

Claustrophobia in magnetic resonance imaging: A randomised controlled trial of immersive entertainment glasses

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ABSTRACT

Introduction: Patients who define themselves as claustrophobic are often unwilling to undergo closed magnetic resonance imaging (MRI). The aim of this research is to determine the effectiveness of immersive entertainment glasses and person-centred care to successfully perform an MRI and to reduce anxiety levels in individuals who identify themselves as having claustrophobia.

Methods: A randomized clinical trial was conducted in 2022 in an imaging department of a University Hospital. The MRI scans were performed using a 1.5T Signa Explorer MRI. Participants were randomly assigned to either the control group (CG), which received specific person-centred care for claustrophobia, or the intervention group (IG), which received specific person-centred nursing care plus immersive entertainment glasses. The sample size was 226 individuals (114 IG and 112 CG).

Results: A total of 189 participants (83.6 %) successfully completed the test from a cohort where previously 49.7 % couldn't complete the MRI. Lower body weight was associated with a higher likelihood of completing the MRI than higher body weight ($p = 0.01$). No statistically significant differences in anxiety were observed between the groups, nor in anxiety level changes during or after the test.

Conclusion: The high result in completing the test may be attributed to the fact that the actual impact is the person-centred approach more than immersive entertainment glasses.

Implications for practice: Patients who were previously unable to undergo MRI can now successfully complete the procedure in a significantly higher proportion of cases because of patient-centred care. This advancement improves diagnostic accuracy and supports better clinical decision-making and patient outcomes.

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Introduction

Magnetic resonance imaging (MRI) has become a commonly used radiological examination, employed to confirm specific diagnoses or monitor subject progress. Some individuals may

experience claustrophobia, anxiety, or be unable to complete the MRI, rendering it a challenging experience.^{1–3} These may include a sense of motion, a reduction in image quality, or even a premature conclusion. Such factors have the potential to negatively impact the procedure itself and the subject experience. Some authors

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have indicated that the prevalence of claustrophobia in the general population ranges from 4.2 % to 5.2 %, and that women have higher levels of anxiety and claustrophobia.⁴⁻⁹

Radiology departments hold a significant responsibility in providing comprehensive care to subjects undergoing an MRI, from the pre-procedure period through to the post-procedure phase. They must harmonize the scientific aspects of the radiology procedure with the humanistic care provided. Furthermore, they are responsible for identifying and managing any complications or challenges that individuals may encounter, even after they are discharged.⁸ Prior to the MRI, a thorough review of the person's medical history is conducted to identify any safety concerns that might contraindicate the procedure. Among these considerations is the potential for anxiety or claustrophobia, which are addressed through the implementation of specific interventions. Such interventions may include the provision of supplementary assistance and time, the guidance of individuals through relaxation techniques, or, in instances of greater severity, the administration of mild sedation or anaesthesia, as may be deemed necessary.¹⁰⁻¹²

In this context, it may be advantageous to consider alternative non-pharmacological interventions. Some innovative technologies have the potential to enhance the subject's experience and facilitate the MRI procedure. Examples of such technologies include ambience experiences,¹³ audiovisual system employing virtual reality (VR) technologies,¹⁴⁻¹⁶ the use of music as a distractor,^{15,16} and even interactive software game incorporating VR technology.¹⁷

The study aims to determine the effectiveness of immersive entertainment glasses (IEG) and person-centred care to successfully perform an MRI scan and to reduce anxiety levels in individuals who identify themselves as having claustrophobia. The IEG (Cinema Vision®, General Electric) (see [Image 1](#)) enhance patients' comfort by providing music and video content to reduce state anxiety.

Material and methods

Reporting Method: Following the EQUATOR guidelines and the CONSORT criteria for reporting parallel group randomized trials,¹⁸ we have ensured full compliance with the required standards.

Design

A single-blind randomized clinical trial was conducted from January to November 2022. Participants were randomly assigned (using a block randomization block size of 2×2) to either the control group (CG), which received specific person-centred nursing care for claustrophobia, or the Intervention group (IG), which received specific person-centred nursing care plus IEG with distracting content (goggles and headphones with a video of Ireland or the African continent, with open landscapes and relaxing music). The person-centred nursing intervention in the radiology setting focuses on providing individualized support to each patient during the X-ray procedure.

Setting of the study

The study was conducted in the Imaging Department in University Hospital MútuaTerrassa, a secondary-level centre in Catalonia, Spain, which performs approximately 20,000 magnetic resonance imaging (MRI) procedures annually. The MRI scans were performed using a non-open 1.5T MRI Signa Explorer with XP XV25, manufactured by General Electric. In this hospital, the usual procedure for people who describe themselves as claustrophobic is to refer them to another centre for an open MRI. In this study,

however, the investigators invited such patients to participate in order to improve the quality of the examination by trying a new approach, which included the option of being accompanied.

Inclusion and exclusion criteria and recruitment

Inclusion criteria were adults over eighteen years old that must undergo an MRI and meet all the following criteria: 1) self-reported fear of enclosed spaces; 2) fear of having an MRI; 3) refuse non-open MRI 4) acceptance to participate in the study.

Exclusion criteria were 1) MRI with breath-hold technique required; 2) be pregnant and 3) subjects undergoing regular treatment for an anxiety-related condition.

Patients who initially described themselves as claustrophobic were contacted again by phone and offered the opportunity to participate. All participants were informed that they could undertake the test with the new device in the non-open MRI scanner, which offered superior images, or decline the test and undergo an open MRI scan. If a subject declined, the research nurse returned the request to the referral unit, which followed the standard procedure for an external open MRI. Those who accepted were randomly assigned to either the control or experimental group.

Sample size calculation

Based on Munn's (2012) systematic review,¹⁹ which identified discrepancies in the efficacy of interventions to reduce anxiety, claustrophobia, sedation and non-compliance in medical imaging techniques, we estimate that a 20 % difference between groups would constitute a successful outcome. The sample size was therefore calculated based on the assumption that 70 % of participants in the intervention group (IG) and 50 % of participants in the control group (CG) would successfully complete the MRI procedure. This calculation was made with an alpha risk of 0.05 and a beta risk of less than 0.2, using two-sided hypothesis test. The estimated loss rate was set at zero, as withdrawals were replaced with other participants. The sample size was determined to be 206 persons (103 IG and 103 CG).

The assignment to the groups was done in a simple random, automated way using the Epidat 4.2 group randomization software.²⁰

Intervention

To implement person-centred care, all appointments were scheduled outside regular hours and on different days. The person-centred nursing intervention in radiology was designed to support patients with claustrophobia undergoing imaging procedures by providing individualised, holistic care. Nurses provided clear, personalised information about the procedure and addressed emotional needs such as anxiety or fear and promoted comfort and active participation throughout the imaging process. As part of the intervention, patients in the IG were provided with an immersive entertainment glasses (IEG) system, which comprised a video player with the capability to incorporate music and an acoustic alarm that would sound if the patient needed to stop the test. Additionally, the system incorporates a monitor that displays the patient's view in the control room.

Control group (CG)

Patients received specific test information and person-centred care from a radiology-specialized nurse while the MRI examination was being performed. Support techniques included verbal communication, the provision of a person-controlled alarm to

enhance the sense of safety, and counselling aimed at helping patients remain calm and focused during the MRI procedure.

Intervention group (IG)

In the Intervention Group, the imaging-specialised nurse provided the same standard support as in the Control Group. In addition, the nurse introduced the use of Immersive Entertainment Glasses (IEG) to distract patients and help them overcome claustrophobia. The IEG are supported by a Cinemavision system. This is an immersive entertainment system that is compatible with MRI equipment. It provides multiple audio and video options, including DVD, CD, Blu-ray, auxiliary inputs and other digital formats. It also provides two-way communication via a video visor, effectively reducing MRI gradient noise. Additionally, headphones are integrated into the system.²¹ Subjects were able to control the audio volume and utilise an alarm bell to enhance their sense of security.

The videos displayed during the MRI were presented with two options: Ireland 4K, a scenic relaxation film accompanied by calming music, and Africa 4K, a similar film set in Africa.^{22,23}

All participants (IG and CG) were permitted to be accompanied by an individual within the MRI room. This could be a family member, a companion, or a nurse.

Data collection and outcome measures

The participants were selected on a consecutive basis from individuals who had been requested to undergo an MRI scan and who had identified themselves as claustrophobic. They were drawn from the catchment area and randomly assigned to the two groups.

On the day of the appointment, the participant was provided with an information sheet that detailed the purpose of the study and the informed consent process. All subjects who met the inclusion criteria and signed the informed consent form were included in the study.

Outcome measurement was carried out by two of the researchers the day of the appointment. The data collection process included: Sociodemographic data (age, gender, weight), mental health background (checked in the clinical history with DSM-5-TR diagnoses), previous experiences: MRI type (open-closed), MRI entrance (head, feet, both), actual experience during the MRI: heart rate (before and after the MRI), MRI duration (min.), repeated sequences, test duration, and anxiety using the Spanish version of the State-Trait Anxiety Inventory (STAI)²⁴ before and after the MRI.

The primary outcome was to complete the test successfully, which was recorded as a dichotomous variable (i.e., “Yes” or “No”). Data was collected on paper forms and then transferred to a Microsoft Excel sheet (Excel 2016, Pro, Inc.).

Data analysis

A univariate and multivariate analysis were performed, as well as an inferential analysis to contrast the study hypotheses. The distribution and normality of the variables were evaluated using the Kolmogorov–Smirnov test. Univariate descriptive analysis was performed using frequencies, proportions or mean, median, standard deviation and IQR. In the case of continuous variables, comparison of means was performed using t Student's test or U the Mann–Whitney test according to normality. For the bivariate study, with the independent variable “MRI finished”, the Chi-square test was used for categorical variables and Student's t-test, as well as the analysis of variance or Kruskal–Wallis test

according to normality. The change in the anxiety variable was measured comparing the State STAI questionnaire before and after the MRI in both groups.

A multivariable logistic regression analysis was performed to assess factors associated with successful MRI completion. Results are presented as odds ratios (ORs) with 95 % confidence intervals (CI), representing the odds of successful MRI completion associated with each independent variable. Statistical significance was set at $p < 0.05$.

Statistical analyses were carried out with the Statistical Package for the Social Sciences (SPSS) Version 25.0 for Windows.

Ethics

This study was approved by the local Research Ethics Committee of local Research Ethics Committee of Fundació Assistencial Mútua de Terrassa with reference number P/I-095 (reference No. xxxxx) on July 6th, 2021, and was also registered at [ClinicalTrials.gov](https://www.clinicaltrials.gov) with ID NCT05304143.

All participants signed the informed consent to participate in the study, and the confidentiality and anonymity of the collected information was assured. Participants were informed that they could withdraw from the study at any time without consequences for their care, and only the investigators had access to the final trial dataset.

In cases where participants consented but were unable to complete the MRI due to claustrophobia or anxiety, standard safety procedures were followed. The nurse provided immediate support and assisted participants out of the scanner, and no further steps were taken without their agreement. They were informed that stopping the scan had no consequences and were offered counselling and the option to reschedule if appropriate.

Results

A total of 415 individuals self-identifying as claustrophobic were contacted during the recruitment period, of whom 139 (33.5 %) declined to participate in the study (see [Fig. 1](#)). Finally, the sample was composed of 226 subjects (114 subjects in the intervention group and 112 subjects in the control group).

The socio-demographic variables and the information about previous and actual MRI of the intervention and control group are presented in [Table 1](#).

As shown in [Table 1](#), the groups were comparable for all variables analysed, although in the intervention group the proportion of male participants was higher than that of female participants with a significance level of 0.05. In terms of relevant background, 86.7 % of the subjects had previously undergone at least one MRI, and 38.1 % reported a negative subjective experience that they attributed to their current claustrophobia. Furthermore, 43.8 % of the subjects had a documented medical history of mental health issues, with varying degrees of severity. However, it should be noted that not all these issues were directly relevant to the MRI scan. No significant differences were observed between the two groups in terms of the percentage of previous MRIs, the percentage of previous negative experiences, or the prevalence of mental health history. In addition, 49.7 % of subjects had to terminate a previous MRI scan prematurely, with no significant differences between the two groups.

Regarding the variables associated with pre-test anxiety, no notable discrepancies were observed between the two groups with respect to anxiety-trait (the intervention group exhibited a 69th percentile, while the control group demonstrated a 70th percentile; $p = 0.61$). Similarly, the level of anxiety-state prior to the test was at the 56th (IG) and 60th (CG) percentiles, with no statistically

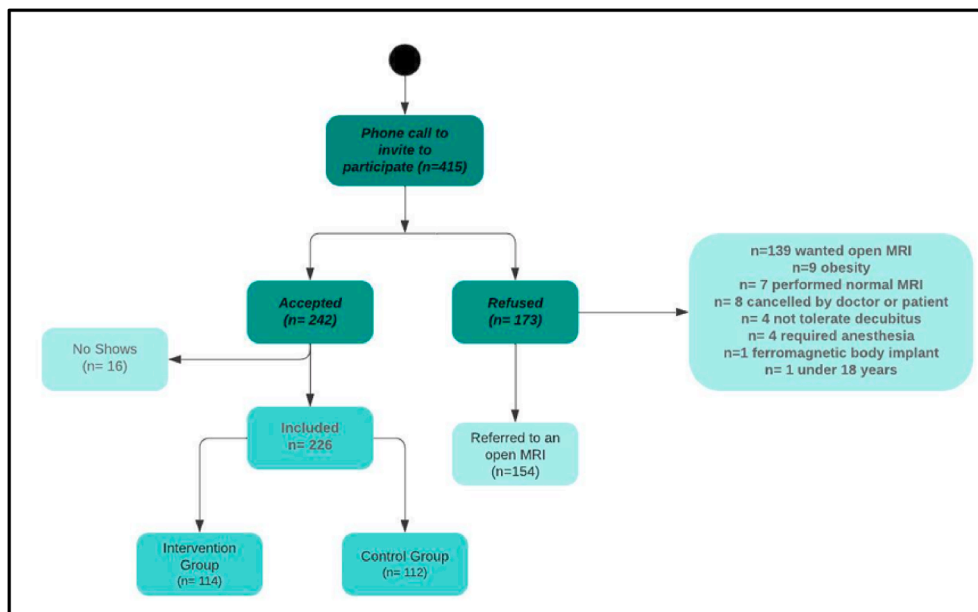


Figure 1. Selection process to include participants.



Image 1. IEG system and patient video projected in the unit control.

significant differences. The observed values were within the normal range of anxiety. Moreover, no statistically significant differences were identified between the two groups in terms of anxiety levels at the conclusion of the test, as well as in the change in anxiety levels throughout the test and at its conclusion (Table 2).

In terms of subjective assessment, the results are markedly positive in both groups, with no significant differences observed in the extent to which subjects “Would recommend the test” CG 8.4 (DS 2.4) vs IG 8.8 (2.2) ($p = 0.16$), “Repeat the test” CG 8.3 (SD 3) vs IG 7.6 (SD 3.8) ($p = 0.13$), or in the “Degree of global satisfaction” CG 9 (SD 2.2) vs IG 8.5 (SD 2.9) ($p = 0.14$).

Regarding the variable of test completion, which is the primary variable under investigation, the comparative results for each of the variables are presented in Table 3. It is noteworthy that 189 participants (83.6 %) were able to complete the test.

No statistically significant differences were identified in the variables under study, except for the weight variable. In this regard, a significant difference was observed between the two groups, with those who did not complete the resonance having a significantly higher average weight than those who did complete it.

The statistically significant difference observed in Table 3 for the variable ‘MRI Duration’ is not relevant as those who did not complete the test finished earlier as expected.

Multivariate logistic regression analysis

The multivariable logistic regression analysis of factors associated with the completion of the MRI are presented in Table 4. This analysis reveals that weight is the sole variable that exerts an influence on the completion of the test. Specifically, individuals with lower body weights are more likely to complete the MRI than those with higher body weights (OR 0.97, CI 95 % 0.95–0.99). However, the magnitude of this effect appears to be small.

Discussion

The present study demonstrates that a nursing person-centred approach enhances the success rate of performing MRI in individuals who define themselves as claustrophobic. Contrary to our initial hypothesis, the results indicated that there was no statistically significant difference between the two groups with respect to success. This suggests that the person-centred approach, when coupled with the creation of a tailored schedule and conditions, facilitated the completion of the MRI in both groups.

Our previous institution's protocol required that all claustrophobic individuals requiring an MRI be referred to an alternate centre for an open MRI. This resulted in reduced image quality,

Table 1

Results of the socio-demographic, antecedent variables and actual experience in MRI of the control and intervention group.

VARIABLES	Global	Control Group n = 112	Intervention Group n = 114	P value
Socio-demographic				
Age ^a	58.1(SD 12.5)	57.8 (SD 13.7)	58.3 (SD 11.1)	0.75
Gender n (%)				
Men	66 (29.2 %)	26 (23.2 %)	40 (35.1 %)	0.05
Women	160 (70.8 %)	86 (76.8 %)	74 (64.9 %)	
Weight ^b (kg)	73 (IQR 25)	73.5 (IQR 24)	73 (IQR 26)	0.99
Mental health background n (%)				
Yes	99 (43.8 %)	42 (42.4 %)	57 (57.6 %)	0.06
Non	127 (56.2 %)	70 (55.1 %)	57 (44.9 %)	
Previous experiences				
Previous MRI n (%)				
Yes	195 (86.7 %)	94 (83.9 %)	101 (89.4 %)	0.30
Non	30 (13.3 %)	18 (16.1 %)	12 (10.6 %)	
Number of previous MRI (mean (SD))				
Open	1.25 (SD 1.9)	1.15 (SD 1.6)	1.35 (SD 2.2)	0.39
Closed	1.76 (SD 2.0)	1.96 (SD 2.2)	1.57 (SD 1.8)	
MRI entrance n (%)				
Head	145 (86.3 %)	74 (89.2 %)	71 (82.6 %)	0.73
Feet	23 (13.7 %)	9 (10.8 %)	14 (17.4 %)	
Actual experience with MRI				
Heart rate ^a				
Before	83.6 (SD 16.4)	84.3 (SD 17.6)	82.5 (SD 15.5)	0.45
After	76.6 (SD 14.4)	78.4 (SD 16.4)	74.8 (SD 13.1)	0.09
MRI duration ^b (in minutes)	18 (IQR 10)	19 (IQR 9)	17 (IQR 9)	0.15
MRI entrance (%)				
Head	189 (83.6 %)	93 (83 %)	96 (84.2 %)	0.06
Feet	31 (13.7 %)	16 (14.3 %)	15 (13.2 %)	
Both	6 (2.7 %)	3 (50 %)	3 (50 %)	
Repeated sequences				
Yes	12 (6 %)	8 (8.2 %)	4 (3.9 %)	0.20
Non	189 (94 %)	90 (91.8 %)	99 (96.1 %)	
Anxiolytic during the MRI				
Yes	9 (4 %)	4 (3.6 %)	5 (4.4 %)	1.00
Non	215 (95.1 %)	107 (96.4 %)	108 (95.6 %)	

^a Mean (SD).^b Median and interquartile range (IQR) (does not follow the normal distribution).**Table 2**

Comparison of the anxiety variable (percentiles) between the two groups.

VARIABLES	STAI state PRE	STAI state POST	Difference (PRE-POST)	P value
Control group (CG)	60.6	65.1	-4.6	0.12
Intervention group (IG)	56.3	64.1	-7.8	
GLOBAL	58.4	64.6	-6.3	

transfer of the individual to another healthcare centre, and an additional financial burden to the primary hospital. The change in practice resulting from the implementation of the current protocol presents nursing imaging professionals with the challenge of managing claustrophobia in their daily practice. Thus, the current approach provides staff and facilities with the necessary tools to address this issue in a person-centred manner.

It is regrettable that the option to prove the new method is not applicable to all individuals. There is a cohort of people who are unable to undergo MRI due to their claustrophobia or their decision not to participate in such procedures. Consequently, this cohort will continue to undergo magnetic resonance imaging (MRI) in open magnets.

The success rate in completing the test is even greater when the profile of the participants is considered, as they are a group with a high prevalence of mental health background and negative experiences in previous MRI procedures. In this sense, various studies have demonstrated a correlation between mental health background and claustrophobia.^{25,26}

When sociodemographic variables were considered, only weight demonstrates a statistically significant correlation with test success. However, the magnitude of this effect was small,

suggesting that, although weight has a measurable impact, it may be of limited practical significance in predicting completion. While some literature addresses claustrophobia in MRI settings and its impact on the subject experience, the issue of weight is not directly addressed. Instead, the focus is on anxiety management, personal care during the procedure, and technique.^{9,27,28} In their analysis of imaging treatments, Bolderston et al. identified issues specific to obese participants. However, they recommended further investigation and did not establish a causal relationship between claustrophobia and obesity in MRI²⁹.

Another factor to be considered is the level of anxiety experienced by the participants both prior to and following the test. Regarding this, the level of anxiety, as measured by the STAI scale, after the test was found to be slightly higher than the previous values. This indicates that the procedure is a source of anxiety, but that the nursing accompaniment has enabled the levels to be controlled. The accompaniment has permitted the task to be completed without eliminating the anxiety experienced.

In relation to anxiety, Saliba et al. concluded that the use of virtual reality pre-MRI as a mock study resulted in a reduction in paediatric anxiety. However, in their study, no differences were observed between the various analyses conducted within the

Table 3

Comparison of variables examined according to whether the MRI was completed or not.

	MRI Finished n = 189	MRI Non finished n = 37	P value
Group			
Control group (CG)	95 (50.3 %)	17 (45.9 %)	0.63
Intervention group (IG)	94 (49.7 %)	20 (54.1 %)	
Sociodemographic data			
Age ^a mean (SD)	58.6 (SD 12.4)	55.4 (SD 12.7)	0.15
Weight ^b median (IQR)	72 (IQR 24)	78 (IQR 35)	0.01
Gender n (%)			
Men	53 (28 %)	13 (35.1 %)	0.38
Women	136 (72 %)	24 (64.9 %)	
Mental health background			
Yes	80 (42.3 %)	19 (51.4 %)	0.40
Non	109 (57.7 %)	18 (48.6 %)	
Previous experiences			
Previous MRI			
Yes	161 (82.6 %)	34 (17.4 %)	0.41
Non	3 (9.7 %)	28 (90.3 %)	
Negative previous experiences			
Yes	74 (39.2 %)	13 (35.1 %)	0.71
Non	115 (60.8 %)	24 (64.9 %)	
Characteristics of the actual MRI			
MRI entrance			
Head	119 (82.1 %)	26 (17.9 %)	0.76
Feet	20 (87 %)	3 (13 %)	
MRI duration ^b	19 (IQR 9)	5 (IQR 6.5)	<0.001
Headphones used			
Yes	120 (63.5 %)	12 (37.5 %)	1.000
Non	69 (36.5 %)	20 (62.5 %)	

^a Mean (Standard Deviation, SD).^b Median (interquartile range, IQR).**Table 4**

Multivariable logistic regression analysis of factors associated with successful MRI completion. Results are expressed as Odds Ratios (OR) with 95 % Confidence Intervals (CI).

Variables	OR	CI 95 %	P
Group (CG or IG)	0.837	0.386–1.815	0.6
Gender	1.072	0.421–2.728	0.88
Age	1.023	0.991–1.056	0.15
Weight	0.971	0.949–0.993	0.01
Mental health background	0.649	0.289–1.460	0.29
Previous MRI	0.587	0.155–2.218	0.43
STAI state PRE	0.990	0.966–1.014	0.40
STAI trait PRE	1.015	0.995–1.036	0.14

OR= Odds Ratio.

CI= Confidence Interval.

same group or between the control and experimental groups. In their article, the authors reported that while MRI success rates were not statistically significant, they nevertheless achieved high rates, as in our study.³⁰

The literature suggests that the prevalence of anxiety is higher in women. Fonseca-Pedrero et al. have shown that women tend to experience higher levels of anxiety, especially in STAI trait scores. These studies have also analysed the biological and psychosocial factors that explain why men and women experience anxiety differently.^{31,32} The present study revealed that the anxiety levels among participants were comparable. This outcome is interpreted as an indication that those who consented to participate exhibited confidence in their capacity to manage their anxiety through the support of health professionals. Furthermore, the anxiety measurement instrument, the STAI scale, already incorporated gender as a factor in its weighting.²⁴

The completion rates and overall satisfaction reported by participants were high in both groups. This result may be attributed to the fact that the actual impact is the accompaniment of the participant, which is a personalized and humanizing form of care.

The absence of a third intervention group with EIG without nurse accompaniment precludes the possibility of differentiating the impact of care from that of EIG.

A substantial body of literature exists in the field of imaging diagnostics that examines the efficacy of multiple interventions for the treatment of claustrophobia. However, the present study does not assess symptoms related to fear or anxiety of enclosed spaces (claustrophobia) or their severity. Rather, it is based on the subjective perception of the individual and their difficulty in accepting being in an enclosed space. Nevertheless, it would have been advantageous to have this measure available for correlation with whether the test was completed.

Limitations

This study has several limitations. First, the sample size calculation assumed a 20 % higher completion rate in the intervention group, which was not observed. A control group of claustrophobic patients receiving standard care was not included, as this was deemed unethical under the current protocol. Additionally, 33.5 % (154/415) individuals who self-identified as claustrophobic declined participation, introducing potential selection bias.

Another limitation of this study is that we did not assess patients' subjective experiences regarding the use—or absence—of virtual reality during the procedure. By not capturing experiential aspects such as comfort, anxiety, perceived distraction, or acceptability in each group, we may have missed meaningful differences in how patients responded to the presence or absence of VR, limiting our ability to fully interpret the impact of the intervention.

Finally, the severity of claustrophobia was not assessed using a validated questionnaire prior to MRI; however, the STAI scale—a validated measure of state and trait anxiety—was used to partially address this limitation.

Conclusions

The person-centred nursing approach, which was offered to individuals with claustrophobia interested in trying a new method, resulted in a superior subject experience, as indicated by higher levels of satisfaction and a greater likelihood of repeating the test. No statistically significant differences were observed between the groups that used IEG and those that did not. Despite these results, there is clear evidence that body weight, MRI duration and type of scan can be useful predictors of MRI completion.

The study is considered a success as it demonstrated a high percentage of subjects with a history of claustrophobia who completed the test. Additionally, some persons may potentially benefit from avoiding sedation or anaesthesia. In general, it is more convenient for patients not to require an additional hospital visit, and the images are of superior quality due to the use of a standard magnet, which provides images with greater diagnostic accuracy. Furthermore, the institution avoids the financial burden of paying for an MRI at another hospital. In this scenario, all parties involved—the person, the professional, and the institution—experience a net benefit.

Statistics submissions

The team includes a statistician, Dr. Olga Monistrol (OM).

Ethics approval and consent to participate

Ethical approval for this study was obtained by the local Research Ethics Committee of Hospital Universitari Mútua de Terrassa with reference P/21-095 on July 6th, 2021.

Written informed consent was obtained for anonymised patient information to be published in this article.

Availability of data

Data required for this study may be made available by the authors upon reasonable request.

Author contributions

OM, MD: Conceptualisation, Methodology, Software.

MD, CF, CC, OM: Data curation, Writing- Original Draft preparation.

IG, CC, MD, CF, OM: Visualisation, Investigation.

MD, OM, CF, CC, IG: Supervision.

OM: Software, Validation.

MD, OM, CC: Writing- Reviewing and Editing.

Ethical considerations

This study was approved by the local Research Ethics Committee of Fundació Assistencial Mútua de Terrassa with reference number P/21-095//on July 6th, 2021.

Participants signed the informed consent to participate in the study and the confidentiality and anonymity of the collected information was assured. The participants could withdraw from the study at any point. Only the investigators had access to the final trial dataset.

Generative AI use

During the preparation of this work the authors used DeepL/Write in order to improve fluency and accuracy by refining the text. After using this tool/service, the authors reviewed and edited

the content as needed and take full responsibility for the content of the publication.

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Conflict of interest statement

None.

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