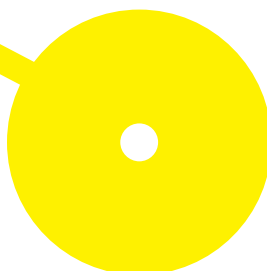




# Characterization of Well-being and Perception of Occupational Noise among health professionals at the São João Local Health Unit

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**SÃO JOÃO**

**Characterization of Well-being and Perception of Occupational Noise among health  
professionals at the São João Local Health Unit**

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## **Abbreviations List**

OT- Occupational Therapy

ULS- Local Health Unit

WEMWBS- Warwick-Edinburgh Mental Well-Being Scale

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## Resumo

**Introdução:** O bem-estar dos profissionais de saúde é um fator de extrema importância para a qualidade dos serviços de saúde. O ruído hospitalar é um dos fatores que contribuí para baixos níveis de bem-estar nos profissionais. Assim, este estudo pretende avaliar o bem-estar e a percepção dos profissionais da ULS São João relativamente ao ruído no seu ambiente de trabalho.

**Métodos:** Estudo do tipo Quantitativo Observacional Descritiva e Transversal composto por uma amostra de 302 participantes. A recolha dos dados foi realizada através de um questionário online constituído por um questionário sociodemográfico, a WEMWBS e o Questionário ao Trabalhador do Projeto *NeoNoise*.

**Resultados:** A média das pontuações totais obtidas na escala indica um nível moderado de bem-estar nos profissionais da ULS São João. Foi possível comprovar a relação entre a pontuação total da WEMWBS e a faixa etária, o trabalho por turnos, os motivos para ouvir música no trabalho e a percepção dos profissionais quanto à caracterização do local de trabalho em relação ao ruído.

**Conclusão:** Os resultados obtidos mostram que o bem-estar aumentou com a idade e é maior naqueles que trabalham em horários fixos, ouvem música para aliviar o stress e consideram o seu ambiente de trabalho confortável em termos de ruído.

**Palavras-chave:** Bem-estar; Percepção do ruído; Profissionais de Saúde; WEMWBS

## **Abstract**

**Background:** The well-being of healthcare workers is an extremely important factor in the quality of healthcare services. Hospital noise is one of the factors that contributes to low levels of well-being among professionals. Therefore, this study aims to assess the well-being and perception of professionals at ULS São João in relation to noise in their work environment.

**Methods:** This was a Quantitative Observational Descriptive Cross-sectional study with a sample of 302 participants. Data was collected using an online questionnaire consisting of a sociodemographic questionnaire, the WEMWBS and the NeoNoise Project Worker Questionnaire.

**Results:** The average of the total scores obtained on the scale indicates a moderate level of well-being among the professionals at ULS São João. It was possible to verify the relationship between the WEMWBS total score and age group, shift work, reasons for listening to music at work and the professionals' perception of the characterization of the workplace in relation to noise.

**Conclusion:** The results show that well-being increased with age and is higher in those who work fixed hours, listen to music to relieve stress and find their working environment comfortable in terms of noise.

**Keywords:** Wellbeing; Noise perception; Healthcare Workers; WEMWBS

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## Introduction

Well-being, understood as a combination of feeling good and functioning well, is an extremely important factor in the provision of health services by professionals (Ruggeri K et al., 2020; Council, 2013; Park et al., 2023) . There are several reasons that affect the well-being levels of healthcare professionals, including hospital noise, which increases stress, exhaustion and lack of motivation (Aumond et al., 2017; Masullo et al., 2021; Torija et al., 2020). Hospitals are considered noisy environments and often exceed the noise levels set by the World Health Organization (Aumond et al., 2017; Masullo et al., 2021; Torija et al., 2020).

The aim of this study is therefore to assess the levels of well-being of health professionals at the São João Local Health Unit, their perception of noise in the workplace and the relationship between the two. It also aims to understand the relationship between well-being and the sociodemographic characteristics of the sample, to subsequently implement programs to reduce noise and provide soundscapes that enhance the well-being of professionals.

It does not deliberately manipulate any of the variables, i.e. the professionals answered about their levels of well-being without any interference from the researcher, who merely analyzed the answers recorded, thus allowing the results to be reliable and correspond to reality. In addition, the study is also descriptive because it was limited to accurately and systematically describing the characteristics of the sample. As the aim was also for the sample to answer the questionnaire at just one point in time, the type of study is cross-sectional.

This study is made up of 4 chapters: (1) Theoretical framework, which provides a general and theoretical context for the subject under study, based on up-to-date literature; (2) Methodology, which describes the type of study, the type of sampling, the evaluation instruments used and the statistical procedures carried out; (3) Results, which present all the results of the statistical analysis carried out; (4) Discussion, which analyzes and justifies all the results using existing literature, and also presents the limitations of the study and recommendations for future research.

## 1. Theoretical framework

According to the World Health Organization, mental health is defined as “*a state of well-being in which the individual realises his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community*” (WHO, 2005, p.2). This definition emphasises well-being, showing that mental health goes beyond the absence of disorders, encompassing the perception that life is going well (Ruggeri K et al., 2020).

Well-being can be defined as the combination of feeling good and being functional. It encompasses the experience of positive emotions and relationships; the development of one's potential; control over one's life and the feeling of having a purpose in life. Furthermore, it allows the individual or population to develop and prosper (Ruggeri K et al., 2020; Council, 2013; Park et al., 2023). This concept of Well-Being thus includes two distinct views: the hedonist view, relating to Subjective Well-Being, and the eudemonist view, relating to Psychological Well-Being (Diener, 1984; Ryff, 1989).

According to the work of Diener (1984), Subjective Well-Being emphasises feelings, namely the search for pleasure and happiness, and is characterised by the individual's perception of their own life in the parameters of general life satisfaction, positive affect and negative affect. In turn, Psychological Well-Being is a multidimensional construct, encompassing much more than happiness and positive emotions. Carol Ryff (1989) created a model that defines Psychological Well-Being as the self-perception of 6 categories: self-acceptance, personal growth, life purpose, positive relationships with others, mastery over the environment and autonomy.

In recent years, particularly during and after the global COVID-19 pandemic, several studies have been published evaluating the well-being of doctors and other health professionals, which is an extremely important factor for health services (Ghahramani et al., 2021; Kinman et al., 2020; Schneider et al., 2022; Shreffler et al., 2020; Wong et al., 2021). It is known that stress and work overload affect the quality of care provided to patients and influence the health and well-being of professionals. It has also been proven that problems such as difficulties in recruiting and retaining doctors, exhaustion and lack of motivation are among the factors related to stress and overload. In addition, the likelihood of committing a serious medical error is approximately 50 per cent higher among doctors with high levels of burnout. Studies have convincingly shown that the well-being of healthcare professionals improves the quality of care, productivity and patient

satisfaction (Denning et al., 2021; Kjosavik, 2018; Sigurdsson, 2021; Townsley et al., 2023; Zaghini et al., 2020; Zhou et al., 2020).

Another reason for all the negative symptoms mentioned above, such as stress, exhaustion and lack of motivation, is hospital noise (Aumond et al., 2017; Masullo et al., 2021; Torija et al., 2020). Hospitals are considered noisy environments, with the emission of environmental noise produced by different equipment and the voices of staff and patients. Technological advances in healthcare often result in an increase in noisy equipment present in this space, thus adding new sources of noise. Hospitals are also located in central urban areas with heavy traffic, which contributes to the increase in noise in the hospital soundscape (de Lima Andrade et al., 2021; G. Loupa et al., 2019; Glykeria Loupa, 2020; Montes-González et al., 2019).

Given all the harmful effects of noise in a hospital setting, especially for healthcare professionals, it is important to develop solutions to reduce these effects and increase the well-being of professionals in their working environment. This is one of the main focuses of Occupational Therapy (OT) services. According to the Environment-Health-Occupation-Well-Being model, the main results of OT services should be the promotion of quality of life and well-being for individuals, communities and populations, and not just a focus on professional performance and participation (Pizzi & Richards, 2017).

It is therefore essential to assess professionals' levels of well-being and their perception of hospital noise to improve the quality of healthcare for both professionals and patients. To contribute to the development of programmes and/or interventions for this purpose, this study aims to assess the well-being and perception of professionals at the São João Local Health Unit regarding noise in their work environment.

## **2. Methodology**

This study is part of a larger research project developed by the Board of Directors of the São João Local Health Unit (ULS), with the collaboration of the New Ideas Group and the Psychosocial Rehabilitation Laboratory of the Porto Polytechnic School of Health.

A cross-sectional descriptive observational quantitative study was carried out. It is characterised by being a type of empirical study of a phenomenon, with the main aim of testing a theory made up of variables of different natures, measured using numerical data and analysed statistically. In this type of study, the researcher takes a passive role in observing the variables

and does not manipulate or control any of them. As this is a cross-sectional study, data on the participants was collected at a single point in time (Yilmaz, 2013).

## 2.1. Participants

A non-probabilistic convenience sampling method was used. It is characterized by the fact that the probability of a certain element belonging to the sample is different from the probability of the other elements, since they are selected for their convenience (João Marôco, 2018).

Inclusion and exclusion criteria were established for the participants in the sample. The inclusion criteria were that all participants would be health professionals from the ULS São João and should have been working there for more than a year, while the exclusion criteria were that health professionals who did not speak Portuguese or had visual problems that compromised their ability to read the questionnaire could not take part.

## 2.2. Instruments

In order to collect data from the sample at a single point in time, an online questionnaire was drawn up using the Microsoft Forms platform, comprising a sociodemographic questionnaire, from the *Warwick-Edinburgh Mental Well-Being Scale (WEMWBS)* and the *NeoNoise Project Worker Questionnaire*.

The Sociodemographic Questionnaire was developed by the study's research team with the aim of characterising the population. It consists of thirteen self-report items: gender; age group; marital status; profession; length of employment; shift work; service/unit where they work; frequency with which they listen to music at work; main reason for listening to music at work; use of headphones at work and what type; opinion on the role of music in the well-being of professionals in the workplace.

The *Warwick-Edinburgh Mental Well-Being Scale (WEMWBS)* is a scale developed with the aim of assessing the mental well-being of the general population, taking into account its hedonistic and eudemonistic aspects. It is made up of 14 items, rated on a Likert scale between 1 and 5 points, associated with 'Never' and 'Always' respectively. The total score of the scale is obtained by adding up the score attributed to each item, thus varying between 14 and 70. The higher the total score, the higher the level of well-being. The WEMWBS was originally developed by experts from NHS Health Scotland, the University of Harwick and the University of Edinburgh

in 2006 and obtained a Cronbach's alpha of 0.91, which shows good psychometric properties (Figueiredo et al., 2022; Tennant et al., 2007).

The *Worker Questionnaire* is part of the *NeoNoise Project* and was included in this study following an approved request to the authors. It is a set of questions developed to identify healthcare professionals' perception of noise in their workplace and is divided into 3 main sections with a total of 11 questions: (1) sociodemographic information; (2) personal acceptability of noise and comfort and (3) identification of the noisiest shift and main sources of noise in the workplace. Section 1 was excluded because a sociodemographic questionnaire suitable for the purpose of this study had been drawn up (Carvalhais et al., 2015).

### 2.3. Procedures

This study is part of a project organised by the Board of Directors of ULS São João in collaboration with the New Ideas Group and the Psychosocial Rehabilitation Laboratory of the School of Health of the Polytechnic of Porto. In order to carry out the study, ethical approval was requested from the Ethics Committee for Health of the São João Local Health Unit, and the Committee received a positive response (no. CES 112/24).

The questionnaire for data collection was presented to all health professionals at ULS São João via the Microsoft Forms platform link, and was made available on the ULS Intranet and in each professional's institutional email between the 8th of May 2024 and the 7th of June 2024. The participation of the individuals in this study was formalised through an informed consent form in accordance with the Declaration of Helsinki, present at the beginning of the study (Associação Médica Mundial, 1996).

All the data collected was then analysed using *IBM SPSS Statistics 28* statistical software. Descriptive statistics procedures were used to characterize the sample under study, with qualitative variables being described using absolute frequencies (n) and relative frequencies (%) while quantitative variables were described using measures of central tendency (mean) and measures of dispersion (standard deviation). For all procedures, a significance level of  $\alpha = 0.05$  and a 95% confidence interval were assumed (J. Marôco, 2018).

With regard to the answers obtained on the WEMWBS instrument, total scores were calculated in order to assess the sample's levels of well-being. The results were presented using measures of central tendency (mean) and measures of dispersion (standard deviation). The

absolute (n) and relative (%) frequencies of the results obtained in the different response options were also described.

Finally, the relationships between the WEMWBS total score and sociodemographic characteristics were analyzed, as were the relationships between the WEMWBS total score and the answers to the Worker Questionnaire. To do this, the independent samples t-test (variables with 2 subgroups) and one-way ANOVA (variables with more than two groups) were used for all the variables as they followed the normality previously tested using the Shapiro-Wilk normality test.

### 3. Results

#### 3.1. Sample characterization

The study sample consisted of 302 participants, the majority of whom were female (221, 73.2 %), aged between 36–45 years (115, 38.1 %) and 46–55 years (96, 31.8%) and married (159, 52.6%).

In terms of profession, more than half of the sample is made up of doctors (66, 21.9%) and nurses (111, 36.8%), who have been in the profession between 11 and 20 years (83, 27.5%) and between 21 and 30 years (96, 31.8%) and who do not currently work shifts (184, 60.9%). 224 members of the sample work at the Porto branch of the Centro Hospitalar Universitário São João, in 77 different services.

*Table 1- Socio-demographic characterization of the sample according to gender, age group, marital status, profession, length of time in the profession and shift work*

Variables	n (%)
<b>Gender</b>	
Male	79 (26.2%)
Woman	221 (73,2%)
Rather not say	2 (0,7%)
<b>Age group</b>	
25–35 years	36 (11.9%)
36–45 years	115 (38.1%)
46–55 years	96 (31.8%)
56–65 years	50 (16.6%)
Over 65 years	5 (1.7%)
<b>Marital Status</b>	
Single	74 (24.5%)
Married	159 (52.6%)
Legal Union	42 (13.9%)
Other	27 (8.9%)

<b>Profession</b>	
Doctor	66 (21.9%)
Nurse	111 (36.8%)
Senior Diagnostic and Therapeutic Technician	39 (12.9%)
Senior Health Technician	5 (1.7%)
Senior Technician	14 (4.6%)
Technical Assistant	43 (14.2%)
Operational Assistant	12 (4.0%)
Managerial Staff	5 (1.7%)
Other	7 (2.3%)
<b>Years of professional experience</b>	
1-10 years	66 (21.9%)
11-20 years	83 (27.5%)
21-30 years	96 (31.8%)
More than 30 years	57 (18.9%)
<b>Do you currently work shifts?</b>	
No	184 (60.9%)
Yes	118 (39.1%)

130 (43.0%) participants report listening to music every day, while 73 (24.2%) never listen to music while at work. Relieving stress (88, 29.1%) is the main reason given by individuals who listen to music at work. The majority also report not using headphones to do so. 87.8% (151) of people who listen to music believe that music can enhance the well-being of professionals in their workplace.

**Table 2- Socio-demographic characterization of the sample according to music habits in workplace**

<b>Variable</b>	<b>n (%)</b>
<b>How often do you listen to music while you work?</b>	
Every day	130 (43.0%)
4 to 5 times per week	44 (14.6%)
2 to 3 times per week	43 (14.2%)
1 time per week	12 (4.0%)
Never	73 (24.2%)
<b>What is your main reason for listening to music at work?</b>	
To relieve stress	88 (51.2%)
Increase productivity	11 (6.4%)
Improve concentration	41 (23.8%)
Entertainment	25 (14.5%)
Other	7 (4.1%)
<b>If you answered 'Other', please specify:</b>	
External noise control	4 (57.1%)
Choice of other professionals you work with	2 (28.6%)
Patient stimulation	1 (14.3%)
<b>Do you use headphones to listen to music at work?</b>	
Yes	44 (25.6%)
No	128 (74.4%)
<b>If you answered yes to the previous question, what type of headphones do you use?</b>	
Wireless over-the-ear headphones	5 (11.6%)

Wired over-ear headphones	3 (7.0%)
Wireless in-ear headphones	12 (27.9%)
Wired in-ear headphones	23 (53.5%)
<b>Do you believe that music in the workplace can improve the well-being of professionals in your workplace?</b>	
No	4 (2.3%)
Yes	151 (87.8%)
Maybe	15 (8.7%)
I don't know	2 (1.2%)

### 3.2. Statistical Analysis of WEMWBS

The results of the frequencies and averages obtained for each WEMWBS item are shown in the following table. The question with the highest score was question 11, with an average of  $4.12 \pm 0.737$  with more than 80 per cent of the answers distributed between the options 'Often' and 'Always'. On the other hand, the questions with the lowest scores were questions 3 and 5, both with an average of less than  $2.76 \pm 0.822$  and  $2.49 \pm 0.925$ , respectively. All the other questions have averages between 3 and 4. The total scores ranged from 14 to 70 points, with an average value of  $48.16 \pm 8.03$ .

*Table 3– Distribution of WEMWBS responses and respective mean and standard deviation*

WEMWBS	None of the time	Rarely	Some of the time	Often	All of the time	$\bar{x} \pm SD$
1. I've been feeling optimistic about the future	7 (2,3%)	60 (19,9%)	128 (42,4%)	86 (28,5%)	21 (7,0%)	3,18±0,908
2. I've been feeling useful	1 (0,3%)	15 (5,0%)	72 (23,8%)	142 (47,0%)	72 (23,8%)	3,89±0,834
3. I've been feeling relaxed	11 (3,6%)	109 (36,1%)	129 (42,7%)	48 (15,9%)	5 (1,7%)	2,76±0,822
4. I've been feeling interested in other people	11 (3,6%)	35 (11,6%)	112 (37,1%)	105 (34,8%)	39 (12,9%)	3,42±0,977
5. I've had energy to spare	38 (12,6%)	123 (40,7%)	102 (33,8%)	32 (10,6%)	7 (2,3%)	2,49±0,925
6. I've been dealing with problems well	1 (0,3%)	12 (4,0%)	139 (46,0%)	134 (44,4%)	16 (5,3%)	3,50±0,676
7. I've been thinking clearly	1 (0,3%)	8 (2,6%)	117 (38,7%)	146 (48,3%)	30 (9,9%)	3,65±0,708
8. I've been feeling good about myself	1 (0,3%)	26 (8,6%)	100 (32,1%)	140 (46,4%)	35 (11,6%)	3,60±0,816
9. I've been feeling close to other people	1 (0,3%)	30 (9,9%)	125 (41,4%)	128 (42,4%)	18 (6,0%)	3,44±0,765

10. I've been feeling confident	3 (1,0%)	22 (7,3%)	128 (42,4%)	129 (42,7%)	20 (6,6%)	3,47±0,767
11. I've been able to make up my own mind about things	1 (0,3%)	6 (2,0%)	42 (13,9%)	160 (53,0%)	93 (30,8%)	4,12±0,737
12. I've been feeling loved	2 (0,7%)	22 (7,3%)	93 (30,8%)	117 (38,7%)	68 (22,5%)	3,75±0,908
13. I've been interested in new things	5 (1,7%)	39 (12,9%)	102 (33,8%)	115 (38,1%)	41 (13,6%)	3,49±0,939
14. I've been feeling cheerful	4 (1,3%)	31 (10,3%)	121 (40,1%)	131 (43,4%)	15 (5,0%)	3,40±0,792

### 3.3. Statistical Analysis of the *NeoNoise Project Worker Questionnaire*

Table 4 shows the results of the questions in the Employee Questionnaire about noise in the workplace. 138 (45.7%) participants considered noise to be acceptable, while 95 (31.5%) considered it to be unacceptable. The biggest sources of noise were equipment noise (173, 30.9%) and team chatter (172, 30.7%). Regarding the classification of the working environment according to noise, the largest number of participants (111, 36.8%) considered it slightly uncomfortable, with the noisiest shift being the morning shift (172, 30.7%).

**Table 4–** Distribution of responses to the *NeoNoise Project Worker Questionnaire*

Variable	n (%)
<b>How would you rate the noise levels in your workplace?</b>	
Clearly acceptable	21 (7.0%)
Acceptable	138 (45.7%)
Unacceptable	95 (31.5%)
Clearly unacceptable	48 (15.9%)
<b>What are the main sources of noise in your workplace?</b>	
Noise from equipment	173 (30.9%)
Team chat	172 (30.7%)
Visits	71 (12.7%)
Healthcare procedures	39 (7.0%)
Other	105 (18.8%)
<b>In regards to noise, how would you classify your working environment?</b>	
Comfortable	67 (22.2%)
Slightly uncomfortable	111 (36.8%)
Uncomfortable	79 (26.2%)
Clearly uncomfortable	45 (14.9%)
<b>On which shift do you find the noise most annoying?</b>	
Morning	154 (51.0%)
Afternoon	51 (16.9%)
Evening	28 (9.3%)
Not applicable	69 (22.8%)

### 3.4. Comparison between WEMWBS and sociodemographic variables

Table 5 shows the results of the relationship between sociodemographic characteristics (gender, age group, marital status, profession, length of time in profession, shift work and place of work) and levels of well-being (total WEMWBS score). There were significant differences in the comparison between age group and levels of well-being ( $p=0.006$ ), with a higher age group being associated with a higher level of well-being. In addition to this, there are also significant differences in shift work ( $p=0.003$ ), with those who don't work shifts having higher levels of well-being.

*Table 5- Comparison between WEMWBS total scores and gender, age group, marital status, profession, length of employment, shift work and place of work*

	Variable	$\bar{x} \pm SD$	p value
Total Score WEMWBS	<b>Age group</b>		
	25-35 years	46.17±6.354	0.006
	36-45 years	47.03±8.210	
	46-55 years	48.32±8.500	
	56-65 years	51.54±7.007	
	Over 65 years	51.80±5.449	
	<b>Do you currently work shifts?</b>		
No	49.24 ±7.41	0.003	
Yes	46.48± 8.68		

Table 6 shows the results of the relationship between health professionals' workplace music listening habits and levels of well-being. Only significant differences ( $p=0.004$ ) were found between the reasons for listening to music and well-being. To identify which groups differed, a post-hoc test was carried out, as shown in Table 10. According to this, the significant difference is found in the 'To relieve stress' and 'Increase productivity' subgroups ( $p=0.037$ ), showing that participants who listen to music to relieve stress have higher levels of well-being than those who listen to music to increase productivity.

*Table 6- Comparison between WEMWBS total scores and questions related to music listening habits in the workplace*

	Variable	$\bar{x} \pm SD$	p-value
Total Score WEMWBS	<b>What is your main reason for listening to music at work?</b>		
	To relieve stress	46.44±7.138	0.004
	Increase productivity	53.09±7.803	
	Improve concentration	49.15±7.475	
	Entertainment	49.80±7.461	
	Other	53.43±4.825	

**Table 7- Post-hoc between the subgroups of “What is your main reason for listening to music at work?”**

What is your main reason for listening to music at work?		p-value
To relieve stress	Increase productivity	0.037
	Improve concentration	0.283
	Entertainment	0.249
	Other	0.106
Increase productivity	Improve concentration	0.497
	Entertainment	0.718
	Other	1.000
Improve concentration	Entertainment	0.997
	Other	0.599
Entertainment	Other	0.767

### 3.5. Comparison between WEMWBS and NeoNoise Project Worker Questionnaire

Regarding the relationship between levels of well-being and the perception of noise by healthcare professionals in their workplace, the results are shown in table 8, highlighting significant differences in the classification of the working environment in relation to noise ( $p=0.040$ ) and levels of well-being. In order to identify which groups have differences, a post-hoc test was carried out, as shown in table 9, which concludes that there is a significant difference ( $p=0.034$ ) between the levels of well-being of the groups who consider the working environment to be comfortable and clearly uncomfortable, with those who consider the environment to be comfortable in terms of noise having a higher level of well-being.

**Table 8- Comparison between WEMWBS total scores and the NeoNoise Project Worker Questionnaire**

	Variable	$\bar{x} \pm SD$	p-value
Total Score WEMWBS	In regards to noise, how would you classify your working environment?		
	Comfortable	50.40±8.785	0.040
	Slightly uncomfortable	47.97±6.960	
	Uncomfortable	47.63±7.706	
	Clearly uncomfortable	46.22±9.327	

**Table 9- Post-hoc between the subgroups of “In regards to noise, how would you classify your working environment?”**

In regards to noise, how would you classify your working environment?		p-value
Comfortable	Slightly uncomfortable	0.200
	Uncomfortable	0.157
	Clearly uncomfortable	0.034
Slightly uncomfortable	Uncomfortable	0.991
	Clearly uncomfortable	0.599
Uncomfortable	Clearly uncomfortable	0.778

#### 4. Discussion

This cross-sectional study assessed the level of well-being and perception of workplace noise among professionals at the São João Local Health Unit. The main objective of this study was to assess the population's levels of well-being and their relationship with the perception of workplace noise and sociodemographic characteristics such as age, gender, profession, among others.

Firstly, it should be emphasised that the results seem to reveal a moderate level of well-being among health professionals at ULS São João, given that the average total score obtained on the WEMWBS is 48.16 points out of a total of 70, which is above the instrument's mid-point.

Regarding sociodemographic characteristics, the results show that there are significant differences in the relationship between the sample's levels of well-being and their age group, indicating that well-being increases with age. Several studies agree with these results, stating that older individuals have more resources to maintain their level of well-being, despite the risks of physical deterioration and other age-related stress factors (Hansen & Blekesaune, 2022; LaFaver et al., 2018; West et al., 2018). This population also has a greater ability to adapt and find strategies to deal effectively with adversity. In addition, they are able to set appropriate and adjusted life goals and reduce their standards of comparison with others, factors that are shown to be adaptive responses on the part of these individuals in order to maintain a sense of well-being in adulthood (Blanchflower, 2021; Hansen & Blekesaune, 2022; Kratz & Brüderl, 2021).

The levels of wellbeing in the older population can also be related to Ryff's model of the eudemon view of wellbeing (Ryff, 1989) and the fact that its six components are already acquired at older ages, namely self-acceptance, personal growth, life purpose (which is probably already defined and/or achieved), positive relationships with others, mastery over the environment (such as stability in the workplace, without the need to apply for new jobs) and autonomy .

In addition to the relationship with age, significant results were found between well-being and shift work, with health professionals who do not work shifts showing higher levels of well-being. Shift work causes a desynchronisation of the circadian rhythm, representing a risk factor for the health of professionals (Rosa et al., 2019). Changes in the circadian rhythm, caused by changes in the daily sleep/wake cycle due to shift work, promote oxidative stress, inflammatory responses and the coagulation process, making the population more vulnerable to hypertension, diabetes mellitus (DM), obesity, atherosclerosis and other diseases. Due to decreased levels of attention and vigilance during the night, sleep deprivation and tiredness, working capacity is

affected by shift work, decreasing the efficiency of professionals and increasing the likelihood of errors. All these factors contribute to a decrease in the wellbeing levels of healthcare professionals who work shifts (Li et al., 2022).

Health professionals are also often subject to a high workload, both physically and emotionally, which can vary depending on the shift and have negative effects on well-being. These effects can also be persistent and felt not only during working hours but also during rest periods. Thus, workers may be prevented from recovering between shifts, which in turn leads to difficulties in maintaining restful sleep and potential conflicts between the roles assumed by the worker, such as work–family conflict (Rosa et al., 2019; Zaghini et al., 2020).

When comparing well-being and listening to music while at work, it was found that there are significant differences in the well-being levels of professionals depending on the reason they listen to music, with those who listen to music to increase productivity showing greater well-being than those who listen to music to relieve stress. This relationship can be explained by the fact that music activates the brain's reward system, releasing dopamine, which can improve mood and motivation. This process is comparable to the effects of external rewards such as caffeine, helping to increase alertness and promote a positive attitude during work. This effect is particularly useful in work environments with repetitive or monotonous tasks, where music can help maintain mood and motivation. In addition, it is known that music can act as a noise blocker in noisy workplaces, such as hospitals, which can interfere with and condition focus at work (Beins, 2023; Jiang & Duffy, 2021).

It is known that music is a complex stimulus which, thanks to brain neuroplasticity, can influence the brain and cause structural and functional changes in it, such as increasing the density of grey and white matter and the corpus callosum and promoting cortical remapping in areas related to musical performance. In addition, there is evidence that music improves cognitive, emotional, physical and social domains, contributing to the promotion of health and well-being (Ploukou & Panagopoulou, 2018; T. Zatar et al., 2024).

Finally, it was also identified that health professionals who report working in a comfortable environment in relation to noise have higher levels of well-being than professionals who perceive the working environment as clearly uncomfortable.

Noise, defined as unwanted sound, is considered a health risk factor (Das & Kishore, 2023). Health services are considered a noisy environment, exceeding the World Health Organization's guidelines on the maximum amount of noise that should be present in hospitals (WHO, 1999).

Exceeding noise levels in hospitals is detrimental to both users and health professionals, leading to increased levels of stress, fatigue and irritability, which reduces their well-being in the workplace (Das & Kishore, 2023; Denning et al., 2021; Kjosavik, 2018; Sigurdsson, 2021; Townsley et al., 2023; Zhou et al., 2020). It is also known that this damage depends on the acoustic characteristics of the sound, such as intensity or frequency – with loud and sudden noises being associated with more harmful effects – and non-acoustic characteristics, such as content or meaning. It should be emphasised that each individual can perceive the same noise differently, which means that the effects of exposure can also vary from individual to individual (Fiebig et al., 2020; Masullo et al., 2021; Zhou et al., 2020). This difference in individual perception of noise may explain why healthcare professionals categorise the working environment differently and identify different sources of noise.

In this sense, it would be important to implement strategies that could increase the well-being levels of professionals. According to the literature, therapeutic sessions with relaxation techniques such as yoga, meditation, acupuncture and even massage chairs are effective strategies in promoting the well-being of health professionals in health services where they have already been implemented. Creating weekly work targets by setting personal goals can promote teamwork and increase quality relationships with others, which is one of the components of the psychological well-being model (Buchanan et al., 2018; Cohen et al., 2023; Schroeder et al., 2018). In addition, creating and implementing music playlists according to personal preferences and/or soundscapes with nature sounds can contribute to promoting well-being (Cerwén et al., 2016; Masullo et al., 2021).

Several limitations were identified throughout this study. A key limitation was the small sample size, which restricted the generalizability of the findings and did not adequately represent all healthcare professionals at ULS São João. Additionally, the length of the questionnaire may have contributed to respondent fatigue, leading to incomplete responses or less thoughtful answers, potentially impacting the accuracy of the data. Another limitation was the reliance on self-reported data, which may be prone to bias such as social desirability or recall bias, where participants may have either downplayed or exaggerated their experiences. Furthermore, the cross-sectional nature of the study only captured a snapshot in time, preventing the observation of any long-term trends or causal relationships. Lastly, the study did not account for potential confounding factors such as individual baseline stress levels, which could influence perceptions of noise and well-being.

Future studies should address these limitations by utilizing larger and more diverse samples to improve generalizability, perhaps employing longitudinal designs to track changes over time. Researchers might also consider shortening or refining questionnaires to reduce participant fatigue and increase the accuracy of responses. Investigating strategies to minimize response biases, such as incorporating objective measures of well-being or noise exposure, would enhance data reliability. Additionally, it would be valuable to explore the efficacy of targeted interventions, such as noise reduction technologies or personalized music playlists, not only in healthcare professionals but also among patients and visitors in different healthcare settings. Expanding this line of research could uncover broader patterns and develop more comprehensive strategies for improving well-being in the healthcare environment.

## **5. Conclusion**

The results of this study suggest that health professionals at ULS São João have moderate levels of well-being. In this population, wellbeing increased with age and is higher in those who work fixed hours, listen to music to relieve stress and consider their working environment comfortable in terms of noise. These differences show us that, although the results are not pessimistic, there are still several aspects to improve, especially in terms of the excessive noise present in healthcare units, which affects the well-being and performance of healthcare professionals

This study thus represents a starting point for developing intervention programmes to reduce the harmful effects of noise in a hospital environment, and the implementation of playlists with music or nature sounds could be an effective strategy, but it should be studied.

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