

Reducing “Treble” with Performance Focused Music Programs in Medical School: A Student Driven Needs Assessment to Clarify Participation Barriers Amongst Undergraduate Medical Students

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ABSTRACT

Introduction: The beneficial impact of performing arts involvement within undergraduate medical education, such as music, has been studied, but support for the arts varies significantly by institution. Research has suggested that medical student involvement in the arts can help develop their identities as physicians and may reduce stress and burnout, an increasingly difficult problem within the medical student community.

Methods: We used a mixed-method cross-sectional study design, using a questionnaire and semi-structured interview designed amongst a team of music professionals and healthcare providers with music backgrounds. Out of 511 enrolled medical students, 93 students participated in the study for a response rate of 18.2%. Questions were piloted among eight medical students, with modifications made in response to feedback. Participants were recruited to participate in an online survey via social media.

Results: Within our sample, the most popular background instrument was piano (58.5%) and voice (50.0%). Of those who responded, most preferred to perform alone (85.7%) or in small groups (51.4%). 78.8% of respondents agreed that music was essential to their wellbeing. Only 62.5% of the respondents with musical backgrounds still play music or sing. Of those who no longer play music, 90.5% of respondents reported time constraint as the limiting factor, followed by lack of access to instruments (42.9%).

Conclusion: This study suggests there are diverse music backgrounds and interests amongst the medical student population. Although most participants believed music was a form of stress relief, undergraduate medical training demands impose time restrictions on student engagement. Investments in music programs that enable adequate involvement and meet student demand have the potential to improve medical student engagement with the arts, alleviate stress, and may even lead to stronger/more empathetic physicians. Periodic needs assessments may be a powerful tool to better align programming to address student desires and reduce barriers.

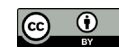
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INTRODUCTION

Humanism is a core component within the field of medicine, not only contributing to high-quality patient care, but also to the wellness of healthcare providers [1]. As such, academic medical centers are being encouraged to integrate humanism into their medical education [2, 3, 4], including through the arts and humanities [5]. Medical students often suffer from poor wellness and increased levels of burnout throughout their training [6]. Studies have shown that integration of the arts in medical education can improve the day-to-day life of medical students [7], and may produce more empathetic physicians [8, 9]. Arts and humanities programs provide a unique opportunity to address medical student burnout while also developing more resilient and compassionate healthcare providers [10, 11].

In particular, research has supported music’s role in teaching humanism in medical education [12, 13] and reduce burnout/improve well-being [14].

Burnout and wellness have become areas of concern within medical education [10, 11], leading to strategic programming designed to help medical learners understand how to develop coping strategies and self-care activities. A survey conducted amongst undergraduate medical institutions indicated that investment in arts-related activities, such as literature, performing arts, or music, has expanded considerably throughout the years [15]. This trend is reflective of a broader movement within higher education to integrate the arts and humanities with sciences, engineering, and medicine [16]. However, funding is

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a common limitation impeding further integration of medical education and the arts [17], as a majority of these programs are school-funded [15]. While several medical schools have robust music offerings, such as the Weill Cornell Music & Medicine Initiative [18], or the Longwood Symphony Orchestra [19], there is wide variability regarding the strength and funding of music programs amongst medical schools. Given that medical students may have varied engagement in programmatic offerings for self-care, clarifying student preferences for music programs, as well as barriers to participation may be crucial in optimizing limited resources to best suit medical student's needs.

The purpose of this study is to survey medical students to 1) examine their music experiences, 2) gauge interest in participating in/attending music performances, and 3) assess potential barriers and support mechanisms during medical training.

METHODS:

Design

Our study implemented a mixed-method, cross sectional study design, using a forty-three-item questionnaire and a semi-structured interview to address music experiences and interests. Survey questions were based on previously published studies [20, 21] and modified by a team of healthcare providers with music backgrounds, as well as collegiate music professors, for content validity. Questions were piloted among eight medical students, with modifications made in response to feedback.

The first portion of the study utilized a survey questionnaire to assess music background, current music involvement and interest (both in performing and attending performances). Additionally, we assessed student satisfaction with music performance opportunities on campus, as well as perceptions of the role of music performance in their lives. Survey respondents were asked to participate in an interview following the completion of the survey. Interview questions were designed to expand on their history of music involvement and/or performance, as well as potential barriers or potential areas of improvement.

Participation was voluntary and approved by the UNMC Institutional Review Board (#326-20-EX).

Recruitment

Medical students currently enrolled at the University of Nebraska Medical Center College of Medicine were recruited via social media through specific interest groups on Facebook. A description of the project and link to the survey were posted four times during a one-month period. At the end of the survey, students were asked to indicate their interest in providing additional information by participating in a follow-up interview.

Interviews

The interviews were conducted online by the principal investigator via Zoom over a period of around 30 minutes each. The recordings were then transcribed by a professional service, and an outside consultant completed qualitative content analysis to categorize participants' experiences in accordance with survey findings.

RESULTS:

Out of a total medical student population of 511 enrolled students, 93 students participated in the study for a response rate of 18.2%. Demographic information is provided in **Table 1**.

Table 1: Participant Demographics

Gender (n=57)*	
Male	43.9% (n = 25)
Female	56.1% (n = 32)
Race (n=70)*	
White	80% (n = 56)
Non-white	20% (n = 14)
Highest Level of Education (n=70)*	
Bachelor's Degree	85.7% (n = 60)
Graduate Degree	14.3% (n = 10)
Location of Residence (n=70)*	
Urban	49.70% (n = 49)
Suburban	25.7% (n = 18)
Rural	4.3% (n = 3)

*Response to these items were voluntary and some participants did not answer selected questions. The total n for each item indicates the total number of responses.

Diversity of Music Backgrounds and Preferences

Survey responses indicated a diversity of music background, as well as preferences, such as performance settings and genres of music to listen to. Specific responses can be found in **Table 2 (next page)**. Our sample had a wide variety of favorite genres of music: Of the 70 participants who responded, the most common were pop (n=47, 67.1%), alternative (n=41, 58.6%), and classical/instrumental (n=40, 57.1%), but there was also considerable interest in other genres such as electronic (n=18, 25.7%), jazz (n=16, 22.9%), and country (n=22, 31.4%). Further, the most common types of music performed in the past were classical (n=22, 66.7%) and pop (n=15, 45.5%), followed by alternative (n=5, 15.2%) and jazz (n=4, 12.1%). Students who reported spending dedicated time playing music or singing (n=35, 62.5%) most often did so alone (n=30, 85.7%). Others played in small group settings such as band/quarter/chamber groups (n=18, 51.4%) or large group settings like choir or orchestra (n=11, 31.4%). In contrast, students who indicated they still performed (n=20, 35.7%), did so in a variety of settings, either alone (n=11, 55%), in a small group setting (n=13, 65%), or large group (n=11, 55%).

Just over 44% (n=41) of students reported they played an instrument. Of this group, the most popular instrument was the piano (n=24, 58.5%), followed by guitar (n=8, 19.5%) and percussion (n=7, 17.1%). Twenty-eight students reported singing, with experiences ranging from formal singing lessons to informal lessons through church choir. Students were asked how many years of they had performed music. Of the 56% of students who responded (n=52), more than 40% of participants reported having at least 10 years of experience in music performance (n=21).

Table 2: Participant Music Preferences and Experience

How often do you listen to music? (n=70)*	
Rarely	1.4% (n = 1)
Under an hour per day	21.4% (n = 15)
1-2 hours per day	30% (n = 21)
2-3 hours per day	22.9% (n = 16)
3-4 hours per day	10% (n = 7)
5+ hours per day	14.3% (n = 10)
How many years have you performed music? (n=52)*	
1 to 3 years	17.3% (n = 9)
4 to 7 years	32.7% (n = 17)
8 to 10 years	21.2% (n = 11)
10+ years	28.8% (n = 15)
Favorite genres of music (n=70)**	
Classical/Instrumental	57.1% (n = 40)
Country	31.4% (n = 22)
Christian/Gospel	14.3% (n = 10)
Pop	67.1% (n = 47)
Hip-hop/Rap	42.9% (n = 30)
Alternative	58.6% (n = 41)
Jazz	22.9% (n = 16)
Electronic	25.7% (n = 18)
Metal	11.4% (n = 8)
Rock	12.9% (n = 9)
Folk	4.3% (n = 3)
Musical	2.9% (n = 2)
Blues	2.9% (n = 2)
RnB	2.9% (n = 2)
International	1.4% (n = 1)

*Response to these items were voluntary and some participants did not answer selected questions. The total n for each item indicates the total number of responses.
 **Respondents were allowed to select more than one if applicable.

Following the survey, a subset of these participants expanded on their music background in interviews. Of those interviewed, all participants (n=7) became involved in music during their childhood through the encouragement of family and teachers. Participants indicated that they received formal training throughout their school years, but the level of training varied. Some participants received only training that was available through the public school system while others received more advanced one-on-one training. All participants had some level of public performance experience, but this again was varied. Participants performed at school related concerts, church events, as well as more competitive recitals.

I went to... public schools. I can't remember if it's a requirement or if it's just strongly suggest that you start an instrument in fourth grade so that's where it came from. I wanted to participate in the curriculum and then from that I wanted to expand. There's always mailings about 'here's a camp you can participate in this summer to work on your skills.' So I did multiple camps after initially joining in fourth grade.

I started when I was three. I've never not known playing. It's always been a part of me. When I was in high school especially

it became more loaded. I was doing competitions and competing for seats and stuff like that. For undergrad I didn't do a music minor or anything. I played in orchestra for fun. I would busk in the subway with some friends.

Honestly, no one else in my family is very musically oriented. It's definitely more of a personal interest that I've pursued but they [parents] supported us in whatever we wanted to do.

It never occurred to me not to join choir and then band. My sister's been in band and so music has always been a part of our family. Our family's very musical but not trained so to speak.

Music and Well-being

Specific responses to survey questions regarding impact of music listening and/or performing on wellbeing and stress are in **Table 3**. A majority of participants reported a positive impact

Table 3: Responses Regarding Importance and Value of Listening and Performing Music on Wellbeing

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	N/A
It is important that I use music for stress relief. (n=66)*	59.1% (n = 39)	19.7% (n = 13)	16.7% (n = 11)	3.0% (n = 2)	1.5% (n = 1)	0.0% (n = 0)
Listening to music is a great form of stress relief for me. (n=67)*	61.2% (n = 41)	28.4% (n = 19)	10.4% (n = 7)	0.0% (n = 0)	0.0% (n = 0)	0.0% (n = 0)
Listening to music greatly improves my wellbeing. (n=67)*	58.2% (n = 39)	31.3% (n = 21)	9.0% (n = 6)	1.5% (n = 1)	0.0% (n = 0)	0.0% (n = 0)
Listening to music is a form of self-entertainment. (n=67)*	61.2% (n = 41)	34.3% (n = 23)	4.5% (n = 3)	0.0% (n = 0)	0.0% (n = 0)	0.0% (n = 0)
Performing music greatly improves my wellbeing. (n=67)*	25.9% (n = 14)	33.3% (n = 18)	22.2% (n = 14)	14.8% (n = 8)	1.9% (n = 1)	1.9% (n = 1)
Performing music is a form of self-entertainment. (n=53)*	33.3% (n = 18)	42.6% (n = 23)	9.3% (n = 5)	7.4% (n = 4)	5.6% (n = 3)	1.9% (n = 1)
Performing music is a great form of stress relief for me. (n=54)*	29.6% (n = 16)	24.1% (n = 13)	16.7% (n = 9)	18.5% (n = 10)	9.3% (n = 5)	1.9% (n = 1)
It is important that I continue to perform music throughout my life. (n=54)*	25.9% (n = 14)	27.8% (n = 15)	24.1% (n = 13)	16.7% (n = 9)	3.7% (n = 2)	1.9% (n = 1)
I believe my music performances provide entertainment for my audience. (n=54)*	16.7% (n = 9)	44.4% (n = 24)	18.5% (n = 10)	7.4% (n = 4)	3.7% (n = 2)	9.3% (n = 5)
I believe my music performances create a connection with the audience. (n=54)*	16.7% (n = 9)	44.4% (n = 24)	18.5% (n = 10)	7.4% (n = 4)	3.7% (n = 2)	9.3% (n = 5)
I believe my music performances provide stress relief for the audience. (n=54)*	14.8% (n = 8)	44.4% (n = 24)	22.2% (n = 12)	7.4% (n = 4)	3.7% (n = 2)	7.4% (n = 4)

*Response to these items were voluntary and some participants did not answer selected questions. The total n for each item indicates the total number of responses.

on stress and well-being when listening and/or performing music. Among musicians, over half believed it was important to continue performing music throughout their lives. Most of the participants believed their performances provided a personal connection, entertainment, and stress relief for the audience.

Results from the interviews revealed details regarding how participants view the relationship between music and their well-being. Music was seen as a creative outlet that balances the intellectual rigors of medical school. Music was also seen as a way to relieve stress and work through emotional situations. Some participants also indicated that playing an instrument or singing was a part of their identity and a skill in which they took pride.

Music is an important creative outlet for me because we're pretty immersed in science analysis, quantitative thinking, critical reasoning but music, I feel like it allows me to use that other half of my brain that's supposedly for creativity.

It's also an important part of my identity. It's something I take pride in being able to do and it gives me a lot of joy to be able to share music with others.

Med school is very stressful and so music is like a way for me to relieve the stress. It's also one of the only times in med school where we're not being graded for our performance, so this is just like a good way to just do something without being judged on it.

I feel like for me music is essential to my well-being. Not even just playing but in terms of just listening to music, that gets me through my day. It's always been a go to for me. It's always been a great relaxer. Like when I'm feeling something, I will make a whole playlist for my feelings just to work through something. Then as someone who's played basically my whole life . . . in terms of reducing stress, that's something I can go to playing old familiar pieces for comfort.

Current Involvement in Music and Limitations

Of the people who received formal or informal music training (n=56), 62.5% (n=35) still play or sing music in their spare time, but only 35.7% of them (n=20) still perform music publicly through small group performances. The most cited factor limiting continued involvement in music performances was time constraint and a lack of access to instruments.

Although many medical students stopped playing or performing music, they agreed they wished to engage in more music-related events at their academic medical centers (n=42, 62.7%) More than half of them would like to perform music during their medical education and recommended having more music performance opportunities (n=29, 53.7%).

In the interviews, time was also mentioned by most participants as a barrier. Several participants mentioned lack of places to practice as a barrier. The inability to practice led to a lack of confidence, potentially explaining why 27.8% (n=10) cited the reason they discontinued music performance was "lack of enjoyment."

. . . the rehearsals were on a night when I had a pre-existing commitment. Then after I missed a few of those [rehearsals] . . . I heard them perform. When I heard the voices that came out of the acapella, I was like, they're really good. I didn't want to bring them down [with my voice].

I guess to sum it up in one word, it would be confidence. It would be the lack thereof. . . I'm a non-traditional student so I've been out of music . . . and that makes a mental, if not literal barrier to re-engaging.

. . . it's difficult for me because I live in a house with 20 other people so it can be annoying to others if I'm banging on the keys or playing a string instrument.

Just time constraints. And the lack of access because, you know, pianos are expensive.

. . . what NMO (Nebraska Medical Orchestra) has done is made a safe space for you to play. So they reserved the Truhlsen (conference) area and said this is an okay space for you to play music as loud as you want and you can practice here as much as you want. I do appreciate that effort made by the College of Medicine . . . It's difficult because you have to balance it with that's also a place for students to study. We already have a limited number of study rooms so to open up more I think would be asking a lot.

All of the participants indicated that balancing their medical school studies requirements with their desire to continue participating in musical pursuits was possible. Time management and setting priorities were discussed as the key to being able to do well in school while continuing to pursue their interest in music.

I could make more time to play but have less time to study. Maybe I wouldn't do as well in school or maybe I wouldn't learn the things I need to learn to be a good doctor.

I made the conscious decision that I want to perform and that's how I'm going to relieve stress. It's been a good balance for me. And even when I'm part of a dedicated group like Nebraska Medical Orchestra, we're never forced to come to rehearsals. It's always like I can choose to come to rehearsal when it fits in my schedule and when I feel like it. And so I think that's a good environment in a healthcare setting because people are more drawn when they have more autonomy in their schedule.

If I had time management skills, I could do it. Do I have time management skills? I don't know . . . I probably have more time . . . because I wasted so much time trying to figure out what I was doing.

DISCUSSION

The results of this study provide support regarding the impact of music on student stress and well-being. Our findings suggest that medical students with music backgrounds may benefit from investments in resources such as dedicated practice spaces and access to musical instruments (e.g., piano keyboards). This would remove significant barriers to music performances for medical students, where institution-supplied music equipment can last up to 50 years with proper care [22]. However, it was evident within our sample that time was a severe limiting factor in continued engagement in music. Unfortunately, time is an invaluable commodity in medical school, often balanced out among a variety of necessary duties, from clinical clerkship responsibilities to exam preparation. Thus, while music

performance opportunities may provide benefits to student wellbeing, it will be vital to take into consideration the time constraints of medical students to ensure such opportunities are fully utilized. It will be critical to engage with medical students in the timing of offerings or ad hoc practice space/access as many students preferred to do this alone (e.g. 24 hours access to practice rooms). Further, it may be helpful to adopt drop in policies for room reservations rather than stricter weekly commitments. Such self-practice opportunities or recorded rehearsals may bridge a gap for a missed session for those who prefer a group activity or for those who gain most enjoyment out of following along by themselves.

It is also worth exploring the long-term impacts of music involvement, and how they can positively contribute to the training of medical professionals, not just through their wellbeing, but also their emotional capacity to connect with patients and their suffering. Mangione and colleagues [23] found that a student's exposure to the humanities strongly predicted his/her ability to appraise others' emotions. Moreover, empathy, a trait crucial to patient care, has been found to be negatively correlated with burnout [24]. However, future efforts towards integrating arts and humanities with medical education, whether through extracurricular opportunities or through formal curriculum, should be careful and intentional. Models as such as the Prism Model [25] can guide educators to develop offerings that will maximize adoption and effectiveness of integrating the arts and humanities into medical education. Moreover, future studies will need to be deliberate about how "effectiveness" of such implementations is measured, as definitions of outcomes vary widely within the current literature [26].

LIMITATIONS

While nearly half of our participants reported experience with instruments, we recognize that our study was susceptible to sampling bias, as participants with music backgrounds are more likely to participate in a study regarding music experience. In addition, while our study recruited 93 participants, responses were entirely voluntary. A consequence of this meant that response rates were variable amongst questions, ranging from 75% (70/93) to 15% (14/93). Future studies may benefit by requiring completion of all survey questions to improve response rates, however, given that time constraints are a significant stressor amongst medical students, it will be crucial to find a balance between survey length and full completion to maximize participation.

Although the results of our study indicated that students perceived listening and/or playing music as forms of stress relief, our results are unable to determine the strength of this association, to what extent such music engagements have on stress relief, or if other variables affect this association. Future directions include measuring stress or well-being amongst medical students and assessing if music utilization, either by playing an instrument/singing or listening to music, results in lower levels of stress or improved well-being.

Finally, the findings from this study are limited to our institution and its students. Medical student perceptions of music opportunities in undergraduate medical education are affected

by the local opportunities and funding their institutions offer, which may vary widely, as mentioned previously. Moreover, it is unclear whether our medical student population is representative of the medical student population at large. Future studies could include psychometric analysis to validate our survey and support its usage, as well as replication of our study at different institutions and with larger sample sizes. This may even include medical school applicants, which may provide evidence as to whether undergraduate medical school programs have preferences for applicants with stronger backgrounds in arts and humanities, including music [27, 28].

CONCLUSION

The current study explores medical students' music experiences, interests in music performances, and perceived barriers and support mechanisms during medical training. Using surveys and semi-structured interviews, we have found a diverse array of music backgrounds and current music involvement among medical students. The results indicate the positive impact of music on stress relief and alleviating burnout for students who undergo rigorous medical training. The survey and interview tools used in this study can be used as a foundation for other schools and programs to increase alignment between student wishes and music-related wellness offerings. Given the benefits of music and the existing barriers to continual music performance, future investments in music programs during medical training could contribute positively to stress reduction, improve engagement and overall experience during medical training, and enhance empathic understanding during medical practice.

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