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Exploring the Therapeutic Potential of Music in Alleviating Stress Among Ambulance Service Professionals and Patients in Pre-Hospital Emergency Settings

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ABSTRACT

Currently, there is little research into the use of music in alleviating stress in ambulance service professionals and patients, despite stress being a major problem within pre-hospital emergency settings. Therefore, this study aimed to investigate the therapeutic potential of music to aid in this area and explore the genres of music that may be best suited to this. In order to do this, UK ambulance staff (n=65) completed a survey about their experience of using music to reduce their stress and that of their patients. Both quantitative and qualitative data were collected, and it was found that the majority of participants found music helpful in alleviating their stress and believed the same for their patients, with pop music being the most common genre to use for both. It is therefore concluded that music does have therapeutic potential to alleviate stress and could be implemented in the pre-hospital setting.

1. INTRODUCTION

Working in the ambulance is a notoriously stressful job due to regularly working with vulnerable people in time-critical situations. One study found that paramedics have an alarmingly high work-stress burnout in comparison to other professions (Grigsby & Knew, 1988). Additionally, it is stressful for the patient too, as they are likely in serious medical need. However, limited research exists as to how this stress can be reduced, particularly for ambulance staff. Music has often been a tool for stress reduction in other areas of society and has proven to be effective (Knight & Rickard, 2001), thus suggesting that one may wish to apply it to this population.

Music therapy can be defined as the professional use of music to optimize a person's quality of life and improve their wellbeing (World Federation of Music Therapy, 2011), with current evidence suggesting individuals with extreme cases of stress, such as trauma exposure or post-traumatic stress disorder (PTSD), may benefit from music therapy (Landis-Shack et al., 2017). Stress can be defined as a response to internal or external stressors and can be physiological or psychological (American Psychology Association, 2018). However, due to the logistical limitations of carrying out active music therapy for stress on the ambulance in pre-hospital emergency settings, this study will investigate the therapeutic potential of music instead.

It is understandable that working in the ambulance is a stressful job as being a paramedic has been ranked the most dangerous job in the UK, with an average of 2,993 attacks on staff by patients every year (Fennell, 2022). However, it must be noted that this study considered other factors outside of mental health and stress, such as death rates and extra insurance, making it harder to assume a correlation between danger and stress alone. Nevertheless, there has been an 186% increase since 2011 in paramedics taking time off work for mental health conditions (ibid.). Despite working similar hours, US paramedics were given a lower danger score of 12.61, compared to 19.31 in the UK, placing paramedics at only the 9th most dangerous job in the US. The study does not explain why this difference exists, but there may be multiple factors at play, including American healthcare being privatised.

Another study found that 100% of their participants, which were 86 paramedics, reported having been exposed to at least one of the listed critical incidents in the study during their career which included the death of a colleague, injury whilst on duty, mass casualties, and the death of a child (Regehr et al., 2002). 82% of paramedics reported feeling overwhelmed or deeply disturbed by incidents they had seen whilst working and the rate of psychiatric medication intake tripled after exposure to these traumatic events (ibid.). However, the list of factors outlined by this study may be too limiting as there may be other areas that contribute to a paramedic's stress. They did somewhat combat this limitation, on the other hand, by collecting qualitative data through interviews with 18 participants. These results are also supported by The Ambulance Staff Charity (TASC) which found a 152% increase in times they were contacted by ambulance service professionals seeking support (TASC, 2022). Sessions for staff experiencing suicidal thoughts also increased between 2022 and 2023 by 274 sessions, demonstrating a significant issue within this demographic (TASC, 2023).

It has also been found that PTSD is common amongst paramedics, with one study finding that in the UK, 21% of paramedics met the DSM-III criteria for PTSD (Clohessy & Ehlers, 1999). In the US, similar reports found that 20% of paramedics and 22% of paramedic students suffer from trauma (Grevin, 1996). However, Clohessy

and Ehlers (1999) only looked at one ambulance service within the UK, making the results harder to generalise and both these studies are fairly outdated, so figures are likely to have changed. In fact, a systematic review and meta-analysis of this very issue actually estimated prevalence rates of 11% for PTSD in ambulance personnel, however, they also found rates of 15% for depression, 15% for anxiety, and 27% for general psychological distress, demonstrating a much higher prevalence than the general population.

Many of the aforementioned studies have looked exclusively at stressors in relation to paramedics. However, there are multiple jobs that are held within the ambulance service, such as technicians and emergency care support workers (ESCWs), that do similar work to paramedics that have not been considered in the current literature. Therefore, this study shall investigate ambulance staff in general. It will also explore stress in patients, as research has found that ambulance transportation can cause or increase a patient's stress significantly, due to separation from family, lack of patient control in decision-making, and factors of uncertainty, such as an unfamiliar hospital, city or length of transport (Brown et al., 1998 cited Myers, 2013).

This stress can also cause physical symptoms in patients, such as an increased heart rate, blood pressure and plasma levels of stress hormones, including adrenaline, noradrenaline, cortisol and prolactin (Weber et al., 2009). This can therefore make the patients' condition worse as prolonged exposure to noise within the ambulance can trigger a negative response in the sympathetic nervous system which can be particularly concerning for those with a cardiac condition due to the increased burden on their cardiovascular system (Byers and Smyth, 1997 cited Myers, 2013).

Limited literature exists on how music has the potential to combat this, yet one study did find that playing music in the ambulance increased comfort and relaxation in patients (Stuhlmiller et al., 2009). Unfortunately, they didn't find a statistically significant change in vital signs, making it harder to determine whether music can tackle some of the aforementioned physical symptoms. However, they reported that this was due to too small a sample size (102 patients), so perhaps there is still potential for music to help in this area.

It is from the literature review that four research questions were devised: how can music be used to reduce stress in ambulance staff following traumatic cases? How can music be used to reduce stress in patients in the pre-hospital setting? What genre of music do paramedics use to reduce their stress? What genre of music would help reduce stress in patients using the ambulance service? These questions shall be answered through conducting an online survey amongst ambulance staff asking about their experience of using music to reduce theirs and their patients' stress. It is hypothesized that music can be an effective tool for reducing stress in both groups and that the most familiar or preferred genres amongst the participants are more likely to be selected to combat this stress.

2. METHODOLOGY

Design. The participants in this study answered all of the questions within the survey, answering on behalf of themselves and the patients that they work with. The questions are a combination of selection questions, Likert-scale questions and open-ended questions. Therefore, both qualitative and quantitative data are collected and subsequently analysed.

Participants. All participants were staff who work within the ambulance service. This can include students, NHS staff, or those who work in private ambulance companies, including patient transport. This study did exclude those who work in the ambulance service but not on the vehicle itself or in the pre-hospital setting, such as call handlers. They were required to have had face-to-face interaction with patients.

A total of 56 different groups were contacted which were a combination of NHS services, UK university paramedic societies and private ambulance companies (see *Figure 1*) who were asked to pass on the survey to the relevant participants. These groups were spread across the UK, allowing for a representative sample. Subsequently, 147 eligible participants responded to the survey, however, only 65 were fully complete and therefore included in the study. The remaining 82 were discarded. Of these 65, there were 34 female and 31 male participants with an average age of 28.31 years (SD: 12.24), ranging from 18 years of age to 66.

The majority of the participants were student paramedics (56.92%) followed by Ambulance Care Assistants (18.46%) (see *Figure 2*). Whilst the ambulance staff came from across the UK, much of the private ambulance staff were based in the North East of England. Nevertheless, only 19 participants were from private ambulance companies, compared to 46 from the NHS. The high number of NHS participants was due to the large number of university students who participated in the study whom complete their training placements within NHS services. As the majority of patients interact with the NHS more than private ambulance companies, this makes the results from the sample more applicable and representative. The service with the most participants was the South East Coast Ambulance Service (18.46%), closely followed by the Scottish Ambulance Service (16.92%) (see *Figure 3*). The average experience amongst participants was 3.73 years (SD: 4.80), ranging from 1 month to 26 years.

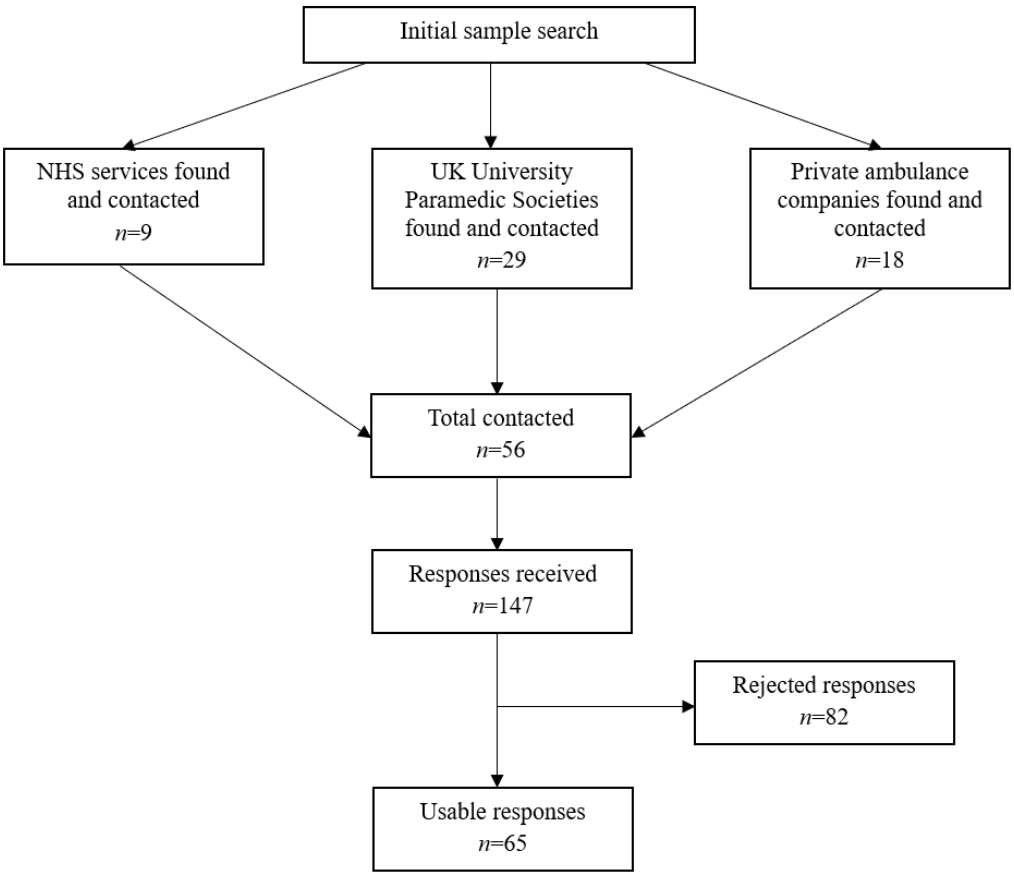

Figure 1 The participant recruitment process of the study

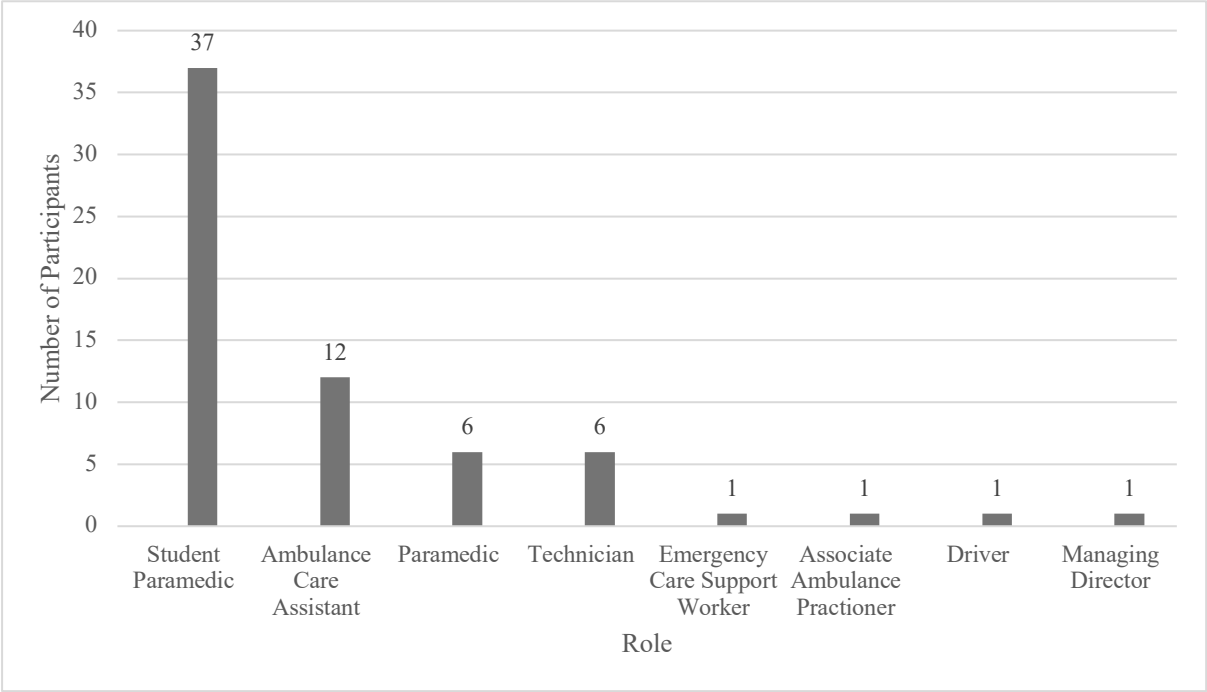

Figure 2 The roles held by participants within the ambulance service

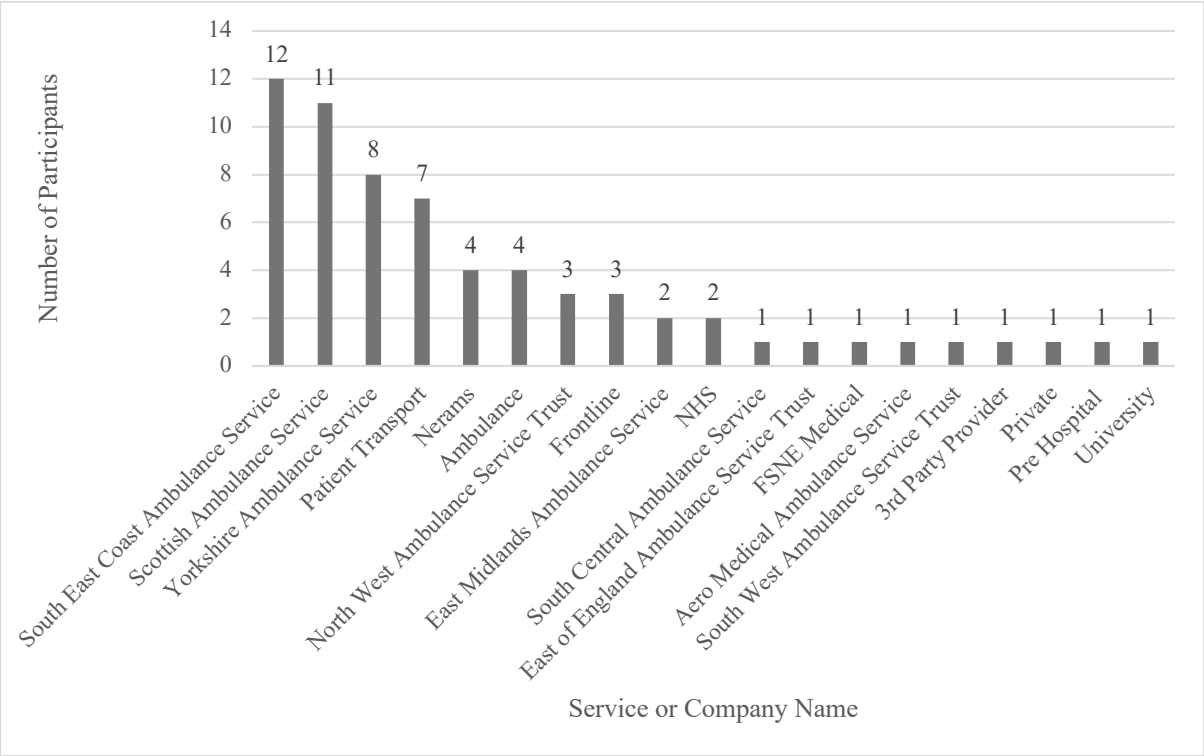

Figure 3 The NHS service or private company that participants work within

Materials. This study was conducted as a survey via Qualtrics, an online survey software. The quantitative data analysis took place using Excel whereas the qualitative analysis took place using NVivo, a qualitative data analysis software. For quantitative questions that required participants to rank their answers, a score system was devised to obtain the most frequent factors reported.

Procedure. Participants were sent a Qualtrics survey which included 16 questions and took them an average of 6 minutes and 6 seconds to complete (see *Appendix 1*). The initial questions were around demographics, followed by questions about their own experiences of using music to reduce their stress and what genres they may prefer to do this. The qualitative question allowed them to give examples of specific circumstances where music has benefited their stress relief. Participants were then asked about their use of music with patients including genre preference, and the factors that go into selecting music for patients. They were also asked an open-ended question in relation to examples of using music with patients.

The genres used within the questions were based on a simplified version of the Short Test of Musical Preference (STOMP) by Rentfrow and Gosling (2003) but with the addition of indie and musical theatre, owing to their great increase in popularity since the STOMP test was created. The question around the factors considered when selecting music to reduce patient stress was accumulated from a variety of the aforementioned literature as common components within ambulance staff's treatment process for their patients. This study overall was approved by the module-wide ethics approval by the Department of Music at Durham University.

3. RESULTS

Participants' Use of Music. In order to ascertain whether stress was something participants encountered in their job, they were asked how often they find their shifts stressful. No one reported 'Always' and only 7.69% reported 'Most of the time'. Nevertheless, only 5 reported never finding their shift stressful, suggesting that stress is commonly experienced by the majority of ambulance staff (see *Figure 4*).

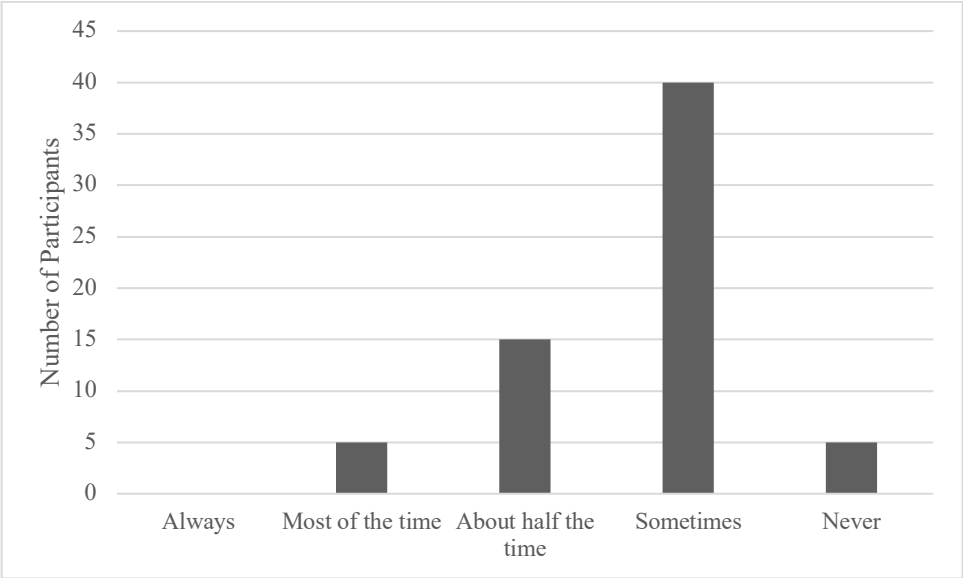

Figure 4 How often participants reported to find their shift stressful

Participants were then asked how often they use music to help reduce this stress and 96.92% reported to use music to a certain extent (see *Figure 5*). This not only suggests that music has great potential to be effective, but also that it can be easily implemented as a stress management tool as it is already being done so by ambulance staff. This effectiveness idea is supported by the 89.23% of participants who subsequently reported they either strongly agreed or somewhat agreed that music was effective in alleviating their stress (see *Figure 6*).

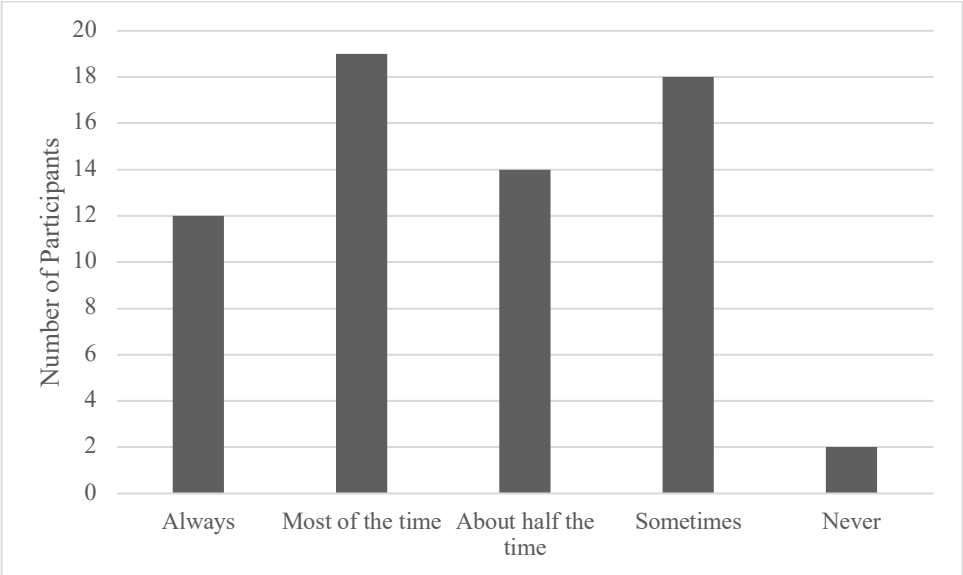

Figure 5 How often participants reported using music to alleviate their stress

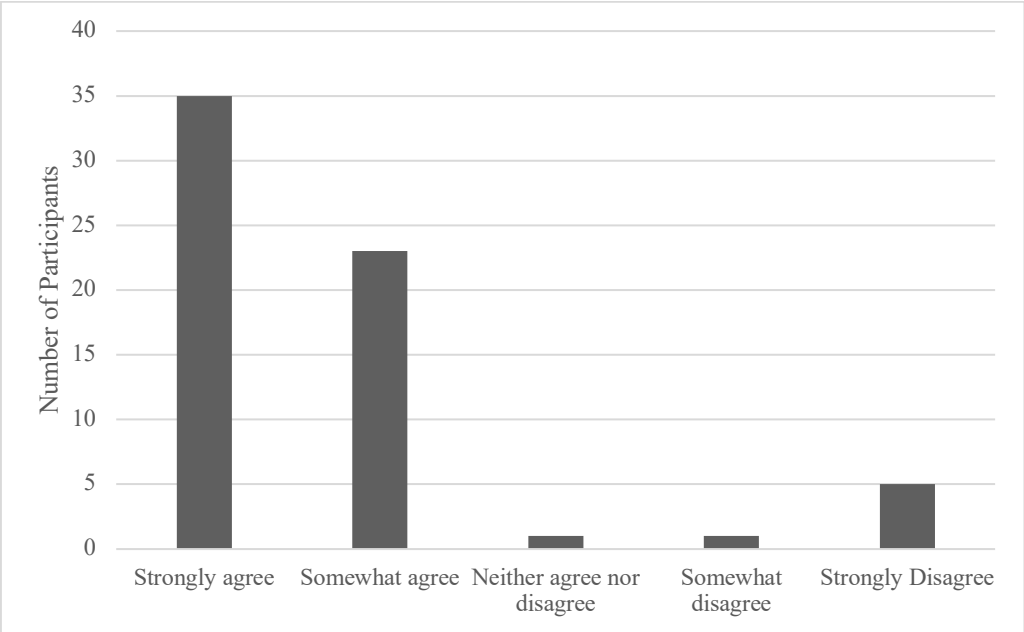

Figure 6 How helpful participants' find music for alleviating their stress

Participants were also asked to give examples of how they have used music to reduce their stress. Through analysing their answers in NVivo, many of the participants listened to music in relation to a specific time (see *Figure 7*). For example, 47.69% mentioned listening to music whilst coming home after a shift, as this was often a way to help distract them or process the day. Additionally, 35.38% of the ambulance staff mentioned using music following a difficult or traumatic job. Some gave references to specific examples including having aggressive patients, encountering cardiac arrests, the death of a patient and a hanging (see *Figure 8*).

Figure 7 The proportion of references of the use of music to alleviate participants' stress from a shift (see *Appendix 2*)

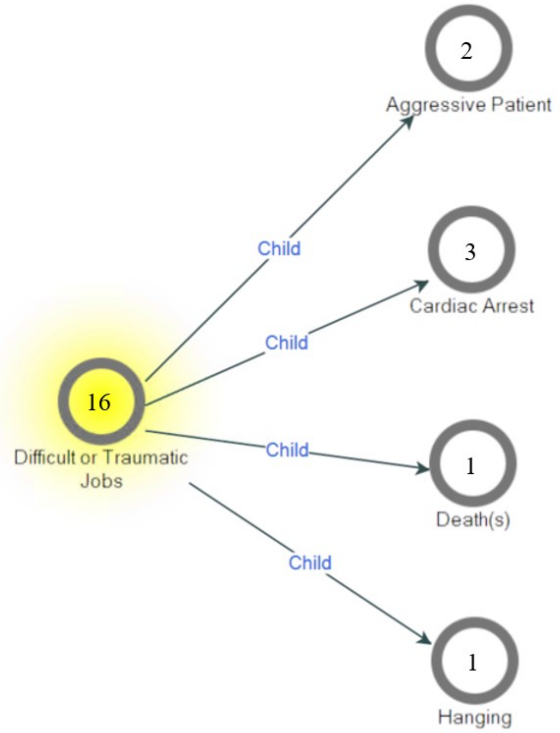

Figure 8 Child nodes within NVivo of difficult or traumatic jobs where participants would listen to music to alleviate their stress

Many participants also spoke about using music for a specific function, often in relation to some of the aforementioned time-related examples. The most common function was to distract themselves and improve mood with 9.23% referencing these themes respectively. 7.69% reported using music to calm themselves, 3.08% referenced using music to help them sleep, and 1.54% used music to facilitate crying. The majority of these examples were in reference to after a job had been done, however, one participant mentioned how them and their crewmates used music to help them focus and prevent overthinking when on their way to larger jobs, potentially multiple causalities or a category 1 call, suggesting a secondary benefit of music of improving medical skills, as having reduced stress before a job may place them in a better position for aiding a patient.

Whilst the majority of answers were in relation to music listening, 7 participants (10.77%) mentioned music-making in the form of singing with 2 of them referencing this in relation to collective music-making by singing with their crewmates. This was reported to help them bond as a team and distract themselves from the difficulties of their work. However, singing is likely to be the only form of music-making that is possible on the ambulance as there is simply not the capacity to have instruments available for staff or patient stress relief. Only 3 participants (4.62%) did not give any examples as they reported never using music to reduce their stress.

Participants' Genre Preference. Participants were asked to rank 11 genres in order of preference for reducing their stress and the ranks were subsequently given scores. The top-ranked genre was given 11 points, and the bottom-ranked genre was only given 1 point (see *Appendix 3*). Pop music was the highest in genre preference, receiving a score of 605 with 72.31% of participants placing it in their top 3 (see *Figure 9*). This is a vast difference compared to other genres as indie music was the second most popular genre but only received a score of 498 with 38.46% of participants placing it in their top three. Nevertheless, this justifies updating the STOMP test due to the high ranking of indie music, supported by musical theatre placing 6th.

Classical, heavy metal and religious music were amongst the lowest-ranked genres for reducing participant stress. Religious music was the lowest overall with a score of 172 (giving it a 433 difference compared to pop music). Only one participant placed religious music in their top 3 compared to 47 participants placing religious music in their bottom 3 genres

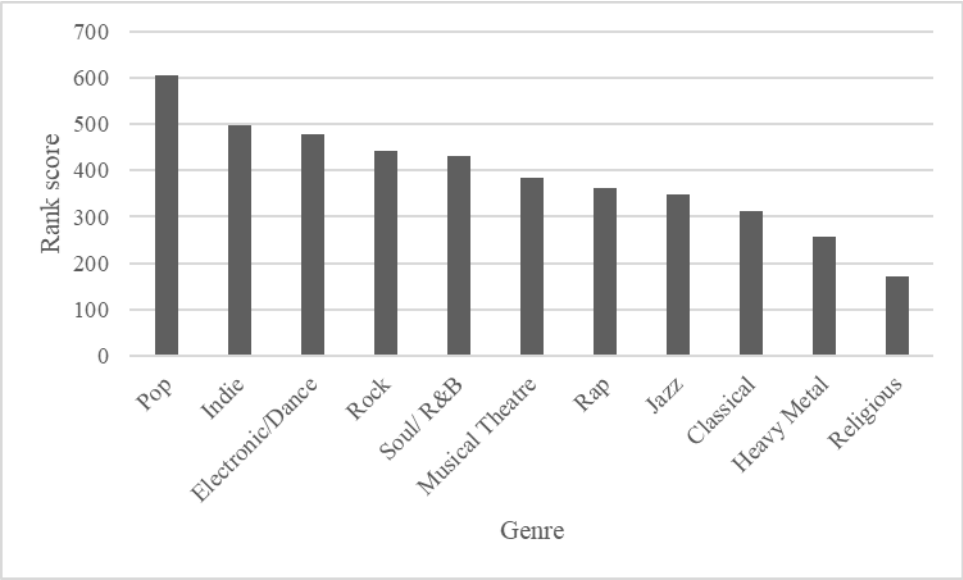

Figure 9 The ranking scores of each genre for alleviating participants' stress

Use of Music with Patients. Despite 96.92% of participants reporting that they use music to reduce their own stress, only 9.23% of participants said they would use music regularly to reduce a patient's stress, reporting either 'Always' or 'Most of the time' (see *Figure 10*). In addition to this being a contrast with their own use of music, 72.31% (47 participants) said they either strongly agreed or somewhat agreed that music could be used to reduce a patient's stress, highlighting a gap between theory and practical implementation (see *Figure 11*). No participants strongly disagreed with the idea of music reducing a patient's stress.

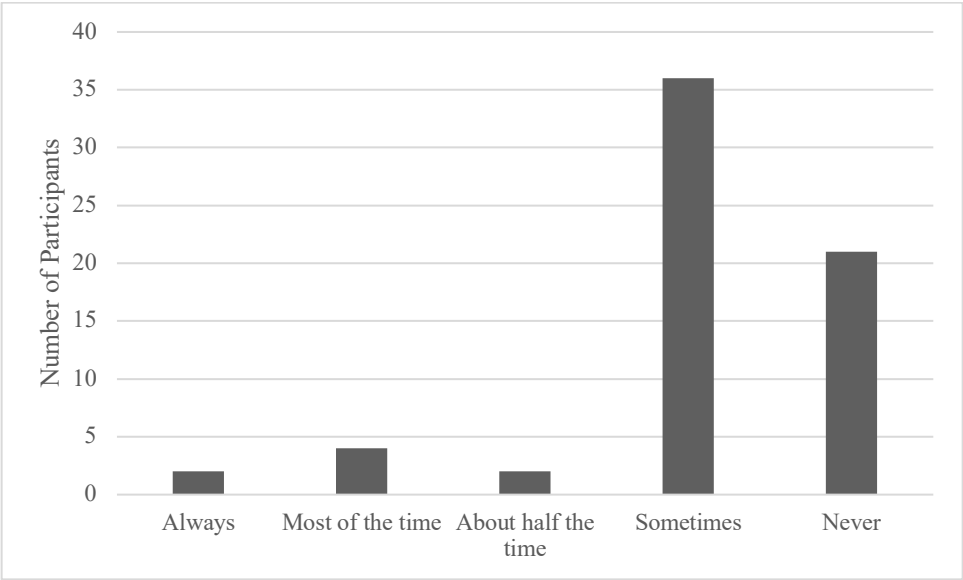

Figure 10 Participants' regularity of using music on their patients

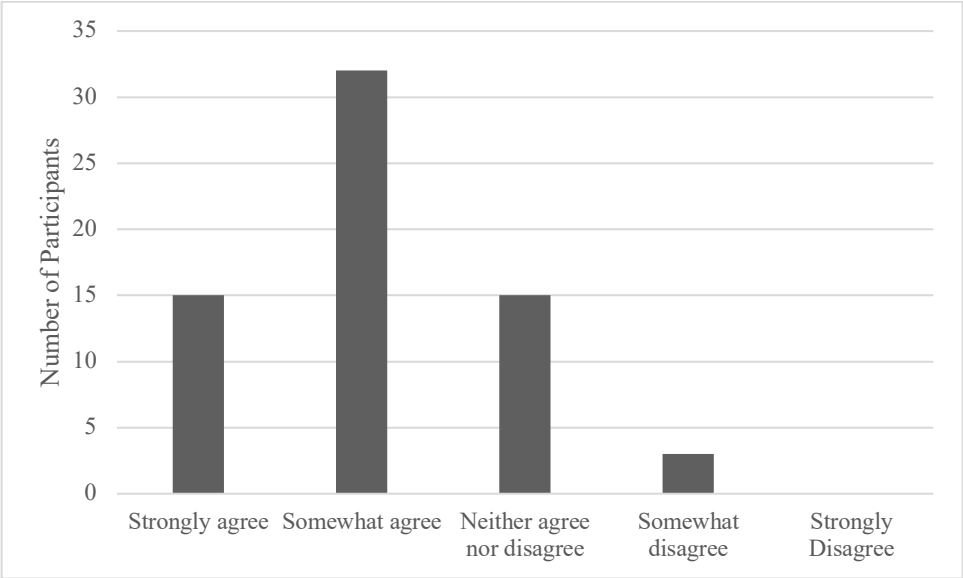

Figure 11 Participants' views on music being able to alleviate a patient's stress

With regards to whether they thought music should therefore be used on the ambulance for alleviating patient stress, 50 participants (76.92%) either strongly agreed or somewhat agreed that music should be used on the ambulance (see *Figure 12*). Only 4 participants (9.15%) reported 'somewhat disagree' or 'strongly disagree' with this idea. This suggests there are grounds for music to be implemented on the ambulance as professionals believe it will make a difference to patient stress.

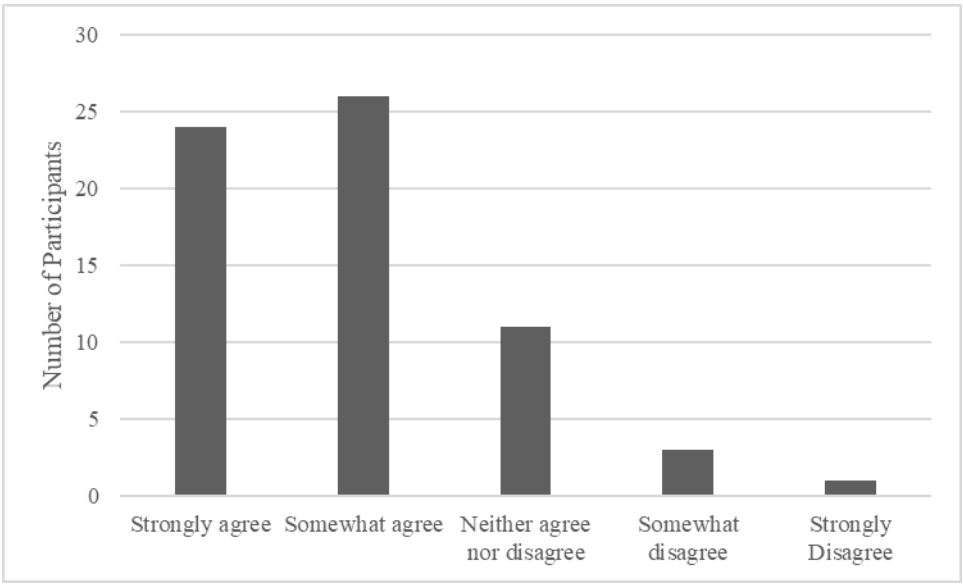

Figure 12 Participants' views on whether music should be used in the ambulance

Similar to before, participants were asked to describe examples of where they have used music to reduce a patient's stress on the ambulance (see *Figure 13*). The answers given were most commonly related to playing music that was familiar to the patient (35.38%). This often meant patient preferences were considered or ambulance staff used their own initiative to play age-appropriate music for the patients, such as Disney music for paediatric patients, and wartime songs for the elderly. The elderly was one of the most common demographics that music was used on with 10 of the 14 participants who referenced them reporting using music specifically with dementia patients (15.38%). However, elderly patients are often the most common demographic who use the ambulance service, due to increased age-related risks, which may explain an increased use of music with them. On the other hand, there were also 10 references to using music with children and young people, suggesting age may be a common factor in the selection of music.

Figure 13 The proportion of references where music has been used with patients on the ambulance (see *Appendix 4*)

In addition to the reference to dementia, there were other references to specific medical conditions requiring music to be used to reduce a patient's stress with one of the most common being for mental health jobs. 10 participants reported how they used music for mental health patients with 7 specifying its use if a patient were to be suffering from anxiety as a way of calming them down. 15.38% of participants reported using music as a calming technique with patients in general, regardless of whether they were suffering from anxiety or not.

Whilst 9.23% of participants said they use music as a distraction when reducing their own stress, this increased slightly to 10.77% reporting using music as a distraction technique to reduce a patient's stress. 42.86% of those distraction technique references were in relation to distracting a patient from their pain which, in turn, lowed the patient's stress levels.

There were also 11 references (16.92%) to stacking or long waits on the ambulance where staff would play music. They reported that the long waits may cause a build-up of anxiety or boredom and so music was a good way to combat this. However, there can be multiple definitions of stacking which may lead to some conflicting results here. One definition of stacking is when ambulances queue outside of hospital, waiting to take their patient into A&E, due to the hospitals being overcrowded (Picken, 2023). Stacking can also refer to times when callers are required to wait for an extended period of time for an ambulance to reach them, due to an influx of patients; the callers are 'stacked' (Harris, 2022). As this study excluded call handlers from the sample, one can assume that the participants are more likely to be referring to the former definition and therefore the themes of stacking or long waits can be grouped together.

Genre Preference for Use With Patients. Interestingly, there were some strong differences between patients and staff in relation to genre preference (see *Figure 14*). Pop music remained the highest genre with a score of 608, only 3 points off the ambulance staff's score. However, heavy metal was ranked the lowest genre instead of religious, with a score of 140, which is 32 points lower than the score religious music received for participants themselves. Religious music scored 401 points for use with patients with 18 participants (27.68%) placing it in their top three, compared to just one before. One of the most drastic changes in results, however, was in relation to classical music. 31 participants (47.69%) placed classical music in their top 3 and it achieved an overall ranking score of 528, second only to pop music. This is a stark contrast to the staff themselves where only 6 placed classical music in their top 3 (9.23%), making a 215 point difference between the scores. Jazz also saw an increase in its score from 349 to 496. Other genres decreased in relation to patients such as indie music, which only achieved 420 points, compared to 498 before.

Participants were also asked to rank 8 different factors in order to determine how the aforementioned genres would be selected. The top factor would receive 8 points and the lowest receive 1 point (see *Appendix 5*). Patient preference was the most common factor with a score of 416 and 51 participants placed it in their top 3 (see *Figure 15*). This was closely followed by age with 46 participants (70.77%) placing it in their top 3, linking to the frequency with which age was mentioned during the previous anecdotal question. Emotional state and medical condition were ranked 3rd and 4th respectively but there may be occasions where they are considered synonymous with one another, such as if the patient is a mental health patient, which may explain their closeness in scores (377 and 292). However, 66.15% of participants placed emotional state in their top 3 compared to just 39.92% for medical condition, suggesting that emotional state is still a greater factor. The time

of day was the lowest-ranked factor with an overall score of 160 and only 2 participants (3.08%) placed it in their top 3.

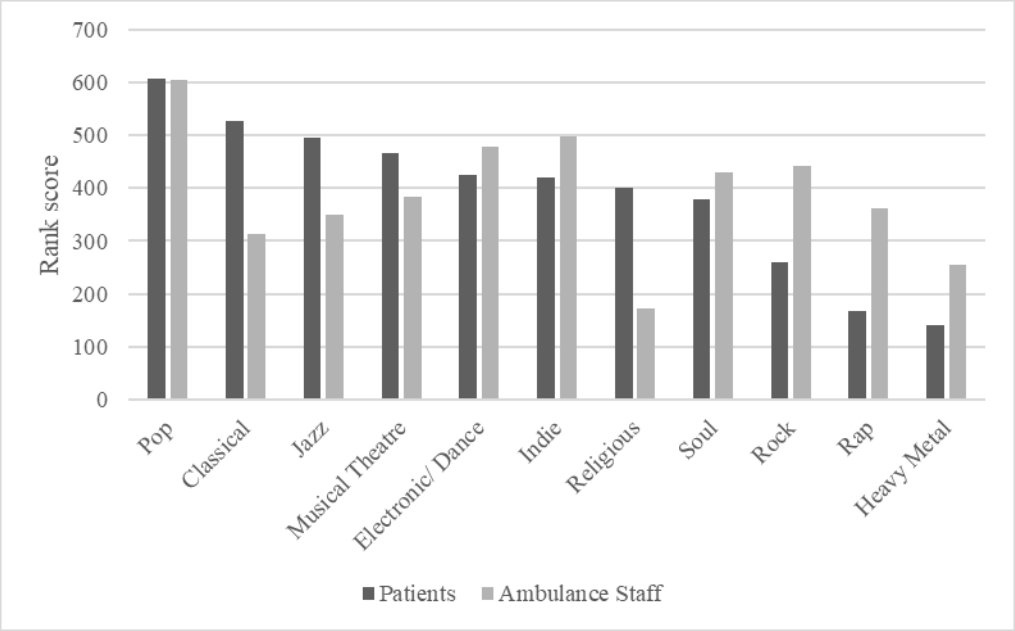

Figure 14 A comparison of the ranking scores for each genre for both patients and ambulance staff

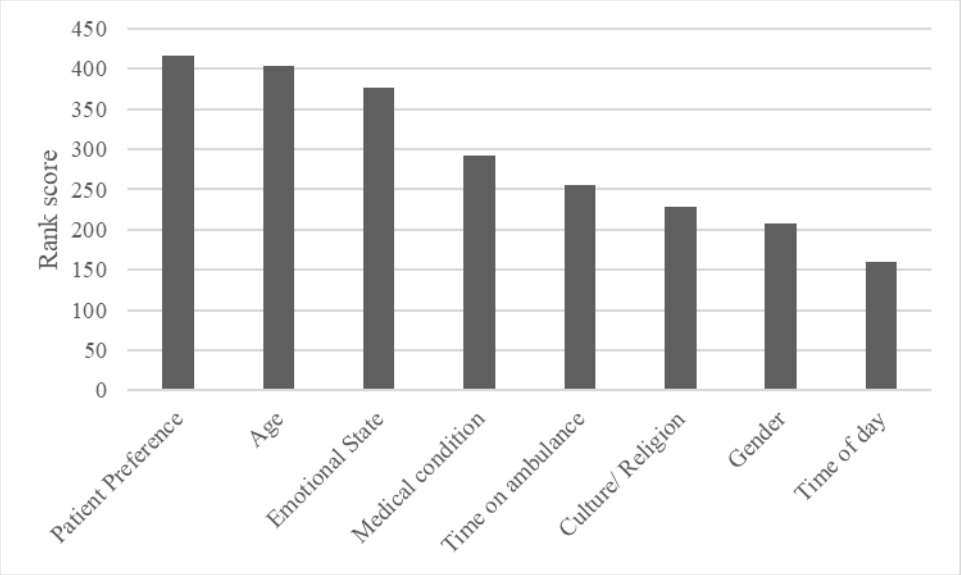

Figure 15 The ranking scores of each factor considered when selecting a genre of music to reduce patient stress

4. DISCUSSION

These results demonstrate that ambulance staff find music helpful for reducing their own stress and believe the same for their patients, despite it not being as common a tool with patients compared to themselves. It can therefore be assumed that music contains therapeutic qualities that can be harnessed in this pre-hospital setting and has the potential to benefit a significant number of people using the ambulance service.

The exploration of genres has demonstrated that pop music was the most preferred genre for both ambulance staff and patients, which is likely to do with the use of the radio on the ambulance, as many common radio stations play pop music. The use of the radio was mentioned several times by participants during the anecdotal questions. Furthermore, the ‘use of music’ was nearly always interpreted as music listening, however, references to music-making were made but this is likely to have practical issues in this setting were it to be fully implemented in a similar way to music therapy. Therefore, music listening is likely to be the most effective way of reducing patient and staff stress. The factors most considered when selecting the music to listen to were

preference, age and emotional state but some participants did express the choice of genre in the music listening would be dependent on each patient and therefore it is hard to make generalisations.

Whilst this study has helped open up an exploration into music within this setting, there are several limitations that should be addressed. This study relied on retrospective data and, in relation to the qualitative questions, required subjective interpretation by the researcher which may lead to bias or inaccuracies. Interpretation as to what encompasses each genre was also required by participants, which may lead to a lack of cohesion in the results. Additionally, the majority of participants were younger in age which may sway the results of genre preference, if age is a contributing factor in this decision. Furthermore, this sample included ambulance staff who were answering on behalf of the patients. It is possible that were this survey to be given to patients, they would have differing opinions from that of the current participants. There was also the assumption that music would always have a positive effect and alleviate stress successfully. It is unclear, therefore, if there would ever be situations where the use of music would be inappropriate.

Despite this, the current study demonstrates the positive therapeutic potential that music holds, such as mood improvements, calming effects and facilitating healthy reflection, allowing to improve the alleviation of stress in both ambulance staff and patients. Further research on the success of different genres, as well as the appropriateness of music in this context, should be conducted before creating a standardised way of implementing music in pre-hospital emergency settings as current literature is greatly lacking.

Through this research, this study has already gained the interest of ambulance companies wanting to explore this idea of music on the ambulance, demonstrating the potential that this research holds, particularly due to the ease with which music can be implemented in this setting. Overall, this study lays the groundwork for the use of music within pre-hospital emergency settings and more broadly its use as a tool in wider healthcare for reducing both patient and staff stress.

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APPENDICES

Appendix 1: Survey questions and question type

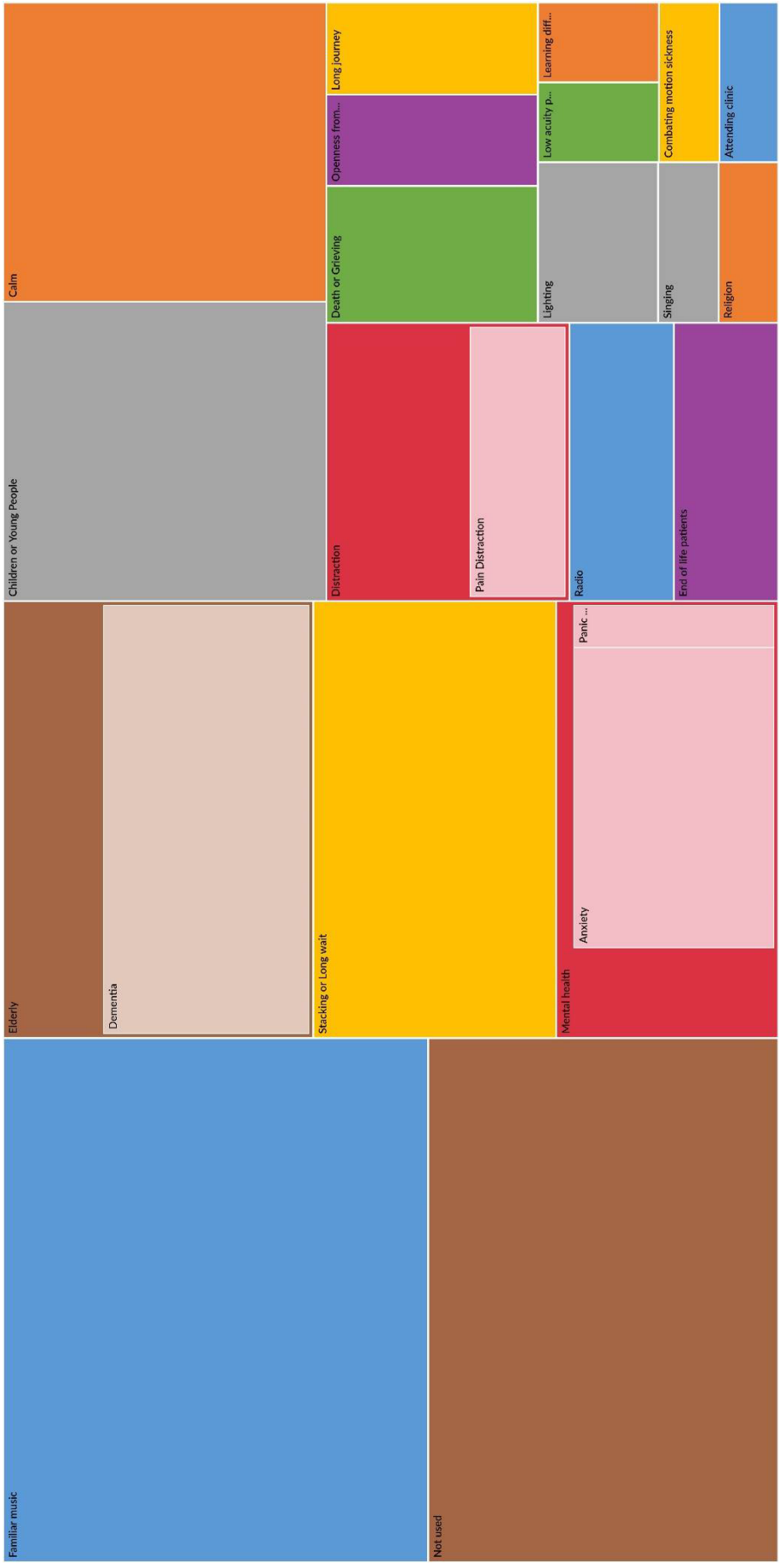
1. What is your age? [Text entry]
2. What is your gender? [Multiple choice]
    a. Male, Female, Non-Binary, Prefer not to say
3. What is the full name of your role within the ambulance service? (If you are a student please specific this). [Text entry]
4. Which service do you work in? [Text entry]
5. How long have you worked on the ambulance? [Text entry]
6. How often do you find you shifts stressful? [Matrix table: Standard Likert]
    a. Never, Sometimes, About half the time, Most of the time, Always
7. How often do you use music to help reduce your stress? [Matrix table: Standard Likert]
    a. Never, Sometimes, About half the time, Most of the time, Always
8. Rank the following genres from most helpful to least helpful for reducing your stress following a shift. [Rank order]
    a. Electronic/Dance, Pop, Country, Religious, Jazz, Folk, Classical, Rock, Heavy Metal, Rap, Soul/R&B, Musical Theatre, Indie
9. Describe a time when you used music to help reduce your stress from a shift. [Text entry]
10. How far do you agree that music helps you reduce your stress? [Matrix table: Standard Likert]
    a. Strongly Disagree, Disagree, Neither Agree nor Disagree, Agree, Strongly Agree
11. How often do you use music to reduce a patients stress? [Matrix table: Standard Likert]
    a. Never, Sometimes, About half the time, Most of the time, Always
12. Rank the following genres from most helpful to least helpful for reducing a patients stress. [Rank order]
    a. Electronic/Dance, Pop, Country, Religious, Jazz, Folk, Classical, Rock, Heavy Metal, Rap, Soul/R&B, Musical Theatre, Indie
13. Rank the following factors from most considered to least considered when selecting music to reduce stress in your patients. [Rank order]
    a. Age, Gender, Medical condition, Time on the ambulance, Culture/ Religion, Time of day, Emotional state, Patient Preference
14. Describe a time when you used music to help reduce a patients stress on the ambulance, keeping all personal information anonymous. [Text entry]
15. How far do you agree that music would help a patient reduce their stress? [Matrix table: Standard Likert]
    a. Strongly Disagree, Disagree, Neither Agree nor Disagree, Agree, Strongly Agree
16. How far do you agree that music should be used on the ambulance?
    a. Strongly Disagree, Disagree, Neither Agree nor Disagree, Agree, Strongly Agree

Appendix 2: Figure 7 enlarged

Appendix 3: Genre preference ranking scores calculation

- Genre 1 (Top genre): 11 points
- Genre 2: 10 points
- Genre 3: 9 points
- Genre 4: 8 points
- Genre 5: 7 points
- Genre 6: 6 points
- Genre 7: 5 points
- Genre 8: 4 points
- Genre 9: 3 points
- Genre 10: 2 points
- Genre 11 (Bottom genre): 1 point

Appendix 4: Figure 13 enlarged



Appendix 5: Factor ranking scores calculation

- Factor 1 (Top factor): 8 points
- Factor 2: 7 points
- Factor 3: 6 points
- Factor 4: 5 points
- Factor 5: 4 points
- Factor 6: 3 points
- Factor 7: 2 points
- Factor 8 (Bottom factor): 1 point