opening.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
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21. Closing.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
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22. A crisis.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
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23. Do you prefer music that is **familiar** or **unfamiliar** to you playing in the operating room?

Familiar music	Unfamiliar music	It makes no difference
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24. How often is music that you **DISLIKE** played in the operating theatre while you are operating?

Never	Rarely	Sometimes	Often	Always
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25. In general terms, do you think having background music **YOU DISLIKE** playing during an operation affects you?

Yes, it is negative effect	Yes, it is positive effect	No, It has no effect
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Section 4: Music’s effect on SURGEON anxiety and stress

Please answer the following questions with the stem:

“When I am operating, having background music (of your own choosing) playing makes me feel...”

26. **Calm.**

Not at all	Somewhat	Moderately so	Very much so
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27. **Relaxed.**

Not at all	Somewhat	Moderately so	Very much so
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28. **Content.**

Not at all	Somewhat	Moderately so	Very much so
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29. **Tense.**

Not at all	Somewhat	Moderately so	Very much so
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30. **Upset.**

Not at all	Somewhat	Moderately so	Very much so
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31. **Worried.**

Not at all	Somewhat	Moderately so	Very much so
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Please answer the following questions with the stem:

“When I am operating, having music (of your own choosing) playing in the background affects...”

32. **How mentally fatiguing a procedure is.**

A lot less fatiguing	A little less fatiguing	No effect	A little more fatiguing	A lot more fatiguing
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33. **How physically fatiguing a procedure is.**

A lot less fatiguing	A little less fatiguing	No effect	A little more fatiguing	A lot more fatiguing
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34. **How hurried or rushed a procedure is.**

A lot less rushed	A little less rushed	No effect	A little more rushed	A lot more rushed
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35. **How complex I perceive a procedure.**

A lot less complex	A little less complex	No effect	A little more complex	A lot more complex
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36. **How anxious I feel during the procedure.**

A lot less anxious	A little less anxious	No effect	A little more anxious	A lot more anxious
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37. **How stressed I feel during the procedure.**

A lot less stressed	A little less stressed	No effect	A little more stressed	A lot more stressed
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38. **How distracting the operating environment is.**

A lot less distracting	A little less distracting	No effect	A little more distracting	A lot more distracting
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Section 5: Music effect on the patient

39. **Do you think having music in the operating theatre affects a patient's anxiety? (pre/post anaesthetic or for non GA cases)**

A lot less anxious	A little less anxious	No effect	A little more anxious	A lot more anxious
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40. **How often would you (or the theatre team) ask the patient what kind of music they would like played?**

Never	Rarely	Sometimes	Often	Always
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Section 6: Demographics

41. In which country do you practice surgery?

42. How old are you?

43. What level of training are you?

Junior registrar-resident / Senior registrar-resident / Consultant-attending

44. Gender

Male / Female / Other

45. What surgical speciality do you work in?

46. Public or private?

47. How often do you listen to music in your free time?

48. Do you play a musical instrument/are you a musician? If so – which?

49. Do you have a hearing impairment?

Section 4

50. Would you be interested in receiving a copy of the study findings/publication?

Yes	No
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If yes, please write your email address here: