



## Research Paper

# Broad Responses and Attitudes to Having Music in Surgery (The BRAHMS Study): An Australia and Aotearoa New Zealand Perspective

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## ABSTRACT

**Background:** Surgery is a stressful exercise, and the experience of occupational stress may have impacts on surgical performance, and surgeon well-being. Music is played in operating theatres (OTs) throughout the world, and while it may improve surgical performance, and reduce clinician stress within the OT, concerns exist over its distracting and noise-creating properties.

**Methods:** In this prospective observational study, between May to August 2022, Vascular, General and Paediatric surgeons and registrars in Australia and Aotearoa New Zealand (AoNZ) responded to a survey investigating the way they use music, and their perceptions and attitudes towards its effect on the OT environment. Binomial logistic regression and Chi squared tests of association were performed, accepting  $p < 0.05$  as significant.

**Results:** In this cohort of 120 surgeons, 45 % were vascular specialists, 30 % were female and 59 % were consultant surgeons. The most commonly preferred music genres were easy listening and pop. Over 75 % of surgeons enjoyed having music in their OTs with the majority reporting it improved their temperament, how mentally fatiguing a procedure felt and how anxious or stressed they felt. Vascular surgeons were more likely to believe music had a positive influence on communication than their general and paediatric surgery colleagues ( $p < 0.01$ ). Registrars had significantly higher odds of believing music had a positive effect on their temperament, and how stressed and anxious they felt when operating, when compared to consultants ( $p < 0.05$ ).

**Conclusions:** This study provides a window into the surgeons' use of and attitudes towards intra-operative background music and its effect on stress and cognitive load in Australia and AoNZ. While overall, music is viewed positively by this cohort, there was some difference seen across specialties and level of experience. Further subjective and objective data in this field may provide useful information to guide hospital policy and inform pathways for clinician wellbeing.

## Introduction

The feeling of stress in the operating theatre (OT), is an experience that is common amongst all surgeons [1]. Surgery warrants expert execution of both technical and non-technical skills (such as communication, teamwork and rapid decision making) under pressure. In the

vascular subspecialty, levels of psychiatric morbidity, burnout and work dissatisfaction are worryingly high, compounded further by COVID-19 related stressors [2,3]. Finding meaningful ways to mitigate workplace stress and improve occupational ergonomics is thus imperative to maintaining service quality and patient satisfaction. Music is one way in which surgeons can alter their operating environment, it is therefore not

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surprising to find that it is played in 67–98 % of operating theatres throughout the world [4–7]. While it is clear that excess noise is deleterious to the surgical team [8–13], many clinicians found music to be a generally favourable part of the theatre environment [4,14–16], with music being seen as improving calmness [6], stress [17,18], mood, and surgeons' and overall team performance [4,5,16]. There is little objective evidence to demonstrate an effect of music on surgeon stress, and only few heterogeneous studies on health professionals' perceptions [16]. The Surgical Task-load Index (SURG-TLX) has been developed from a similar National Aeronautics and Space Administration Task-load Index (NASA-TLX) to measure workload and stressors in surgeons [19]. It is a multi-dimensional self-rating scale assessing: mental demands, physical demands, temporal demands, task complexity, situational stress/anxiety, and distractedness, and has been validated against a number of surgical stressors [19,20].

This study aimed to compare cross-specialty surgeons' perceptions towards the effect of background music on their own experience of stress and mental workload in the Australasian setting, using the SURG-TLX as a framework.

## Materials and methods

### Clinical settings

This study was conducted in Australia and Aotearoa New Zealand (AoNZ) between May and August 2022. Ethics was determined to be out of scope by the Health and Disability Ethics Committee (Ref: 2022 OOS 12965).

### The study

All Vascular Surgeons and Vascular Trainees affiliated with the Australia and New Zealand Society of Vascular Surgery (ANZSVS) and General and Paediatric Surgeons and Registrars at two New Zealand Tertiary metropolitan centres were invited to participate via relevant emailing lists. Consenting participants were asked to complete an online or paper, anonymous 5-min questionnaire. All entries were non-incentivised. The questionnaire collected data on demographics, music preferences and perceptions of music on aspects of the theatre environment. The Surgical Task-load Index (SURG-TLX) was used as a framework to assess parameters of operative stress [19]. Using Likert scales, data was collected on participants' perceptions of the effect of music on their intra-operative feelings, distractedness, anxiousness, feelings of stress, perceived complexity, feeling rushed, mental fatigue and physical fatigue (SURG-TLX). Summary statistics were calculated for all outcomes of interest. The two tailed *t*-test was used for parametric data, and the Mann-Whitney-*U* test was used for non-parametric data. Pearson Chi-Square test was used to compare binomial variables. Missing data was handled using pair-wise deletion. Analyses were performed using SPSS and  $p < 0.05$  was considered statistically significant.

## Results

### Demographics

There were 120 vascular, general and paediatric surgeons and registrars/residents who responded in total (30 % response rate). Amongst those respondents, 45 % were vascular surgeons, 11 % were paediatric surgeons, 30 % were female and 59 % were consultant surgeons/attendings (Table 1). There were 4 surveys returned with partially missing data (3 %).

### The effect of music

Amongst the respondents, 76 % reported enjoying music within their OTs whereas 12 % did not enjoy music. Overall, the most commonly

**Table 1**  
Respondent demographics.

		n	%
Gender	Male	84	70.0 %
	Female	36	30.0 %
Level of Training	Registrar	49	40.8 %
	Consultant	71	59.2 %
Surgical Specialty	General or Paediatric Surgery	53	44.1 %
	Paediatric	13	10.8 %
	Vascular Surgery	54	45.0 %
Country of Practice	New Zealand	75	62.5 %
	Australia	45	37.5 %

preferred genres were Easy Listening (49 %), Pop (48 %), Rock (29 %) and Classical music (22 %) (Supplementary Table 1).

Overwhelmingly, respondents reported that music improved their temperament (68 %) and how stressed they felt (59 %). Half of respondents (51 %) reported music had no effect on focus, 33 % felt that it was improved. Opinions on communication were divided, in that 50 % of respondents felt that music had no effect, 25 % felt that it was improved and 25 % felt it was worsened (Fig. 1).

A majority of respondents felt that music reduced how mentally fatiguing a procedure felt (67 %), and how anxious they felt during a procedure (56 %), though most felt it had no influence on how physically fatiguing, hurried or rushed, or how complex the procedure was perceived. Interestingly, 30 % of respondents thought music made the OT environment less distracting, and 27 % felt it was more distracting (Fig. 2).

### Demographic comparators

Vascular surgeons had a 2.5 higher odds than general and paediatric surgeons to believe that music improved communication rather than have a negative or neutral effect ( $p = 0.006$ ). When comparing views of music's effect on the SURG-TLX, there was no other statistically significant difference between the two specialty groups. A binomial logistic regression was performed to ascertain the effects of gender and level of training on a positive perception of the effect of music on dimensions of the SURG-TLX. Registrars had significantly higher odds to think that music improves their temperament (2.79 (1.14–6.84)  $p = 0.025$ ), how stressed they felt (2.48 (1.09–5.62)  $p = 0.029$ ), and how anxious they felt (2.96 (1.30–6.71)  $p = 0.009$ ) when compared to consultants. There was no gender difference in perspectives.

## Discussion

This paper represents one of the largest cohorts of surgeons and surgical residents surveyed on the topic of intra-operative music [5,16]. In this study, in line with international experiences, it was demonstrated that music was commonly played [4,6,7], and found to be widely viewed as enjoyable in the OT environment. There was a perceived positive effect on elements of the SURG-TLX such as mental fatigue and anxiety [4,14,15]. Across specialties, there were many similar perspectives towards OT music, however vascular surgeons appeared to view music's effect on communication more favourably. Interestingly, junior staff were more likely to think music had an anxiolytic and mood-adjusting effect.

Worldwide survey based studies have found OT practitioners generally report that music improves concentration [18,21], promoted feeling calm or less stressed [4,6,17] and improved general mood [4], similar to the findings in this study.

There are conflicting reports on whether intra-operative music is distracting. Music was not thought to be overall a distraction [17,21], however in times of crisis or critical situations, opinions differed [4,6,7,14]. In previous studies, while there were polarized opinions on whether music was a distractor, a vast majority would turn the music

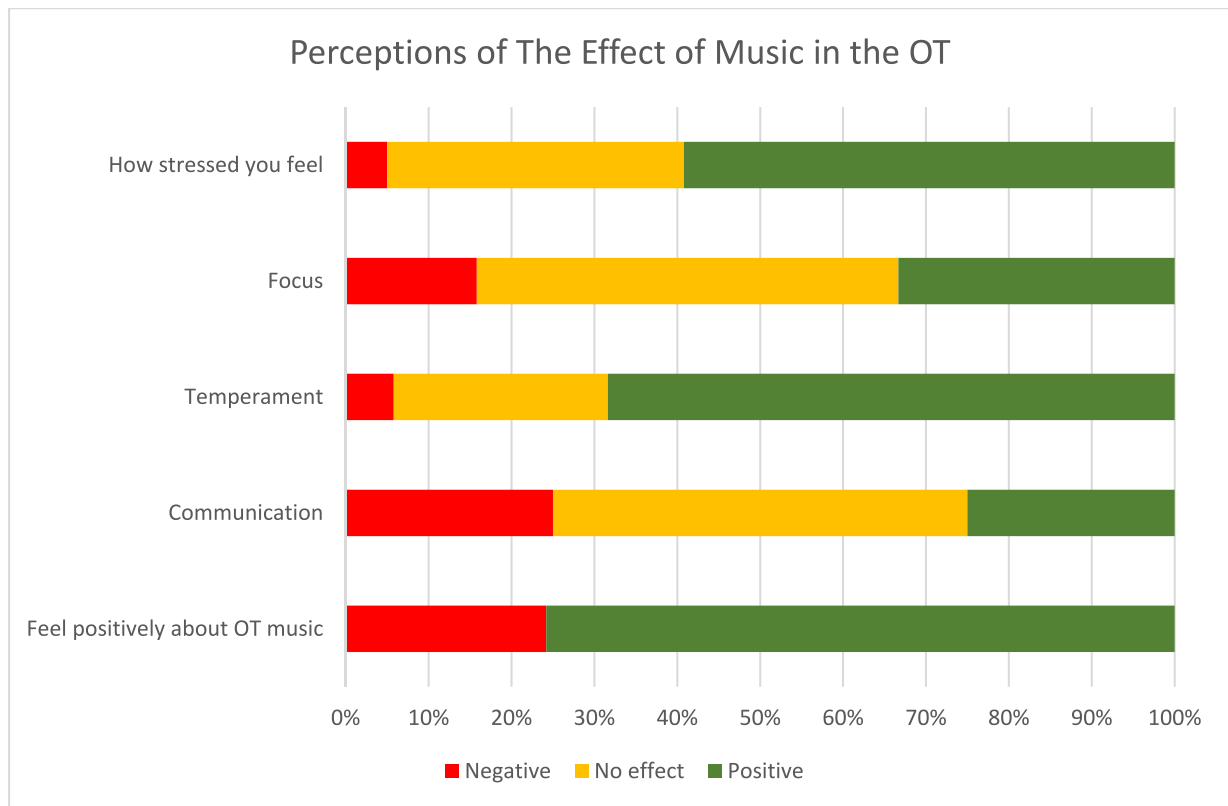


Fig. 1. Respondents' perceptions of the effect of music on elements in the operating theatre (OT).

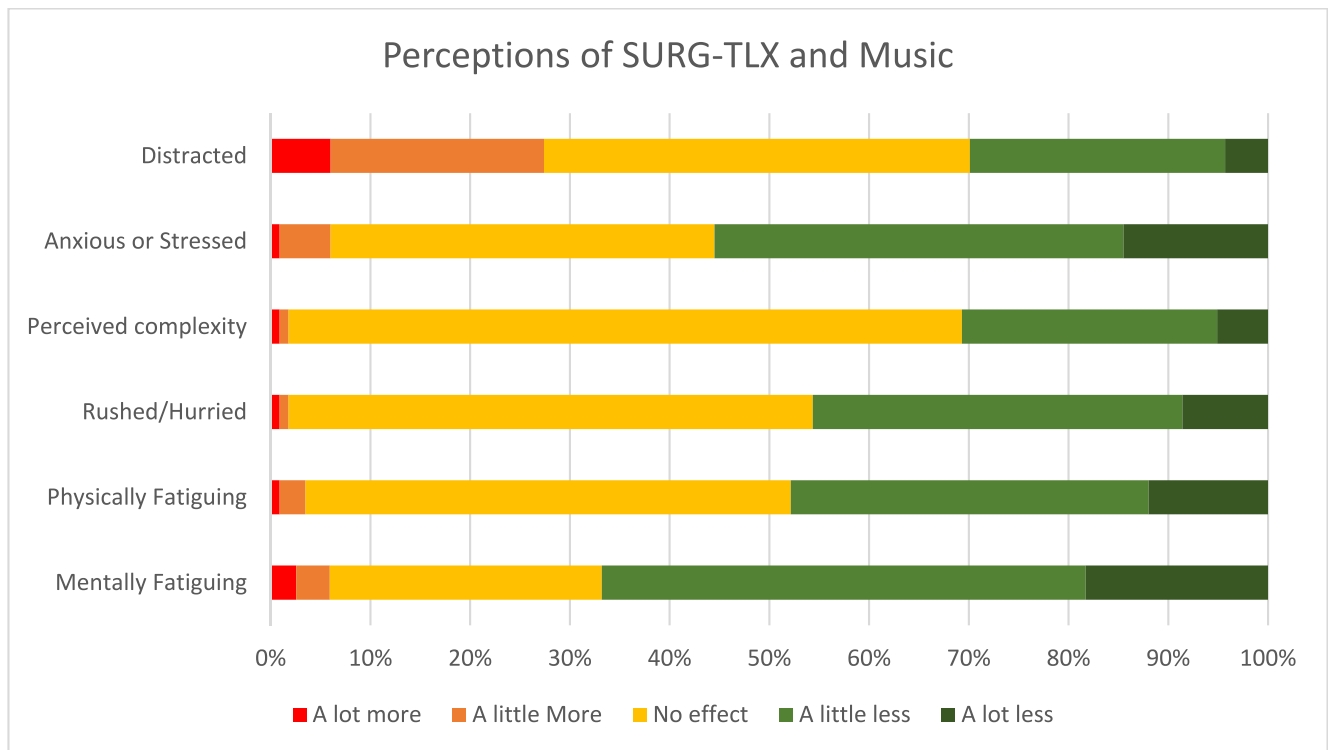


Fig. 2. Respondents perceptions of the effect of music on Surgical Task-load Index (SURG-TLX) parameters.

down during a crisis, and many during critical steps or induction of anaesthesia [4,5]. In one study assessing 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, rather stress-relieving [22]. The perceived effect of music on communication also

holds contention in the literature. In a recent systematic review, communication was regarded to be either unaffected or positively influenced by music by approximately 60 % of 911 respondents [15]. However, other studies have found, when music is played, a reduction in the correct rate of auditory speech perception (in a simulated setting) [23], and an increase in repeated request rate [24]. In the present study, the difference in perception of music towards communication between specialties may warrant further and broader investigation as a difference in specialty culture, the nature of the specialties procedures (ie endovascular), or in the way teams function in these environments.

Easy listening and pop, came out strongly as both preferred and commonly played genres, perhaps due to the accessibility and familiarity to the greatest majority of staff, a finding reproduced in other studies [4,21]. 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 %), though in this study, we did not find a “Jazz Gap” (9 % vs 9 %). The type of music that is most beneficial is unclear. Some authors propose that the most favourable music to play is familiar music [25–27], at a low to medium volume [28]. One study showed a significant improved effect on time to task completion with hip-hop [29], however another suggested that music that participants found pleasant music was better than either unpleasant music or silence [30]. The effect of music on surgeons appears to be individualised. Whilst the majority of respondents in this study, and other studies have reported a positive influence, there are a notable minority who find music to be distracting [4–6,16]. A formalised approach to music in the OT should consider these differences in opinions between staff. Open discussion prior to a theatre list, or as part of the start-of list briefing, may be useful in clarifying the way in which music is used during the day. This may have the added benefit of anticipating inter-staff conflict. Similarly, given the frequent and ubiquitous use of music globally – an integrated music system and ready access to streaming services may be considered a fundamental aspect of theatre suite design, and may promote the democratization of music selection.

Burnout has been found to be common amongst surgeons with nearly 40 % meeting criteria in a one American survey. Choosing the vascular subspecialty was an independent risk factor [31]. Burnout in vascular surgery trainees is associated with higher levels of depression and perceived stress [32]. It is well documented that music is beneficial for patients, in that it can reduce peri-operative anxiety and pain [33–35], however the short- and long-term effects on the surgeon's and their team's wellbeing is not well known. In the field of music therapy, music is increasingly being used in mental healthcare and medical settings with data to suggest a medium-to-strong beneficial effect on stress related outcomes [36]. Surgeon well-being is complex and multifaceted, and there is a crucial need to develop and implement effective interventions to improve personal and professional components of surgeon wellness and maintain a sustainable workforce [37]. While many factors may influence professional wellness (such as personal satisfaction, relationships, ambitions, hobbies, work-life balance, drug and alcohol use and mental health), music in the occupational space may have a small role to play in this large complex puzzle.

There are several limitations to this review. The response rate of 30 % was low, and a responder bias may skew the results towards favourable responses. This was a survey of three sub-specialties 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. Secondly, other studies have included anaesthetists, nurses and allied staff, however in this paper, the study population was limited to only surgeons and specialty trainees to provide a focused perspective on the experience of this subgroup of theatre staff. The authors recognize that the subjective perspectives collected here, may not represent other subgroups of theatre staff. Finally, music may be used for the benefit of surgical patients, though the patient experience has not been explored in this study, as it was aimed towards the use during general anaesthesia cases.

The findings in this study demonstrate a positive perception of music on a surgeon's experience of intra-operative stress. Further studies with an interventional design utilising physiological and psychological outcome measures may be useful in quantifying an effect in this environment. Qualitative or mixed-method studies may also prove useful in better understanding why surgeons choose to have or not have music, how they make their choices, and how conflict is managed in this setting.

## Conclusion

Music is used widely and is viewed by this cross-discipline cohort of surgeons as improving elements within the OT environment such as mood, team performance, and surgeon task-load, using the SURG-TLX as a framework. However, concerns regarding the effect on communication remain. While there was similarity between specialties with regard to perceptions of music, there vascular specialists were more likely to believe it improved communication. Junior staff were more likely to consider a beneficial effect of OT music. 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.

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## Ethical approval

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## CRediT authorship contribution statement

**Anantha Narayanan:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. **Maheshwar Naidoo:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Resources, Software, Validation, Writing – original draft, Writing – review & editing. **Victor Kong:** Conceptualization, Data curation, Investigation, Methodology, Resources, Supervision, Validation, Writing – review & editing. **Lydia Pearson:** Conceptualization, Data curation, Investigation, Methodology, Writing – review & editing. **Kevin Mani:** Conceptualization, Methodology, Supervision, Validation, Writing – review & editing. **James P. Fisher:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. **Manar Khashram:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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