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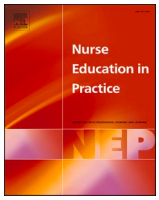

Effectiveness of debriefing after a short training on brief tobacco intervention for nursing students: A randomized clinical trial

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ABSTRACT

Aim: To determine the effectiveness of debriefing after the objective assessment of brief tobacco interventions (BTI) training and its changes after 3 and 9 months.
Design: Controlled clinical trial with random assignment by blocks.
Methods: 145 sec-year students enrolled in a 4-year nursing degree program participated in the study, with 80 in the intervention group and 65 in the control group. Training according to the 5As (Ask, Advise, Assess, Assist and Arrange) and 5Rs (Relevance, Risks, Rewards, Roadblocks and Repetition) model was provided to both the control and experimental groups as a brief tobacco intervention strategy in primary care. Presentation of three clinical scenarios through videotaped objective structured clinical examination (VOSCE) and assessment with the BTI-St© tool. Posterior debriefing with the experimental group. Descriptive statistical analyses, 2-factor repeated measures ANOVA. Each subject was measured 5 times. (ID protocol: NCT06564766)
Results: The time*group interaction results demonstrated significant differences with large effect sizes across all three scenarios. In the experimental groups, the most notable differences were observed immediately after the debriefing compared with baseline. Although these differences decreased over time, they remained present at 3 and 9 months in all scenarios relative to the baseline.
Conclusions: The inclusion of debriefing in a brief intervention for learning about BTI within the context of primary care of nursing students resulted in a significant increase in their learning and greater durability, at least after nine months.

1. Introduction

Tobacco consumption is a major health problem worldwide, as it has a high associated morbi-mortality and disability (Cornelius et al., 2020) and provokes the death of around 8 million people worldwide (World Health Organization, 2023). The average worldwide consumption prevalence shows a decreasing trend, from 22.7 % in 2007 to 19.6 % in 2019 (WHO, 2021). However, the prevalence in European countries is above the mean; in Spain, it has reached 2,08% (National Statistical Institute (INEbase), 2017). This problem requires the implementation of long-term and cost-effective interventions by health systems (López-Nicolás et al., 2017).

Brief tobacco interventions (BTI) are key elements in the care of the smoking pandemic (World Health Organization, 2014). Different organizations and institutions have proposed BTI based on the 5As (Ask, Advise, Assess, Assist and Arrange) and 5Rs (Relevance, Risks, Rewards, Roadblocks and Repetition) strategy as a model to follow (World Health Organization, 2017, 2014), as it is adaptable to all areas of health (A Clinical Practice Guideline for Treating, 2008). Studies have shown that the training of professionals in these types of interventions can improve the application of support measures for smoking cessation (Lindson et al., 2021). A special recommendation is the training of nurses; aside from being the largest group of health professionals, they are key professionals in addressing tobacco consumption (Youdan and Queally, 2005) and they also have a great potential for significantly contributing to maintaining tobacco abstinence in the long term (Rice et al., 2017). In addition, the WHO recommends including specific training courses on tobacco dependence and cessation in the study plans of health

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professionals (WHO, 2010).

Research has also shown that training on the management of smoking significantly improves the nursing student's intention to participate in smoke cessation activities, improving their skills and confidence (Choi and Kim, 2018; Pardavila-Belio et al., 2023; Zhang et al., 2021). However, many studies conducted in different countries point out that only about 33–40 % of nursing students receive this type of training in their study plans (Warren et al., 2009). Also, many of them perceive that they lack the knowledge and skills necessary for effectively conducting this intervention (Moxham et al., 2023).

A systematic review of nursing student training in smoking cessation focusing on BTI showed that collaborative learning was the most commonly used methodology, which used role-play, case-based discussion and high-fidelity simulation (Zhang et al., 2024). Generally, most educational strategies directed at nursing students on smoking cessation interventions, independently of their duration, the academic year where they are taught and either face-to-face or blended, have shown an increase in the knowledge, attitudes, self-efficacy and skills of the students (Zhang et al., 2024). Nevertheless, the learning results are mainly assessed through self-completed instruments, which may not necessarily reflect the real changes in knowledge or skills due to the inherent subjectivity of this type of assessment (van de Mortel, 2008).

In the training of health professionals, the objective assessment of BTI learning has been applied through the use of the objective structured clinical examination (OSCE) (Park et al., 2019) and the videotaped objective structured clinical examination (VOSCE) (El Hajj et al., 2022; Lucas et al., 2016). In the case of the VOSCE, two techniques have been used. In the first, the student performs a simulation with a standardized smoker, which is recorded on video and posteriorly assessed according to the criteria of experts through the use of a structured assessment (Hagimoto et al., 2018). In the second, the student watches and assesses, through a validated tool, scenarios recorded in a video that show a BTI performed by a professional and actors who interpret the smoker (Ramos-Morcillo et al., 2019). Despite the advantages of this type of tool, which allows for the efficient assessment of the competencies of students in clinical tasks, its use is not very frequent (Wadland et al., 2011). Perhaps this is due to the scarcity of instruments and the complexity of recording videos (Kiehl et al., 2014; Lucas et al., 2016; Wadland et al., 2011). This assessment methodology offers advantages in the learning of skills, especially when combined with active methodologies such as debriefing, at the same time turning the assessment of a scenario into a learning opportunity (Arabi and Kennedy, 2023).

1.1. Literature review

Debriefing is a key component of simulation-based nursing education. A meta-analysis of the effectiveness of debriefing methods revealed that meaningful learning and video-assisted debriefing are especially effective in enhancing critical thinking, reducing stress and increasing student satisfaction (Niu et al., 2021). In the studies published on the training of nursing students on smoking cessation interventions, debriefing is used as a key tool after the execution of role-play or simulation scenarios. Its objective is to reinforce the positive aspects of the experience and promote reflective learning (Shishani et al., 2013). Keiser and Arthur (Keiser and Arthur, 2021) defined debriefing or after-action review (AAR) as "a systematic technique that turns a recent event into a learning opportunity through a combination of task feedback, reflection and discussion". These characteristics allow this tool to be applied in multiple contexts and learning situations.

Debriefing after the objective assessment using OSCE or VOSCE can favor the effect of the training on students, as they receive comments on the task and how they can perform it more efficiently, making them reflect on their successes and errors (Beaird et al., 2017). Although some studies have tested this methodology, they have been directed toward assessing the impact of learning about pathology on medical students and the results did not provide conclusive results in favor of this intervention (Hungund et al., 2015). To our knowledge, this teaching strategy has not been applied in the training of smoking cessation interventions. However, there is a need to provide new evidence assessed with objective instruments that show their short-term reach.

2. Objectives and hypotheses

2.1. Aim

To determine the effectiveness of debriefing after the objective assessment of brief tobacco intervention (BTI) training in nursing students.

2.2. Objective

To assess the impact of debriefing on nursing students' knowledge and skills related to BTI immediately after training, as well as at 3- and 9-months post-intervention.

2.3. Research question/hypotheses

- Research Question: Does debriefing improve the retention of knowledge and skills related to BTI among nursing students over time?

Hypothesis: Nursing students who participate in debriefing after BTI training will demonstrate significantly greater knowledge retention and skill application at 3 and 9 months compared with those who do not receive debriefing.

3. Methods

3.1. Design

A controlled clinical trial with random assignment by blocks to assess the debriefing intervention compared with a non-debriefing intervention, with a follow-up consisting of 5 measurements for 9 months. Clinical trial protocol ID NCT06564766.

3.2. Study setting and sampling

The study was conducted with second-year students enrolled in a 4-year nursing degree program at the University of Murcia, Spain, in the second term of the academic years 2021–2022 and 2022–2023.

The sample size was calculated using the Pass 11 software (Power Analysis & Sample Size) for the repeated measures ANOVA test (Muller et al., 1992). A repeated measures design with one between factor and one within factor has two groups with 65 subjects each for 130 subjects. Each subject is measured five times. This design achieves 100 % power to test the AB interaction if a Geisser-Greenhouse Corrected F Test is used with a 5 % significance level and the actual effect standard deviation is 1.

3.3. Inclusion criteria

The inclusion criteria were enrollment in the second-year Community Health Care course, where BTI training is provided and acceptance to participate in the study. In the two academic years where the research took place, 284 students enrolled in the course.

Of the 284 students eligible to participate in the study, 261 accepted. The study employed a block randomization method with blocks of 13–16 students corresponding to the existing laboratory groups. Each block was randomized separately, aiming to ensure an equal distribution of participants between the intervention and control groups. The allocation sequence was generated in advance and sealed, sequentially numbered envelopes were used to conceal group assignments until the

moment of intervention, managed by a researcher not involved in delivering the interventions to prevent bias. While the intention of the block randomization was to create groups of equal size, a slight initial difference was observed, with 129 students allocated to the intervention group and 132 to the control group (see Fig. 1). This minor disparity could be attributed to the variable size of the blocks (13–16 students) used in the randomization process.

3.4. Main outcome: competence (VOSCE and instrument)

The competence of students in both groups (EG and CG) was evaluated alongside the research using the Videotape Objective Structured Clinical Examination (VOSCE). Students were shown three video-recorded clinical scenarios (problem-videos) with standardized patients, where a nursing professional performs a brief tobacco intervention (BTI) with a patient who visits the primary care consultation, following the 5As and 5Rs model. The videos showed three habitual situations that may be encountered in clinical practice, including patients in different phases of change: contemplation and preparation for action. The following scenarios were raised: the patient was not willing to quit smoking (scenarios 1 and 2) and the patient was willing to stop smoking (scenario 3). For example, a 45-year-old patient with hypertension attends a routine nursing appointment. During the consultation, the nurse asks about smoking habits, offering brief counseling and resources to support cessation following the 5As model. Besides, the three scenarios showed common mistakes in this type of intervention and the students had to detect them using the previously validated BTI-St© assessment tool.

The VOSCE was developed using a Delphi methodology with a multidisciplinary panel of experts to ensure content relevance and clarity. It was subsequently piloted with nursing students to evaluate its comprehensibility, realism and technical quality. Full details of the development and testing process are available in a previously published article (Ramos-Morcillo et al., 2019).

To assess the change in the learning of the brief advice on tobacco cessation in nursing students, the Brief Tobacco Intervention BTI-St© tool was used using the problem-videos with standardized patients described above. This instrument is based on the test model of criterion or a competence test, which allows for objectively assessing the students' performance in BTI and detecting learning deficiencies. It is shaped as an algorithm composed of 23 dichotomous items organized according to the 5As and 5Rs model, with adequate validity and reliability (Ramos-Morcillo et al., 2019). For example, in the first A: ASK "Do you currently use tobacco?" there are four items on which the student must decide whether they have been carried out in the scenario: *1. Classifying the person as non-smoker or ex-smoker; 2. Recording in their*

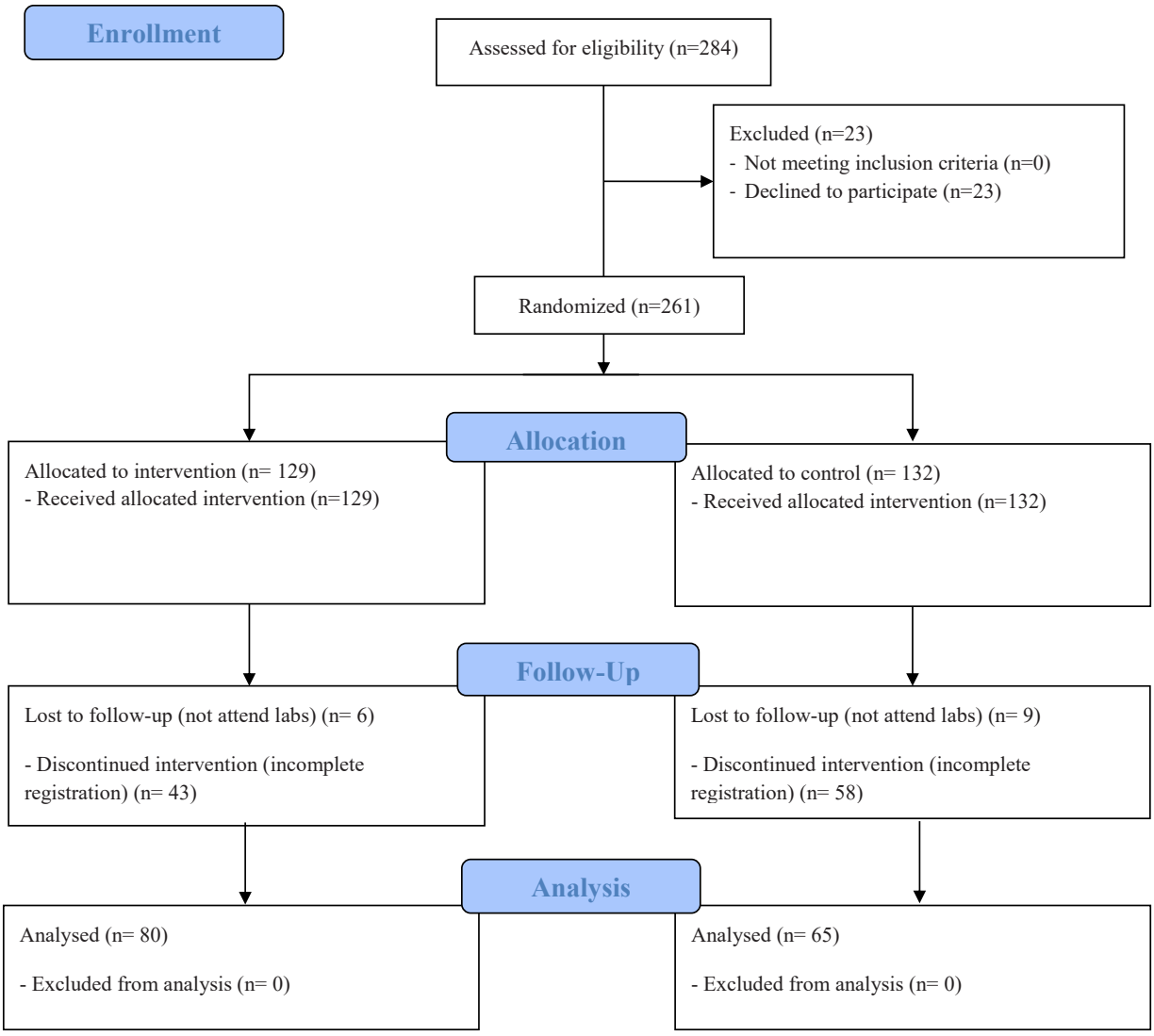

Fig. 1. Consort Flow Diagram.

clinical history; 3. Offering positive reinforcement and 4. Asking about exposures to passive smoking and offering advice if necessary. The whole instrument and items can be consulted in the validation publication (Ramos-Morcillo et al., 2019).

The students must watch a video-problem scenario and answer whether it meets the criteria of a smoking cessation brief intervention. The answers are corrected according to the gold standard pattern defined in the scenarios' validation and the scores of the items oscillate between 0 (not correct) and 1 (correct). If the students correctly answer all the items, the maximum score of the scenarios posed is from 0 to 1.

3.5. Study intervention

Both the experimental group (EG) and control group (CG) received 2.5 hours of training on BTI in groups of 13–16 students at the Community Health Care course labs according to their standard schedule. The contents included 1) general aspects and epidemiology of smoking, 2) passive smoking, 3) evidence for the effectiveness of anti-smoking interventions and 4) addressing smoking in Primary Care as proposed by the WHO, according to the 5As and 5Rs model to help patients stop smoking (World Health Organization, 2014). This model presents the five main steps of the 5As (Ask, Advise, Assess, Assist and Arrange) to provide a brief intervention in the area of primary care and the 5Rs (Relevance, Risks, Rewards, Roadblocks and Repetition) that must be addressed if the smoker is not willing to quit smoking at the present time.

After the training, the competence of the students in both groups (EG and CG) was assessed using the Videotape Objective Structured Clinical Examination (VOSCE) and the Brief Tobacco Intervention BTI-St© tool. Only the experimental group took part in a debriefing session regarding their observed clinical scenarios, whereas the control group did not attend this session.

Based on Cheng's systematic review (Cheng et al., 2014) the debriefing had the following characteristics: it was short (≤ 15 minutes), led by an experienced instructor, focused on healthcare management or decision-making and used the plus-delta tool. This tool involved participants reflecting on the simulation, evaluating their performance and identifying both their successes and areas for improvement (Cheng et al., 2021). The instructor verified in each video the exact moment when the intervention was or was not carried out and the more complex aspects were discussed. The students and the instructor in charge of the debriefing analysis were unaware of whether the group was experimental or control.

3.6. Data collection

Data were collected at five different time points (measurements) for both the EG and CG (Fig. 2):

T0 (Baseline): Before the BTI training, in the first month of the Community Nursing course (first week of February 2022 and 2023).

T1 (Post-Training): After the students in both groups received the 2.5-hour BTI training.

T2 (Post-Debriefing): This was conducted immediately after the debriefing session for the EG and the CG at the end of the first day of the intervention.

T3 (3 months): Three months after the training (May 2022 and 2023).

T4 (9 months): Nine months after the training (November 2022 and 2023).

At each measurement time point, all students watched the same three video-recorded clinical scenarios and completed the BTI-St© assessment tool to evaluate their learning and ability to detect errors in the BTI.

3.7. Data analysis

Descriptive, mean and standard deviation analyses were performed for the quantitative variables and frequencies and percentages for the qualitative ones. According to the nature of the variable to be compared, Student's t and Chi-square tests were used to compare the variables studied between the control and experimental groups.

The overall score for each student in each of the three cases was calculated and it was weighed by the number of items they had to answer. Thus, the score in each case could oscillate between 0 and 1. To analyze the differences in intra-subject and inter-subject means, a 2-factor repeated measures ANOVA was used. The assumption of this test was the condition of sphericity and in the case of not meeting the assumption, a multivariate approach was used that does not need for the variance-covariance matrix to be spherical or the F statistic with the degrees of freedom modified with the ε correction index (Greenhouse-Geisser estimation) (Pardo Merino and San Martín Castellanos, 2011). In the statistical analysis, a significance level of 5 % ($p \leq 0.05$) was used. The SPSS® v. 25 (Statistical Package for the Social Sciences) software was used to analyze the data.

3.8. Ethical consideration

The study was approved by the Ethics Committee of the University of

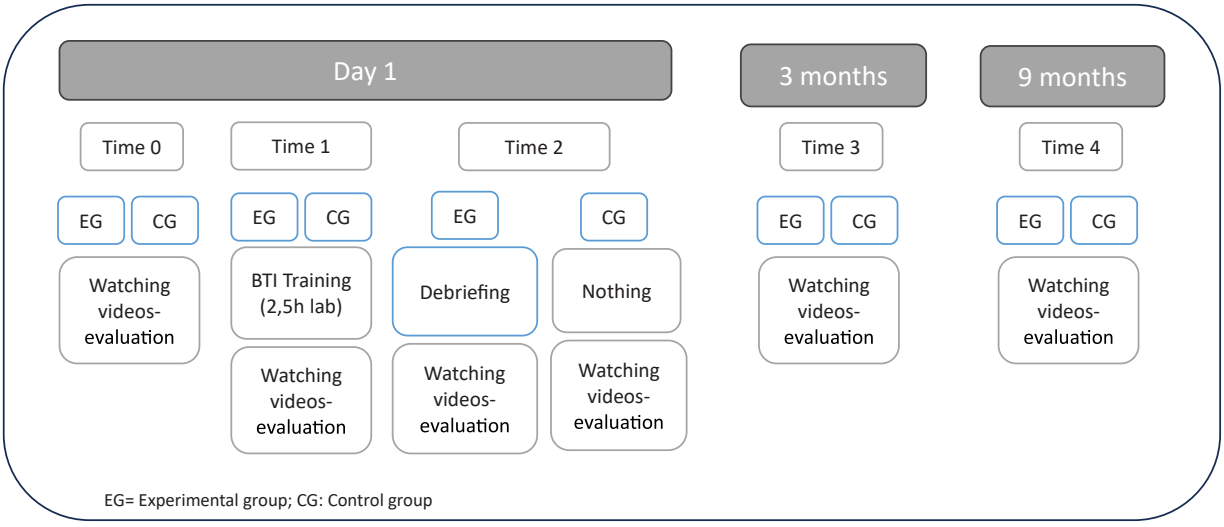

Fig. 2. Intervention protocol for the different measures in the control and experimental groups.

Murcia (ID: 1968/2018). All the procedures followed the ethical guidelines from the Declaration of Helsinki. After explaining the object of study and the ethical guarantees, the students' participation was voluntary. The anonymity of the students was maintained and the confidentiality of the data obtained was ensured by creating a personal code.

4. Results

4.1. Characteristics of the sample

The final sample comprised 145 students enrolled in the second year of the Nursing Degree, which is a 4-year program, 80 students in the intervention group and 65 in the control group. The flow of participants through the study, including the initial group sizes and the reasons for attrition, is detailed in the Consort Flow Diagram (Fig. 1).

The sample had a mean age of 20.81 (SD=5.09) and 79.3 % were women. No significant differences were found according to age (20.60 vs 21.08 years, $p = 0.57$) and sex (77.5 % vs 81.54 % women, $p = 0.55$) of the participants according to the group they belonged to.

4.2. Impact of the debriefing over the 9 months

The intra-subject and inter-subject analyses provided different results in both groups in each case (Table 1). In scenario 1, the results of the effect of the time*group interaction showed statistically significant differences ($p < 0.001$), which meant that the change trends in the BTI scores were different in both groups, with a large effect size ($\eta 2$=0.98). In the pairwise comparison of the different measurements in both groups (control and experimental), a statistically significant difference was observed in the baseline measurements (T0), after the training and debriefing (T2) and after nine months (T4) (Fig. 3).

In scenario 2, just as in the previous one, the results of the effect of the time*group interaction showed statistically significant differences ($p < 0.001$), which indicated that the change trends in the BTI scores were different in both groups, with a large effect size ($\eta 2$=0.99). In the pairwise comparison of the different measurements in both groups, a statistically significant difference was observed between both groups only after the training and debriefing (T2) (Fig. 3).

Lastly, in scenario 3, the results of the effect of the time*group interaction showed statistically significant differences ($p < 0.001$), which indicated that the change trends in the BTI scores were different in both groups, with a large effect size ($\eta 2$=0.98). In the pairwise comparison between the different measurements in both groups, a statistically significant difference was observed after the training and debriefing (T2) after 3 (T3) and nine months (T4) (Fig. 3).

In the intra-subject changes produced, it was observed that in the control group, the implementation of the BTI training showed significant differences with respect to the baseline measurement, pointing to a weak improvement of the competence of the students in scenario one after three months and scenario two after the training and after three months, while this effect was not observed in scenario 3. In the experimental group, statistically significant differences were produced after the training in scenarios 1 and 2 and the most important differences were observed after the debriefing, as compared with the baseline, with these statistically significant differences decreasing but otherwise maintained with respect to the baseline measurement, after 3 and 9 months in all three scenarios (Table 1).

5. Discussion

The main objective of this study was to assess whether incorporating an active learning methodology, such as debriefing, into the traditional teaching of a BTI could significantly enhance nursing students' competencies in smoking cessation up to nine months after the interventions. The research was conducted at a public Spanish university with second-

Table 1
Comparison of the BTI ST© scores in the three scenarios across the five measures between the control and experimental groups.

	T0		T1		T2		T3 (3 months)		T4 (9 months)		Within-subject				Between Time*group	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*	*p*	*η2*	*F*	*p*	*η2*
Scenario 1																
Control	$0,70^{3}$	0,17	0,76	0,14	0,73	0,14	$0,78^{0}$	0,15	0,71	0,21	5,10	< 0,001	0,25	8514,71	< 0,001	0,98
Experimental	$0,63^{1,2,3,4}$	0,21	$0,77^{0,2}$	0,14	$0,95^{0,1,3,4}$	0,12	$0,78^{0,2}$	0,21	$0,78^{0,2}$	0,19	37,24	< 0,001	0,66			
Scenario 2																
Control	$0,68^{1,3}$	0,17	$0,78^{0,2}$	0,12	$0,74^{1}$	0,14	$0,79^{0}$	0,11	0,74	0,17	10,79	< 0,001	0,41	12875,77	< 0,001	0,99
Experimental	$0,68^{1,2,3,4}$	0,18	$0,78^{0,2}$	0,12	$0,95^{0,1,3,4}$	0,14	$0,80^{0,2}$	0,13	$0,76^{0,2}$	0,15	33,60	< 0,001	0,64			
Scenario 3																
Control	0,56	0,17	0,59	0,14	0,58	0,13	0,61	0,11	0,59	0,18	2,02	0,100	0,12	6857,33	< 0,001	0,98
Experimental	$0,56^{2,3,4}$	0,20	$0,61^{2,3,4}$	0,15	$0,93^{0,1,3,4}$	0,16	$0,74^{0,1,2}$	0,12	$0,72^{0,1,2}$	0,15	52,31	< 0,001	0,73			

T0, T1, T2, T3, T4 = Measurement time; **M**= Mean; **SD**= Standard Deviation; **η2**= eta square; **p** =P -value; **F**= F statistic value
$^{0, 1, 2, 3, 4}$ indicates the measurement with statistically significant differences with $p < 0.05$ in the pairwise analysis.

Fig. 3. Line graphs of the changes in the three measurements in the experimental and control groups across the three scenarios.

year students enrolled in the Nursing Degree program, who received this training as part of the Community Health Care course. This approach differs from typical practices in Spain, where the teaching of these competencies mainly occurs in the 3rd and 4th years of the degree. Thus, this study provides a new perspective by introducing this training earlier in the academic curriculum (Martínez et al., 2023).

Firstly, our findings indicate that after a brief, face-to-face training session lasting approximately 2.5 hours, students improved their competence in developing a brief smoking cessation intervention (BTI) based on the 5As and 5Rs model. However, its effectiveness was not evident in every scenario and the overall impact was modest. The results were comparable to those from other studies, where brief teaching interventions (3–4 hours) enhanced the attitudes and self-perception of nursing students, albeit with small effect sizes (Cohen's d: 0.05–0.46) (Schwindt et al., 2014).

In our case, our findings confirmed that the students in the experimental group who participated in the debriefing significantly improved their BTI competence, achieving very high scores immediately after the intervention, with a notable increase compared with the baseline competence. This improvement was maintained after three and nine months, although a decrease in magnitude was observed over time. Our results support the notion that debriefing can yield important outcomes that persist for up to nine months following the training, aligning with other studies that employed active teaching methodologies, which demonstrated learning retention lasting 3–6 months post-training session (Ho et al., 2022; Zhang et al., 2021). As shown in the training of other nursing curricula, the addition of debriefing to teaching helps students develop confidence, critical thinking, encourages reflection and enhances the acquisition of competencies (Alanezi et al., 2025; Bradley et al., 2020; Fung et al., 2021).

Debriefing has sufficiently shown its usefulness as part of simulation-based learning (Fegran et al., 2023; Sohn et al., 2012) The novel aspect of our findings is that they support its use after the objective assessment of video-recorded clinical scenarios so that the scenario assessment also becomes a learning situation. Its practical simplicity and efficiency are based on the complex interaction of three fundamental psychological principles: feedback, observational learning and the modeling of behavior and the establishment of objectives (Keiser and Arthur, 2021).

Structured debriefing methods (Lee et al., 2020) and structured collaborative reflection-based debriefing in virtual simulation have been shown to be more effective (Yun and Kang, 2024). Our intervention was based on a standardized theoretical model that facilitates the implementation of structured debriefing using the Plus/Delta tool. This approach was integrated with the analysis of clinical scenarios that were specifically designed for their assessment with the BTI-St© tool (Ramos-Morcillo et al., 2019). The combination of these elements allowed for greater coherence in the assessment of learning, optimizing the educational impact of the intervention. As pointed out in other studies, the addition of external data sources (videos with standardized clinical scenarios) to the reflections of students can counteract the biases and erroneous perceptions that emerge from the subjective analysis of the students (Cheng et al., 2021).

One of the strengths of the results is that they were assessed for nine months through the use of the BTI-St© tool (Ramos-Morcillo et al., 2019), an objective tool that allows for the quantification of the effects with a lower possibility of bias. This methodology establishes a consensus between the examiners when previously determining a standardized criterion, it increases the objectivity of the assessment and allows for the assessment of a large number of students (Humphris and Kaney, 2000; Vivekananda-Schmidt et al., 2007). Thus, the use of a validated tool and the use of problem-videos facilitated the simultaneous assessment of the students when the case was equally presented to all of them so that the variation in performance may be mainly due to the individual learning of the student, rather than the characteristics of the case (Hulsman et al., 2006). This type of assessment has already been previously used in the training of health science students, although using assessment rubrics that require the participation of experts (Koole et al., 2012) or self-evaluation questionnaires, which limits its use due to the subjectivity of the instrument (Coyne et al., 2018).

In our research, the students were presented with three clinical simulation scenarios of a brief tobacco intervention (BTI) featuring standardized patients that were recorded on video (problem-videos), following the 5 As and 5 Rs model. The cases had different levels of difficulty: scenario 1 was low, scenario 2 was medium and scenario 3 was high. Although the debriefing's positive effect was shown in all three scenarios, the itemized analysis of the results indicated a greater long-term effect in the scenario with the highest difficulty. These findings suggest that the difficulty of the scenario was a factor to consider for three reasons: 1) if could be motivational for the student, especially those with the greatest difficulty (Feng et al., 2024); 2) this characteristic must be taken into consideration in a context where the scenarios have different levels of difficulty and their progressive presentation facilitates learning and reduces stress (Bellido-Esteban et al., 2021); and 3) the higher cognitive effort forces them to perform a deeper level of information processing, which results in the need to consider the meaning of what is being processed (Tulving and Craik, 2000), thereby facilitating learning that is longer lasting and better established.

5.1. Strength and limitations

Among the limitations of the study, we find the self-selection bias, as the students could opt to participate or not. This perhaps resulted in a higher participation of students who were more motivated. On the other hand, we identified a final difference in the size of the intervention and control groups. While the initial randomization aimed for comparable groups, differential attrition due to students not attending labs or incomplete registration led to this disparity. However, the statistical analysis, a 2-factor repeated measures ANOVA, is robust for comparing changes over time between groups, even with slightly different sizes.

Additionally, in case 1, the control group obtained a higher baseline score than the experimental group, although the differences were not clinically relevant and were equalized in the second measurement. This suggests that the groups were comparable in terms of progress and response to the intervention. In addition, the present research was only centered on assessing the learning of BTI competencies without providing direct evidence that the training effectively increased the frequency of interventions in their future as nurses.

5.2. Recommendation for further research

Future challenges in this area involve examining the long-term impact of debriefing beyond nine months to assess sustained skills and knowledge. Research should also explore its effectiveness across diverse nursing student populations and settings. Additionally, strategies for integrating debriefing into nursing curricula require evaluation. Importantly, further investigation is necessary to demonstrate the effectiveness of this methodology in achieving final outcomes, such as the successful implementation of tobacco cessation interventions by graduates in their professional careers practice.

5.3. Implications for policy and practice

There is still much to be done in the training of nursing students about smoking cessation. A study conducted in Spain with a sample of 4381 students revealed that only 33.4 % received training on how to help smokers stop smoking (Martínez et al., 2023). In addition, nursing programs tend to focus on the effects of smoking on health, ignoring practical aspects, such as how to provide support to smokers during their process of smoking cessation (Petersen et al., 2017; Sreeramareddy et al., 2018). Given that nursing students are future health professionals, it is fundamental to integrate education interventions about smoking cessation, such as the one studied in their undergraduate training. These interventions are not only cost-effective and easy to implement but also promote responsibility in addressing smoking, improving their knowledge and skills to help patients stop smoking.

6. Conclusions

Incorporating debriefing into a brief intervention for learning BTI in the context of primary care for nursing students significantly enhances learning and its retention over time, lasting at least up to 9 months. When nursing students receive training with appropriate tools, they are better equipped to contribute meaningfully to efforts in smoking cessation. This type of training could serve as a valuable and engaging option for nursing faculties if integrated into their curricula, potentially resulting in future nurses executing effective interventions in BTI.

CRediT authorship contribution statement

Suarez-Cortes Maria: Writing – review & editing, Resources, Methodology, Investigation, Conceptualization. **Leal Costa César:** Writing – review & editing, Supervision, Software, Methodology, Investigation, Formal analysis, Data curation. **Ramos-Morcillo Antonio Jesús:** Writing – original draft, Supervision, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Ruzafa-Martínez Maria:** Writing – review & editing, Writing – original draft, Validation, Supervision, Resources, Methodology, Investigation, Formal analysis, Conceptualization. **Molina-Rodríguez Alonso:** Writing – review & editing, Resources, Methodology, Investigation, Conceptualization.

Patient consent statement

No Patient or Public Contribution.

Ethics approval statement

The study was approved by the Ethics Committee of the University of Murcia (ID: 1968/2018). All the procedures followed the ethical guidelines from the Declaration of Helsinki. After explaining the object of study and the ethical guarantees, the students' participation was voluntary. The study met the requirements established by EU Regulation 2016/679 of the European Parliament and the Council from 27 April 2016 on the General Data Protection Regulation (GDPR).

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Not applicable

Clinical trial registration

Trial Register: ClinicalTrials.gov. Clinical trial registration number: NCT06564766. Registration website: https://clinicaltrials.gov/study/NCT06564766

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Data availability

The data and analyses from this study will be made available by the authors upon reasonable request for academic and scientific review purposes. Data sharing will be conducted in accordance with legal requirements and ethical principles regarding the protection of personal data.

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