

The ENDO-Study: A qualitative study to assess the impact of a short film on medical students' understanding and perception of endometriosis.

ENDO-Study: Un estudio cualitativo para evaluar el impacto de un cortometraje en la comprensión y percepción de la endometriosis por parte de estudiantes de medicina

Carlos Santiago Piñel Pérez^{1*}, Rosendo Alfonso González², Eva Álvarez García³, Alfonso Durán Somacarrera⁴, Alejandra Irazola Laguna⁵, María José Gómez-Roso Jareño⁶

¹ Servicio de Ginecología y Obstetricia del Hospital Viamed Santa Elena (Madrid), Servicio de Ginecología y Obstetricia del Hospital Quirónsalud San José (Madrid) y Profesor Asociado de la Universidad Europea (Madrid); carlos.s.pinel@gmail.com, <https://orcid.org/0000-0001-6647-8718>

² Estudiante de Medicina de la Universidad Europea (Madrid) ; rosendoalfglez@gmail.com

³ Estudiante de Medicina de la Universidad Europea (Madrid) ; evalgar2000@gmail.com

⁴ Estudiante de Medicina de la Universidad Europea (Madrid) ; info.somacarrera@gmail.com

⁵ Estudiante de Medicina de la Universidad Europea (Madrid) ; alejandrairazola@gmail.com

⁶ Servicio de Ginecología y Obstetricia del Hospital Viamed Santa Elena (Madrid), Servicio de Ginecología y Obstetricia del Hospital Quirónsalud San José (Madrid) y Profesora Asociada de la Universidad Europea (Madrid); mariajose.grj@gmail.com, <https://orcid.org/0000-0001-6436-8419>

* Correspondencia: carlos.s.pinel@gmail.com

Recibido: 14/11/24; Aceptado: 11/12/24; Publicado: 13/12/24

Abstract: This study investigates the effectiveness of a short film, *END-O*, as an educational tool for enhancing medical students' understanding of endometriosis and its impact on patients' quality of life. Endometriosis, a prevalent yet often underdiagnosed condition affecting women, presents significant physical and emotional challenges. A qualitative approach was employed, involving 23 sixth-year medical students randomly assigned to either a study group (n=11) that viewed the film or a control group (n=12) that did not. Following a lecture on endometriosis, both groups completed questionnaires assessing their understanding and perceptions of the disease. The study group demonstrated significantly greater recognition of symptoms ($p = 0.005$) and expressed more detailed insights regarding the disease's impact on life, including emotional and social dimensions. The findings suggest that the film effectively promotes empathy and a deeper understanding of endometriosis among future healthcare providers, highlighting the importance of integrating humanistic approaches in medical education. This intervention may contribute to addressing the critical underdiagnosis and undertreatment of endometriosis.

Key words: endometriosis; empathy; compassion; understanding; medical students; short film

Resumen: Este estudio investiga la efectividad de un cortometraje, *END-O*, como herramienta educativa para mejorar la comprensión de los estudiantes de medicina sobre la endometriosis y su impacto en la calidad de vida de las pacientes. La endometriosis, una afección prevalente pero a menudo infradiagnosticada que afecta a mujeres, presenta importantes desafíos físicos y emocionales. Se empleó un enfoque cualitativo, involucrando a 23 estudiantes de medicina de sexto año, asignados al azar a un grupo de estudio (n=11) que vio el cortometraje o a un grupo de control (n=12) que no lo vio. Después de una clase sobre endometriosis, ambos grupos completaron cuestionarios que evaluaban su comprensión y percepción de la enfermedad. El grupo de estudio mostró un reconocimiento significativamente mayor de los síntomas ($p = 0,005$) y expresó ideas más detalladas sobre el impacto de la enfermedad en la vida, incluyendo sus dimensiones emocionales y sociales. Los resultados sugieren que el cortometraje promueve eficazmente la empatía y una comprensión más profunda de la endometriosis entre los futuros profesionales de la salud, resaltando la importancia de integrar enfoques humanísticos en la educación médica. Esta intervención podría contribuir a abordar el problema crítico del infradiagnóstico y el tratamiento insuficiente de la endometriosis.

Palabras clave: endometriosis; empatía; compasión; comprensión; estudiantes de medicina; cortometraje

1. Introduction

1.1 Endometriosis

Endometriosis is a chronic disease associated with pelvic pain and infertility (1). There are various types of endometriosis, the most common being ovarian endometriotic cysts (endometriomas), superficial peritoneal lesions, and deep endometriosis, characterized by infiltrative lesions in the peritoneum, muscle tissue, or neighboring organs. These endometriotic lesions are histologically defined by the presence of ectopic endometrial glands and stroma (2). While definitive diagnosis is histological, current clinical examinations and imaging techniques enable less invasive diagnostic methods. In addition to infertility, the clinical manifestations mainly include pelvic symptoms such as pelvic pain, dysmenorrhea, and dyspareunia. However, endometriosis is increasingly regarded as a systemic disease with multiple areas of impact.

Endometriosis affects 5-10% of women of reproductive age (1). It is present in 50-80% of women with pelvic pain and in 50% of women with infertility (3). Despite its high prevalence, the disease remains underdiagnosed, with delays ranging from 4 to 11 years from the onset of symptoms to diagnosis, and approximately 65% of women remain undiagnosed (4). This diagnostic delay results from a combination of systemic and individual factors. On the one hand, healthcare providers may minimize or dismiss patients' reports of pain, particularly in young women, perpetuating a pattern of underrecognition of symptoms. On the other hand, the normalization of menstrual pain as "part of being a woman," often influenced by social attitudes and familial norms, contributes to delayed medical evaluation. Additionally, some diagnostic limitations arise from the invasive nature of histological confirmation, which typically requires surgery (4).

It is important to note that many patients actively seek medical help, often repeatedly, only to encounter dismissive attitudes or inconclusive evaluations before receiving a definitive diagnosis. This systemic issue underscores the critical need for enhanced awareness and training among healthcare providers. Addressing these challenges can mitigate diagnostic delays and reduce the profound impact of endometriosis on women's quality of life, which is exacerbated by severe pain, infertility, and reduced satisfaction across somatic, mental, and social domains (5).

1.2 Empathy and Compassion

Empathy and compassion are essential components of medical practice and high-quality healthcare (6,7). Empathy can be defined as the understanding of the patient's suffering, while compassion is the emotional response that involves actions aimed at alleviating the patient's suffering. Both are fundamental in patient care and contribute to improved clinical outcomes (8), as empathy is necessary to drive compassionate actions (9). However, empathy and compassion are not exclusively intrinsic qualities of each healthcare provider. They can be cultivated and improved through educational interventions (8), which is crucial from undergraduate training, as several studies have shown that empathy and compassion tend to decline during medical school and residency (10-12).

1.3 The Use of Films in Medical Education

The use of television programs and films is an effective tool to promote humanistic, empathetic, compassionate, and patient-centered approaches in medical students (13). These methods also enhance emotional engagement, making learning more memorable and enjoyable (14,15), as previous studies have demonstrated that students are more likely to learn and retain information when a teaching point is associated with an emotional response (15,16). Thus, an educational approach that utilizes films to address both scientific and humanistic issues can help

medical students reflect on empathy, develop a compassionate approach to patients and their suffering, and increase their awareness of stigmatizing attitudes (17).

Most studies based on television series focus on healthcare professionals, addressing topics such as breaking bad news, managing difficult situations, professionalism, ethics, empathy, and the doctor-patient relationship (13). Studies involving films tend to focus on specific diseases or specialties, with a clear predominance of mental health and psychiatry (18-28). General themes explored in films include professionalism (29), ethics (30,31), terminal illness and cancer management (32), as well as more specific topics such as addictions (33-35), pandemics (36), epilepsy (22), dementia (37), and HIV/AIDS (38). The pedagogical strategies employed in these studies vary, and many have reported their findings as independent educational events (13). Students have expressed satisfaction with the use of films for medical education purposes, reporting that these tools enhanced their knowledge base (13).

Given the high prevalence of endometriosis and its clinical, psycho-emotional, and social consequences, it is essential to educate medical students, as future physicians, about this disease and its impact on patients' symptoms and quality of life. By doing so, the current underdiagnosis situation can be mitigated. The objective of this study is to assess whether the use of a short film as an additional educational tool is effective in improving students' understanding of endometriosis and its impact on patients' quality of life.

2. Methods

2.1 Study Design and Procedure

This is a qualitative study. The participants were 6th-year medical students from the Ruber Juan Bravo Hospital Complex at the European University. The class was randomly divided into two groups. All students attended a lecture on endometriosis delivered by one of the course professors. Following this lecture, the students were randomly divided into two groups: one group was sent the short film END-O, while the other group was not. The second group was unaware of the film's existence or that their peers had watched it. Afterward, each student completed a questionnaire to evaluate differences in responses between the two groups. Participation was voluntary.

2.2 Participants

The 6th-year medical class at the Ruber Juan Bravo Hospital Complex of the European University for the 2023/2024 academic year consisted of 23 students. Eleven students were assigned to the group that watched the short film (study group), and 12 to the group that did not (control group). Participation was 100% (11 students) in the study group and 91.67% (11 students) in the control group. In the study group, 72.73% of participants were female (8 students), and 27.27% were male (3 students), compared to 81.82% female (9 students) and 18.18% male (2 students) in the control group.

2.3 Instruments

2.3.1 Short Film END-O

END-O is a 15-minute short film available on YouTube, directed by Alice Seabright, which addresses issues related to women's health and the impact of endometriosis on daily life. It follows the story of Jaq, a young woman who struggles to maintain a normal appearance to the outside world while silently suffering the debilitating effects of endometriosis. Throughout the film, the difficulties faced by the protagonist and her sister are explored, highlighting their efforts to balance their professional and personal lives while dealing with constant pain and the medical challenges associated with the disease. The short film focuses on the experience of living with endometriosis,

emphasizing the physical and emotional pain it causes and the lack of understanding and support faced by those with the condition. The story is told from the perspective of a young woman, allowing for an authentic and empathetic representation of the daily struggles caused by her condition. The short film adopts a realistic approach to portraying life with a chronic illness, focusing on small moments and everyday challenges. Its tone is dramatic and emotional, designed to create an emotional connection with the audience and raise awareness about endometriosis.

2.3.2 Questionnaires

Two questionnaires were designed, one for each group. The control group’s questionnaire contained open-ended questions about basic concepts related to endometriosis (definition, symptoms, impact on quality of life), as well as a question regarding the students' personal perception of the importance of the disease (Table 1).

Table 1. Control Group Questionnaire

1	In short, how would you define endometriosis?
2	What are its main symptoms?
3	How do you think it affects a woman's life?
4	Explain, in as much detail as you wish, your view on the importance of endometriosis.

The study group’s questionnaire included the same questions as the control group’s, with additional multiple-choice questions regarding the educational and outreach value of the short film, and a final question asking for personal feedback on the film (Table 2).

Table 2. Study Group Questionnaire

1	In short, how would you define endometriosis?
2	What are its main symptoms?
3	How do you think it affects a woman's life?
4	Explain, in as much detail as you wish, your view on the importance of endometriosis.
5	Did you find the short film END-O interesting? <ul style="list-style-type: none"> - No, not at all - A little interesting - Quite interesting - Yes, very much
6	Did it help you complement what you had already learned about endometriosis in class? <ul style="list-style-type: none"> - No, not at all - A little helpful - Quite helpful - Yes, very helpful
7	Would you recommend it to other classmates for viewing? <ul style="list-style-type: none"> - No, not at all - A little recommended - Quite recommended

	- Yes, highly recommended
8	Do you think it is advisable for non-healthcare professionals, such as patients, partners, or family members of patients, to watch it to help them understand the consequences of endometriosis? <ul style="list-style-type: none"> - No, not at all - A little advisable - Quite advisable - Yes, very advisable
9	Lastly, please provide a personal assessment of the short film END-O, in as much detail as you wish.

2.4 Quantitative Data Analysis

2.4.1 Understanding of Endometriosis

Students’ definitions of endometriosis were evaluated, particularly noting whether they included the histopathological concept of the disease, specifically the proliferation of endometrial tissue outside the endometrium. In addition, students’ ability to identify the symptoms of endometriosis was assessed based on the symptoms specified in the guidelines of the Spanish Society of Gynecology and Obstetrics (39) (Table 3), creating a variable where the maximum possible score was 6 and the minimum was 0.

Table 3. Symptoms of Endometriosis

1	Dyspareunia
2	Chronic pelvic pain + Cyclic pelvic pain: Dysmenorrhea, pain limited to ovulation
3	Dyschezia, dysuria
4	Abnormal bleeding
5	Infertility
6	Chronic fatigue

2.4.2 Perception of Endometriosis

Two analyses were conducted to assess the perception of endometriosis. Quantitatively, the number of words used by the students in their responses regarding the impact on patients' lives and their personal view of the disease’s importance was compared.

2.4.3 Statistical Analysis

For the analysis of identified symptoms and word counts, normality of the variables was checked using Levene’s test for homogeneity of variances and the Shapiro-Wilk test. Means and Student’s t-test were used for variables with normal distribution, while medians and the Mann-Whitney U test were applied for variables that did not meet normality criteria. Fisher’s exact test was used for comparing proportions.

2.5 Qualitative Analysis of Responses

All student responses were transcribed and organized according to the two groups: study group and control group. After a thorough reading of the responses, initial codes were created based on words or phrases capturing key aspects of the answers, in order to identify emerging themes and patterns. Similar codes were subsequently grouped into broader categories or themes. This methodology enabled a qualitative comparison between the groups.

3. Results

3.1 Quantitative Analysis

3.1.1 Understanding of Endometriosis

Most students provided an accurate definition of endometriosis, describing it as a condition characterized by the proliferation of endometrial tissue outside the endometrium. No differences were found between the groups in this regard: 90.9% vs. 90.9% ($p = 1$) (Table 4). However, there was a greater recognition of symptoms in the study group compared to the control group, with a difference of 1.55 (95% CI 0.53 - 2.56) symptoms ($p = 0.005$) (Table 5).

Table 4. Frequency Distribution and Fisher's Exact Test for Endometriosis Definition

Group	Correct (%)	Incorrect (%)	p - value
Study	90.9	9.1	1
Control	90.9	9.1	

Table 5. Means and Student's t-test for Symptoms Identified by Students

Group	Mean	95% CI	p - value
Study	3.82	2.98 - 4.66	0.005
Control	2.27	1.59 - 2.95	

3.1.2 Perception of Endometriosis

Quantitatively, the median number of words used to describe the impact of endometriosis on a woman's life was higher in the study group (18) compared to the control group (9), although this difference was not statistically significant ($p = 0.075$) (Table 6). The median number of words used to describe personal views on the importance of endometriosis was higher in the study group (49) versus the control group (26), with this difference being statistically significant ($p = 0.033$) (Table 7).

Table 6. Medians and Mann-Whitney U-test for Word Count on the Impact of Endometriosis on Women's Lives

Group	Median	95% CI	p - value
Study	18	12,71 - 54,03	0.075
Control	9	1,71 - 27,47	

Table 7. Medians and Mann-Whitney U-test for Word Count on Personal Views Regarding the Importance of Endometriosis

Group	Median	95% CI	p - value
Study	49	30.70 - 96.18	0.033
Control	26	10.69 - 39.02	

3.2 Qualitative Analysis

3.2.1 Question: "How do you think it affects a woman's life?"

Table 8 shows the development of themes following the initial coding of the responses.

Table 8. Development of themes following the initial coding of the responses to question "How do you think it affects a woman's life?"

1	Disability and Daily Limitations - Study Group: 1, 2, 3, 11 - Control Group: 1, 2, 5, 8, 10, 11
2	Pain and Symptoms - Study Group: 5, 6, 10 - Control Group: 4, 6, 7, 8
3	Psychological Impact - Study Group: 6, 7, 10 - Control Group: 6, 7
4	Impact on Relationships and Fertility - Study Group: 5, 8, 9 - Control Group: 3, 6, 7, 8
5	Social Conditioning - Study Group: 10 - Control Group: 8

Both groups emphasized disability and daily limitations as significant impacts of endometriosis. The study group used more emphatic and detailed terms ("it can completely incapacitate her", "condition many aspects", "cause significant incapacitation"). The control group also mentioned incapacity but in a more general manner ("very limiting", "limitations due to pain", "greater disability"). Both groups identified pain and symptoms as central problems. The study group provided more detail about the nature of the pain ("incapacitating pain", "multiple negative symptoms"), while the control group focused on intense and recurring pain, mentioning disability associated with menstruation. Both groups acknowledged the psychological impact, although the study group offered more details on anxiety and self-esteem. The control group focused more on infertility and its psychological effects. Both groups recognized the impact on fertility and personal relationships. The study group provided specific examples (sexual relationships, reproductive desire, risk of hysterectomy), while the control group concentrated more on infertility and its emotional impact. Only the study group explicitly mentioned social conditioning, discussing anxiety related to public bleeding and fear of social events.

3.2.2 Question: "Explain, in as much detail as you wish, your view on the importance of endometriosis"

Table 9 shows the development of themes after initial coding of the responses.

Table 9. Development of themes following the initial coding of the responses to question "Explain, in as much detail as you wish, your view on the importance of endometriosis"

1	Severity and Severe Symptoms - Study Group: 1, 3, 5, 7, 9, 10, 13 - Control Group: 6, 7, 9, 10
2	Lack of Awareness and Public Consciousness - Study Group: 2, 8, 11, 12 - Control Group: 1, 4, 8
3	Diagnosis and Treatment - Study Group: 4, 5, 7, 13 - Control Group: 3, 5, 7, 11
4	Need for Research - Study Group: 6, 8 - Control Group: 2
5	Emotional and Psychological Impact - Study Group: 9, 10 - Control Group: 10

Both groups acknowledged the severity and serious symptoms associated with endometriosis. The study group mentioned more details about the symptoms and the impact on daily life, including the emotional burden and anxiety ("significant symptoms and discomfort", "constant worry and uncontrollable suffering"). The control group focused more on chronic pain and the resulting disability but in a more general way. Both groups highlighted the general lack of awareness and the need for increased public awareness. The study group noted the lack of social knowledge and the importance of raising awareness about the disease. The control group suggested that explanatory videos could be useful in raising awareness. Both groups recognized the importance of early diagnosis and the need for appropriate treatment. The study group detailed the diagnostic challenges and lack of curative treatments, specifically mentioning hysterectomy as an invasive option. The control group also mentioned diagnostic difficulties and the absence of a cure but in a more general way. Both groups agreed that more research on endometriosis is needed. The study group emphasized the importance of research and development to improve the quality of life of patients. The control group mentioned that there is still much to investigate about the disease. Regarding emotional and psychological impact, the study group specifically mentioned anxiety and constant worry associated with endometriosis. In contrast, the control group recognized the emotional impact, mainly in relation to chronic pain and resulting disability.

3.3 Relevance of the Short Film as a Teaching and Awareness Tool

The majority of students who watched the short film (72.73%) found it very useful as a supplement to what they had already learned about endometriosis in the lecture. Another 18.18% considered it quite useful, and 9.10% found it somewhat useful. Regarding recommendations,

81.82% found the short film to be highly recommendable for their peers, with 90.90% considering it quite recommendable, and 9.10% finding it somewhat recommendable. For non-medical audiences, such as patients, their partners, or family members, 90.90% of students considered the short film to be highly recommendable as a way to help them understand the consequences of endometriosis.

In terms of personal feedback on the video, most students who watched the short film END-O rated the experience positively, emphasizing its ability to illustrate the impact of endometriosis on patients' daily lives. The comments reflected a general appreciation for the narrative and visual approach of the short film, as well as its effectiveness in enhancing understanding and empathy towards individuals suffering from this condition. Several students noted that the short film was "very effective in understanding how this disease affects the daily lives of patients," highlighting its usefulness in conveying the suffering and difficulties faced, especially to those without in-depth medical knowledge. One student remarked, "I think it's quite helpful for understanding what they really go through, especially for family members who aren't familiar with medicine."

Other students emphasized the importance of the short film in raising awareness of endometriosis and educating the general public. One student stated, "I think it's an excellent video to raise awareness of the condition and help people understand what it's like to live with it, the frustration these women feel." The same student added that more videos like this are needed to "reach as many people as possible," including patients who have yet to be diagnosed and do not understand their symptoms. The narrative and visual analogies used in the short film were also well-received. One student highlighted the effectiveness of a specific scene: "I really liked the scene where the poached eggs break, as it's an analogy that I think is very original but also very accurate." Additionally, several students appreciated how the short film used an analogy with the male experience, which helped them empathize more: "In my case, it helped me feel represented by the 'brutality' of the example, likely helping me better understand how patients feel."

However, not all comments were entirely positive. One student mentioned that while the video was useful for the general population, they did not find it as helpful as a medical student: "I didn't find it as useful as a medical student, but for the general public, it's good to introduce them to the topic." Another student stressed the importance of complementing theoretical learning with experiences like this: "Good video to supplement the theoretical learning about endometriosis."

Overall, the short film END-O was well-received by students, who appreciated its ability to humanize the disease and facilitate a deeper understanding of the daily challenges faced by women with endometriosis. The following quotes illustrate these points: "It's a very representative video of how women live with this issue and useful for the general public since it's not talked about much and is largely unknown." "It reflects very well the personal concerns of a woman living with endometriosis, as well as the medical aspect a patient has to endure." "It's extremely explicit and realistic, which helps anyone, whether they work in healthcare or not, to understand and empathize with the women who suffer from it."

4. Discussion

No significant differences were found between the two groups in terms of the definition of endometriosis, which was relatively homogeneous. This likely reflects the solid foundation acquired during the lecture. However, students who watched the short film were able to identify a greater number of symptoms of the disease compared to the control group. The short film vividly portrays the various symptoms of endometriosis, creating a strong emotional impact, which likely helped students retain a higher number of symptoms. Emotional engagement is known to enhance cognitive retention (40).

The analysis of responses regarding the impact of endometriosis on women's lives shows that students who watched the short film had a deeper and more detailed understanding of the disease's effects. They used more emotive and detailed language, suggesting greater empathy and understanding. In comparison, the control group recognized the same issues but in a more general and less detailed manner. Thus, the short film appears to have been effective in enhancing both comprehension and empathy toward women suffering from endometriosis. Students who watched the film demonstrated a heightened awareness of the multiple aspects of life affected by the disease, including physical, emotional, and social dimensions.

Regarding the students' personal views on the importance of endometriosis, those who watched the short film had a deeper and more detailed understanding of its significance. They used more words to express their views compared to the control group, whose responses were much shorter. Additionally, the language used by the short film group was more emphatic, providing more detailed insights into various aspects of the disease, including the emotional impact and the lack of public awareness. In contrast, the control group recognized the importance of endometriosis but in a more general way, with less emphasis on emotional and social aspects. Therefore, the short film seems to have effectively enhanced students' understanding of the importance of endometriosis. Those who watched the film demonstrated greater awareness of the severe symptoms, emotional impact, and the need for increased awareness and research.

These findings align with those reported in similar studies, such as the 2015 review by Law et al., which highlights the use of television programs and films as effective tools for fostering empathy, understanding, and a humanistic approach in medical students (13). Our results also support the work of De Souza and Adams (41), who emphasize that films can engage students emotionally, providing a deeper connection to the human aspects of illness. In our study, students who watched the short film on endometriosis demonstrated greater empathy and a more comprehensive understanding of the disease's impact on women's lives, reflecting the power of films to evoke emotional and reflective engagement. As seen in most published experiences involving the use of films in medical education (13), students' reception of the short film as an educational tool was highly satisfactory and humanizing. Their responses indicate that the short film not only enriched their theoretical knowledge but also promoted greater empathy and understanding toward patients with endometriosis.

Although the use of films and television programs in medical education is not new, to the best of our knowledge, this is the first study to report an educational experience focusing on a specific disease like endometriosis. Humanizing medicine is crucial, and medical educators should not limit themselves to imparting theoretical knowledge to students but must also instill the importance of empathy and compassion toward patients (8). Emphasizing these qualities in relation to patients with a chronic disease that significantly affects women's quality of life, such as endometriosis, is essential. This is particularly important for a disease with a high rate of underdiagnosis and, consequently, undertreatment (1, 4). Such an approach not only benefits students by providing a more humanistic view of the disease but also benefits their future patients, as the emotional impact of the short film will likely keep this disease in mind throughout their professional careers.

This study has some limitations. The sample size was small, consisting of only 23 medical students from the same academic institution. This limits the generalizability of the results to a broader population of medical students. Most participants were female, which may have influenced their perception and understanding of endometriosis. A more balanced gender distribution could provide a more diverse and comprehensive perspective. Furthermore, the study was not blinded, and students were aware that they were participating in a study, which could have influenced their responses. Qualitative responses may also have been influenced by students' writing and communication skills, introducing variability that could affect the results. Incorporating additional

qualitative methods, such as semi-structured interviews or focus groups, could provide richer and more nuanced insights into the participants' experiences. Observational techniques, particularly in clinical or educational settings, could also enhance the understanding of behavioral changes following such interventions. Moreover, the study was conducted over a short period, immediately after viewing the short film, and did not assess the long-term impact on knowledge retention or the development of empathy and compassion. Lastly, the questionnaires used to evaluate the understanding and perception of endometriosis were not previously validated, which could affect the reliability of the responses.

To address these limitations and expand on the findings, future research should aim to include larger and more diverse samples, encompassing students from multiple universities and various educational levels. Longitudinal studies could examine the evolution of empathy, compassion, and knowledge retention over months or years following the intervention. An interdisciplinary approach, integrating methods from psychology, education, and neuroscience, could provide a deeper understanding of how educational tools like films influence both cognitive and emotional domains. For example, the inclusion of neuroimaging techniques to study brain activity related to empathy, or psychometric tools to assess emotional engagement, could offer valuable insights. Incorporating diverse educational methodologies, such as role-playing, narrative medicine workshops, or interdisciplinary discussions, alongside films, could further enrich the educational impact.

5. Conclusion

- The use of the short film END-O enhanced both the understanding of the disease and its impact on women's lives among medical students.

Supplementary material: Link to the short film END-O: <https://www.youtube.com/watch?v=HK1P0rWi7rU>

Funding: There has been no funding

Acknowledgement: To all the students participating in the study

Conflict of Interest: The authors declare that they have no conflict of interest

Author 's contribution:

- **Carlos Piñel:** Conceptualization and design of the study, data collection, analysis, and complete drafting of the article.
- **Rosendo Alfonso, Eva Álvarez, Alfonso Durán and Alejandra Irazola:** Assistance in the organization of study implementation, including distribution of questionnaires and encouraging one of the study groups to view the video material.
- **María José Gómez-Roso:** Critical review of the article, focused on identifying errors and improving content accuracy.

References

1. Taylor HS, Kotlyar AM, Flores VA. Endometriosis is a chronic systemic disease: clinical challenges and novel innovations. *Lancet*. 2021;397(10276):839-52. [https://doi.org/10.1016/s0140-6736\(21\)00389-5](https://doi.org/10.1016/s0140-6736(21)00389-5)
2. Clement PB. The pathology of endometriosis: a survey of the many faces of a common disease emphasizing diagnostic pitfalls and unusual and newly appreciated aspects. *Adv Anat Pathol*. 2007;14(4):241-60. <https://doi.org/10.1097/PAP.0b013e3180ca7d7b>.
3. Giudice LC. Clinical practice. Endometriosis. *N Engl J Med*. 2010;362(25):2389-98. <https://doi.org/10.1056/NEJMcp1000274>.
4. Greene R, Stratton P, Cleary SD, Ballweg ML, Sinaii N. Diagnostic experience among 4,334 women reporting surgically diagnosed endometriosis. *Fertil Steril*. 2009;91(1):32-9. <https://doi.org/10.1016/j.fertnstert.2007.11.020>.
5. Baczek G, Mietus M, Klimanek J, et al. The impact of endometriosis on the quality of women's life. *Ginekol Pol*. 2024;95(5):356-64. <https://doi.org/10.5603/gpl.93995>.

6. Association of American Medical Colleges (AAMC). Learning Objectives for Medical Student Education: Guidelines for Medical Schools. <https://store.aamc.org/learning-objectives-for-medical-student-education-guidelines-for-medical-schools-pdf.html>
7. Kelm Z, Womer J, Walter JK, Feudtner C. Interventions to cultivate physician empathy: a systematic review. BMC Med Educ. 2014;14:219. <https://doi.org/10.1186/1472-6920-14-219>.
8. Patel S, Pelletier-Bui A, Smith S, et al. Curricula for empathy and compassion training in medical education: a systematic review. PLoS One. 2019;14(8):e0221412. <https://doi.org/10.1371/journal.pone.0221412>.
9. Sinclair S, Norris JM, McConnell SJ, Chochinov HM, Hack TF, Hagen NA, et al. Compassion: a scoping review of the healthcare literature. BMC Palliat Care. 2016;15:6. <https://doi.org/10.1186/s12904-016-0080-0>.
10. Bellini LM, Shea JA. Mood change and empathy decline persist during three years of internal medicine training. Acad Med. 2005;80(2):164-7. <https://doi.org/10.1097/00001888-200502000-00013>.
11. Hojat M, Mangione S, Nasca TJ, Rattner S, Erdmann JB, Gonnella JS, et al. An empirical study of decline in empathy in medical school. Med Educ. 2004;38(9):934-41. <https://doi.org/10.1111/j.1365-2929.2004.01911.x>
12. Neumann M, Edelhauser F, Tauschel D, Fischer MR, Wirtz M, Woopen C, et al. Empathy decline and its reasons: a systematic review of studies with medical students and residents. Acad Med. 2011;86(8):996-1009. <https://doi.org/10.1097/ACM.0b013e318221e615>
13. Law M, Kwong W, Friesen F, Veinot P, Ng SL. The current landscape of television and movies in medical education. Perspect Med Educ. 2015;4(5):218-24. <https://doi.org/10.1007/s40037-015-0205-9>
14. Blasco PG, Moreto G, Roncoletta AFT, Levites MR, Janaudis MA. Using movie clips to foster learners' reflection: improving education in the affective domain. Fam Med. 2006;38:94-6. https://sobramfa.com.br/wp-content/uploads/2019/07/2006_fev_Movie_Clips..pdf
15. Taylor JS. Learning with emotion: a powerful and effective pedagogical technique. Acad Med. 2010;85:1110. <https://doi.org/10.1097/acm.0b013e3181e202d3>
16. McConnell MM, Eva KW. The role of emotion in the learning and transfer of clinical skills and knowledge. Acad Med. 2012;87:1316-22. <https://doi.org/10.1097/acm.0b013e3182675af2>
17. Zeppegno P, Gramaglia C, Feggi A, Lombardi A, Torre E. The effectiveness of a new approach using movies in the training of medical students. Perspect Med Educ. 2015;4(5):261-3. <https://doi.org/10.1007/s40037-015-0208-6>.
18. Akram A, O'Brien A, O'Neill A, Latham R. Crossing the line—learning psychiatry at the movies. Int Rev Psychiatry. 2009;21:267-8. <https://doi.org/10.1080/09540260902746880>
19. Bhagar HA. Should cinema be used for medical student education in psychiatry? Med Educ. 2005;39:972-3. <https://doi.org/10.1111/j.1365-2929.2005.02252.x>
20. Johnson JM, Beresin EV, Stern TA. Using Breaking Bad to teach about defense mechanisms. Acad Psychiatry. 2014 Dec;38(6):716-9. <https://doi.org/10.1007/s40596-014-0161-4>
21. Hyler SE, Schanzer B. Using commercially available films to teach about borderline personality disorder. Bull Menninger Clin. 1997;61:458-68.
22. Kalra G. Teaching diagnostic approach to a patient through cinema. Epilepsy Behav. 2011;22:571-3. <https://doi.org/10.1016/j.yebeh.2011.07.018>
23. Kalra G. Psychiatry movie club: a novel way to teach psychiatry. Indian J Psychiatry. 2011;53:258. <https://doi.org/10.4103/0019-5545.86820>
24. Graf H, Abler B, Weydt P, Kammer T, Plener PL. Development, implementation, and evaluation of a movie-based curriculum to teach psychopathology. Teach Learn Med. 2014;26(1):86-9. <https://doi.org/10.1080/10401334.2013.857340>
25. Hankir A, Holloway D, Zaman R, Agius M. Cinematherapy and film as an educational tool in undergraduate psychiatry teaching: a case report and review of the literature. Psychiatr Danub. 2015 Sep;27 Suppl 1:S136-42. PMID: 26417749.
26. Bui E, Rodgers R, Chabrol H, Birmes P, Schmitt L. Is Anakin Skywalker suffering from borderline personality disorder? Psychiatry Res. 2011;185(1-2):299. <https://doi.org/10.1016/j.psychres.2009.03.031> .
27. Wilson N, Heath D, Heath T, Gallagher P, Huthwaite M. Madness at the movies: prioritised movies for self-directed learning by medical students. Australas Psychiatry. 2014;22(5):450-3. <https://doi.org/10.1177/1039856214545550>.

28. Retamero C, Walsh L, Otero-Perez G. Use of the film *The Bridge* to augment the suicide curriculum in undergraduate medical education. *Acad Psychiatry*. 2014;38(5):605-10. <https://doi.org/10.1007/s40596-014-0086-y>
29. Lumlertgul N, Kijpaisalratana N, Pityaratstian N, Wangsaturaka D. Cinemeducation: a pilot student project using movies to help students learn medical professionalism. *Med Teach*. 2009;31:e327-32. <https://doi.org/10.1080/01421590802637941>
30. Rattani A, Kaakour D, Syed RH, Kaakour AH. Rethinking TV and movies in medical ethics and professionalism education. *Med Teach*. 2020 Apr;42(4):477-478. <https://doi.org/10.1080/0142159x.2019.1626981>
31. Volandes A. Medical ethics on film: towards a reconstruction of the teaching of healthcare professionals. *J Med Ethics*. 2007;33:678-80. <https://doi.org/10.1136/jme.2006.017665>
32. Ozcakir A, Bilgel N. Educating medical students about the personal meaning of terminal illness using the film, 'Wit.' *J Palliat Med*. 2014;17:913-7. <https://doi.org/10.1089/jpm.2013.0462>
33. Welsh CJ. OD's and DT's: using movies to teach intoxication and withdrawal syndromes to medical students. *Acad Psychiatry*. 2003;27:182-6. <https://doi.org/10.1176/appi.ap.27.3.182>
34. Pais de Lacerda A. Medical education: addiction and the cinema (drugs and gambling as a search for happiness). *J Med Movies*. 2005; 1: 95-102. https://revistas.usal.es/cinco/index.php/medicina_y_cine/article/view/206/377
35. Cape G. Movies as a vehicle to teach addiction medicine. *Int Rev Psychiatry*. 2009;21(3):213-7. <https://doi.org/10.1080/09540260902747094>.
36. Daher-Nashif S. Doctors' challenges during infectious disease outbreaks: medical education insights from realistic fiction movies. *Adv Med Educ Pract*. 2021;12:265-72. <https://doi.org/10.2147/AMEP.S297427>.
37. Baminiwatta A, Fernando R, Williams S. Improving medical students' understanding of dementia using a movie (*The Father*). *Educ Prim Care*. 2023;34(2):109. <https://doi.org/10.1080/14739879.2023.2178333> .
38. Goldman JD. An elective seminar to teach first-year students the social and medical aspects of AIDS. *J Med Educ*. 1987;62:557-61.
39. Sociedad Española de Ginecología y Obstetricia. *Endometriosis*. Prosego; 2013.
40. Schwabe L, Wolf OT. Stress prompts habit behavior in humans. *J Neurosci*. 2009;29(22):7191-8. <https://doi.org/10.1523/JNEUROSCI.0979-09.2009> .
41. De Souza D, Adams GC. Practical Pedagogical Tips for Using Movies in Medical Education. *Acad Psychiatry*. 2023 Feb;47(1):90-94. <https://doi.org/10.1007/s40596-022-01740-y>



© 2024 Universidad de Murcia. Enviado para su publicación en acceso abierto bajo los términos y condiciones de la licencia Creative Commons Reconocimiento-NoComercial-Sin Obra Derivada 4.0 España (CC BY-NC-ND) (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).