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## **Transformation of a university educational space through musical Flow on undergraduate dental school students during the COVID-19 pandemic: a pilot study.**

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### **Abstract**

Dental students are subjected to continuous high levels of stress and anxiety, and music has been used in various fields to improve attention and performance in students. The aim of this study was to test how the addition of musical flow during clinical activity can control anxiety levels, improving the educational experience during clinical work among undergraduate dental school students. 119 students with different nationalities in their 5th year of dental school were included and distributed into two groups: group I (n=63) listened to music; group II or control (n=56) did not listen to any type of music. Using the Visual Analogue Scale (VAS) along with a questionnaire filled in by the students, we recorded their degree of pre- and post-operative anxiety and the influence of music during their clinical practice. 86% considered music as a useful tool to decrease their anxiety; for 89% it could improve their clinical practice. Group I experienced a decrease in anxiety according to a VAS of 1.76 points; group II of 0.85 points. COVID-19 increased students' anxiety by 58%. The introduction of musical flow during clinical work may decrease their level of anxiety, improving the development of their activity.

**Keywords:** Anxiety; University; Students; Music; Musical Flow.

## [es] Transformación del espacio educativo mediante flujo musical en estudiantes de Grado en Odontología durante la pandemia por COVID-19: estudio piloto.

### Resumen

Los estudiantes de odontología están sometidos a altos niveles continuos de estrés y ansiedad. La música se ha utilizado en diversos ámbitos para mejorar la atención y el rendimiento de los estudiantes. El objetivo de este estudio fue comprobar cómo la incorporación del flujo musical durante la actividad clínica puede controlar los niveles de ansiedad, mejorando la experiencia educativa durante el trabajo clínico entre los estudiantes de pregrado de la facultad de odontología. Se incluyeron 119 estudiantes de diferentes nacionalidades que cursaban el 5º año de la facultad de odontología y se distribuyeron en dos grupos: el grupo I (n=63) escuchó música; el grupo II o control (n=56) no escuchó ningún tipo de música. Utilizando la Escala Visual Analógica (EVA) junto con un cuestionario relleno por los estudiantes, se registró su grado de ansiedad pre y postoperatoria y la influencia de la música durante su práctica clínica. El 86% consideró que la música era una herramienta útil para disminuir su ansiedad; para el 89% podía mejorar su práctica clínica. El grupo I experimentó una disminución de la ansiedad según la EVA de 1,76 puntos; el grupo II de 0,85 puntos. El COVID-19 aumentó la ansiedad de los estudiantes en un 58%. La introducción del flujo musical durante el trabajo clínico puede disminuir su nivel de ansiedad, mejorando el desarrollo de su actividad clínica.

**Palabras clave:** Ansiedad; Universidad; Estudiantes; Música; Flujo Musical.

**Summary:** 1. Introduction; 2. Materials and Methods; 3. Results; 4. Discussion; 5. Conclusion.

### 1. Introduction

Dental students are subjected to high levels of stress and anxiety during their clinical practice. This may be due to several reasons, including workload, clinical requirements or examinations (Alzahem et al, 2011), (Al-Sowygh et al, 2013).

Within the different biosanitary careers, dental students suffer the highest levels of stress and anxiety during their clinical workload with patients, higher than the one obtained by medical students (Prinz et al, 2012). This anxiety has increased due to the COVID-19 pandemic, where they have been subjected to greater restrictions and have had to follow stricter health regulations in polyclinics (Yildirim & Atas, 2020). The COVID-19 pandemic has highlighted the need to create an educational-based project that transforms and enhances the student experience (García et al, 2020), including the completion of university internships, creating a more relaxed and modern environment. Anxiety can create problems in learning and those students who are more anxious can find it difficult to fulfil academic responsibilities and easily distracted to irrelevant aspects that are available and also show problem in focus and concentration on important features. Stress and anxiety are quiet much observable in student life (Bharadwaj, 2017).

The current tendency calls for the humanisation of medicine, dentistry and education, as well as in university classrooms, through techniques like emotional intelligence (Báez, 2018). Some research in dentistry has shown how music has beneficial effects on patients (Gupta & Ahmed, 2020), (Kim et al, 2011), but research on its impact on students is limited.

Bharadwaj et al (2017) suggest that music therapy is effective in reducing the stress and anxiety levels of university students.

Music can produce psychological and physiological changes in individuals, decreasing heart rate and blood pressure (Kupeli, 2020), or even promote neuronal neuroplasticity (Schlaug, 2015).

The aim of this study was to test how the addition of musical flow during clinical activity can control and ease anxiety levels, while improving the educational experience during clinical work among undergraduate dental school students. Musical flow is a new project performed in a private university in Madrid, where music can control the stress and anxiety levels not only of patients undergoing treatments,

but also of the students or professionals who face various complex treatments, improving the development of practices.

## 2. Materials and Methods

The present pilot study was conducted at the university polyclinic in a private university in Madrid, Spain, in accordance with the ethical principles and additional requirements of Spanish law. Approval was obtained from the ethics committee to conduct this study and was assigned the internal code **CIPI/213006.43**.

This experimental randomised study was conducted on 135 students from September 2021 during the COVID-19 pandemic, and each student was informed about the study and voluntarily agreed to take part in it, signing an informed consent.

Students in 5<sup>th</sup> year of the dental school who attended clinic at the university polyclinic were included. All of them signed an informed consent along with a questionnaire in Spanish or English. Students with hearing impairment, with a known psychiatric disorder or under anxiolytic treatment were excluded. 16 students refused to participate in the study. Finally, 119 students were included in the study. During clinical work, group I (n=63) listened to music of their own election. Group II (n=56) did not listen to any music and acted as a control.

The music was reproduced by the computer placed in the office where the practice was carried out, at a constant average volume, without exceeding 60 db, following the recommendations of Nilsson (2008), allowing a correct conversation flow between teacher, student and patient.

Students were free to choose the kind of music to listen during their clinical practice. Treatments performed by the students were as follows: dental filling, check-up, cleaning, periodontal study, scaling and root planning, dental extraction, endodontics and as dental assistants.

At the end of their clinical work, they filled in a Visual Analogue Scale (VAS), where we evaluated from 0 to 10 their level of anxiety before and after treating each patient, where 0 was "totally relaxed" and 10 "maximum possible anxiety". The VAS allows the measurement of various subjective clinical phenomena such as anxiety (Appukuttan et al, 2014).

A questionnaire was completed by students, like the one used by Keilani et al (2017), which was modified and expanded with some questions referring to fear or anxiety due to the COVID-19 pandemic. The questions were as follows: "Has the COVID-19 pandemic increased your fear or anxiety during clinical practice?", "Do you play a musical instrument or had previous musical education?", "What kind of music have you chosen to listen during each procedure?", "Do you think music has helped you to decrease your stress or anxiety during the procedure?", "Do you think music has contributed to improve your work?", "Would you like to listen to music every day during clinical work?". There was a calibrated, blinded dental observer who randomized and collected and quantified the data.

## 3. Results

A total of 119 students in their 5th year of dental school with different nationalities, agreed to participate in the study (Fig. 1)

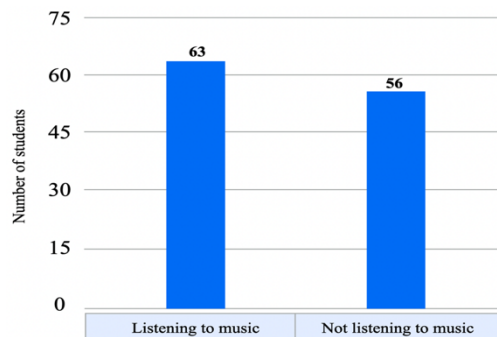


Figure 1. *Incidence profile of students listening to music during clinical work.*

The age range of the study sample was: 21-25 years (81%), 26-30 (15%) and >30 years (4%). The gender split was 58% female and 42% male. The students in group I chose music of different genres (Table 1).

**Table 1**  
*Kind of music chosen by students*

<i>Kind of music chosen by students</i>		
<b>Music</b>	<b>n</b>	<b>%</b>
Pop	17	27%
Classical	14	22%
Classicism	7	50%
Baroque	3	22%
Other	2	14%
Unknown by student	2	14%
Rock	5	8%
Instrumental	4	6%
Other	23	37%

Figure 2 shows how 86% considered music as a useful tool in reducing anxiety.

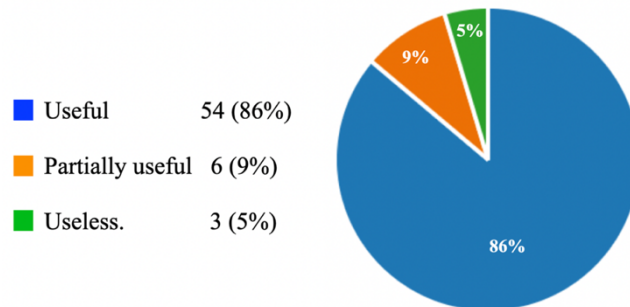


Figure 2. *Effectiveness of music to reduce anxiety during clinical practice.*

89% claimed to have improved the development of their clinical work (Fig. 3).

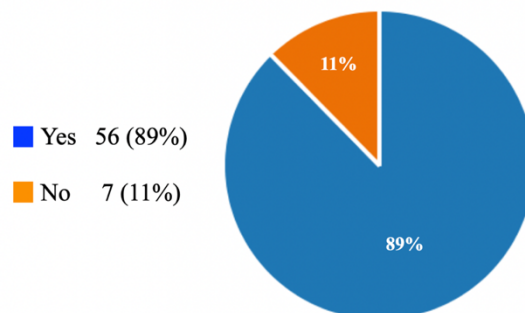


Figure 3. *Contribution of music in the improvement of clinical work among the students.*

The treatments performed were fillings (29%), followed by first visits (28%) and dental cleanings (15%). Eight percent of the students worked as dental assistants (Table 2).

**Table 2**

*Total treatment performed by students*

Treatment	n	
	Music group	Control group
Dental filling	19	16
First visit / Checkup	18	15
Cleaning	7	11
Periodontal study	5	3
Scaling and root planing	6	3
Dental extraction	2	2
Endodontics	1	1
Dental assistant	5	5

92% of all students included in the study would like to treat their next clinical patient while listening to music (Fig. 4).

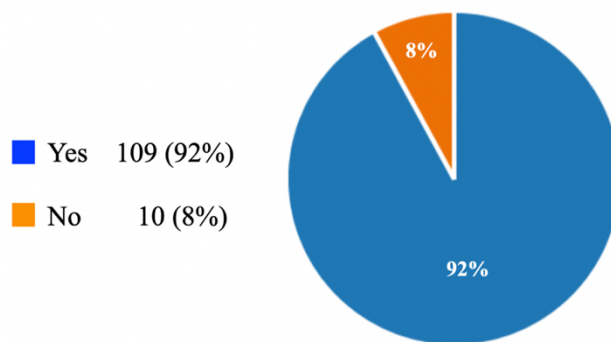


Figure 4. *Percentage of students that would request music to be played at their next clinical patient.*

Group I experienced a decrease in anxiety of 1.76 points (VAS); Group II of 0.85 (Fig. 5).

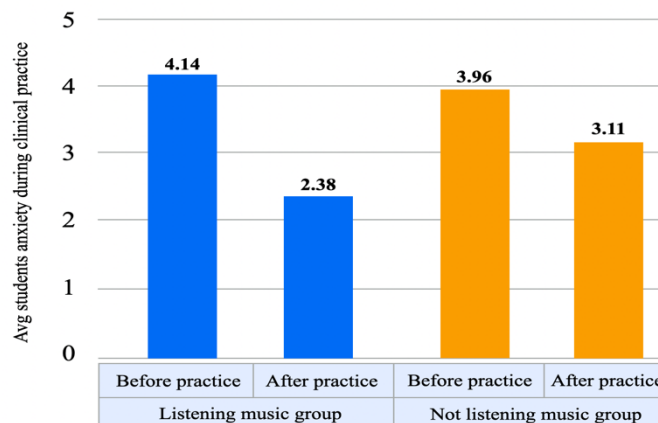


Figure 5. *Average of students' subjective anxiety score on a 10 point scale.*

With regards to COVID-19, 58% of students claimed to have experienced an increased level of anxiety in the clinic due to the pandemic (Fig. 6)

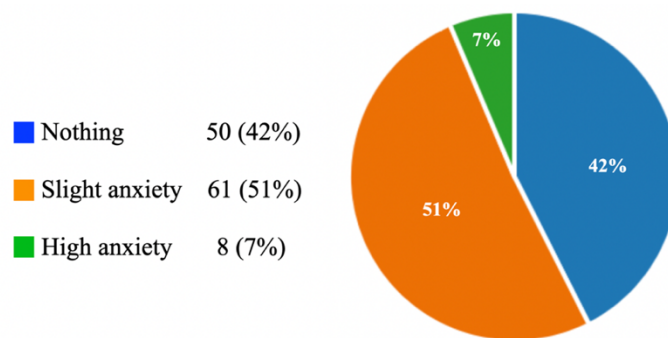


Figure 6. Influence of COVID-19 in increasing anxiety during clinical practice.

#### 4. Discussion

Published studies in dentistry have achieved good results in controlling anxiety by listening to music (Gupta et al, 2020). However, most of them are focused on the patient (Di Nasso et al, 2016), (Gupta et al, 2020), and not so much on the professional or the student. Dental students are submitted to high levels of stress and anxiety during their clinical practices, higher than experienced by students in other biosanitary degrees (Khanagar et al, 2021). According to the results obtained in their study, Kumar et al (2016) observed better academic results in those students who studied while listening to music compared to those who did not listen at all. Free choice of music seems to have a positive effect (Kim et al, 2011). In our study, music was chosen freely and without restriction by the students, with a result in anxiety control of up to 86%. Bradt et al (2013) recommended a guided choice of music, which should be characterised by a slow tempo and the absence of abrupt changes, avoiding music that causes strong emotional reactions. The musical styles chosen by the students in this study were diverse, ranging from pop (27%) to classical music (22%), whether from classicism, baroque, or any other periods (Table 1). Several studies have found good results when listening to classical music (Kim et al, 2011), (Malakoutikhah et al, 2020), but we have not found any that make a distinction within the different stages. 50% of the students who listened to classical music chose classicism music, and 22% chose baroque music (Table 1). In this experimental study, most students chose pop music. However, most studies have evaluated the use of classical music instead of pop music. The results of this study encourage further research.

In terms of gender, 58% were female, in concordance with the findings of Khan et al (2020), where they observed an increasing percentage of female dental students. This becomes highly relevant as several studies have observed higher levels of anxiety in female dental students than males (Basudan et al, 2017), (Bharadwaj, 2017). In addition, Ghasemi et al (2017) observed how students with no prior musical knowledge suffered more stress or anxiety during their clinical placements than those who received prior musical education. In this pilot study, 43% of those who listened to music claimed to have previous musical knowledge, which may have further decreased their anxiety in accordance with Ghasemi et al (2017).

The COVID-19 pandemic has increased the anxiety values of the students by 58%, even reaching high values in 7% of the students, in line to the data recorded by Generali et al (2020).

Some limitations of this study may be due to the musical style chosen by the students, who could have selected music without a slow tempo as Bradt et al (2013) recommended. Our study did not compare results between the different types of music chosen. Further studies should be conducted in this way.

## 5. Conclusion

The results obtained in this pilot study support the necessity to implement a musical flow project not only in university dental clinics, but also in all university campuses to improve teaching methods and learning techniques. Music can be a useful tool to reduce anxiety in students. This transformation of a university educational space through musical flow should be considered a priority to incorporate preventive strategies and intervention programs that help to preserve the mental health of students, thus improving the treatment provided to the patients. As a further study, a larger-scale study is recommended to discover the clinical usefulness of music therapy in dental students, including statistical data.

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### **Competing interest**

None

### **Authors contributions**

The authors have worked together on this work, with equal contributions from each one.



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