Patient experiences of radiation-induced menopause in cervical cancer: A scoping review

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Systematic Review

Patient experiences of radiation-induced menopause in cervical cancer: A scoping review

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ABSTRACT

Introduction: Radiation-induced menopause (RIM), a form of premature ovarian insufficiency, is a frequent yet under-recognised consequence of pelvic radiotherapy for cervical cancer. Beyond vasomotor and urogenital symptoms, RIM affects psychological wellbeing, sexual identity, and overall quality of life (QoL). For therapeutic radiographers, understanding survivorship impact is critical to delivering holistic, person-centred care that extends beyond treatment into long-term wellbeing.
Methods: A scoping review was conducted following PRISMA-ScR guidelines to map literature on experiences, QoL impacts, and supportive interventions for individuals assigned female at birth who developed RIM after external beam radiotherapy, brachytherapy, or chemoradiation for cervical cancer. Searches of PubMed, PsycINFO, Google Scholar, citation lists, and grey literature, were carried out between January–May, 2025, identifying English-language empirical and review studies. Two reviewers independently screened and extracted data, with methodological quality described using the QuADS tool.
Results: From 528 records, 21 studies (2006–2025) met inclusion criteria. Most focused on cervical cancer survivors from high-income countries, with limited evidence from diverse populations. RIM was consistently linked to high symptom burden and QoL impairment. Survivors reported abrupt, distressing menopausal changes compounded by limited clinician recognition. Hormone replacement therapy (HRT) and multidisciplinary care improved outcomes, yet uptake, communication, and equity gaps remain.
Conclusion: RIM is a major survivorship issue that remains inconsistently managed and insufficiently researched. Evidence underscores the need for early recognition, inclusive assessment, and proactive involvement of therapeutic radiographers within integrated survivorship pathways to support education and timely intervention.
Implications for practice: Embedding menopause education, validated PROMs, and sensitive communication within survivorship care can enhance QoL and promote equitable, multidisciplinary support for cervical cancer survivors.

Introduction

Early menopause, or primary ovarian insufficiency (POI), is defined as the cessation of menstruation with follicle-stimulating hormone (FSH) levels of 20–40 mIU/mL before age 40.[1] POI is a recognised consequence of treatment for cervical cancer, arising from chemotherapy, radiotherapy, or surgery. It is characterised by permanent ovarian failure, with adverse effects including vasomotor instability, vaginal dryness, sleep disturbance, and long-term risks such as osteoporosis, cardiovascular disease, and cognitive decline.[2–4] These changes also affect psychological wellbeing, relationships, and overall quality of life.[5–7]

Chemotherapy can induce menopause but is most often combined with radiotherapy in cervical cancer. Radiotherapy was therefore chosen as the focus of this review, given its central role in

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cervical cancer treatment and its distinct trajectory of ovarian failure. In contrast to surgical oophorectomy, which causes immediate menopause, radiotherapy may induce ovarian failure more gradually.[8] Models predict that time to failure depends on radiation dose and patient age, with endocrine activity sometimes persisting for months or years.[9] This unpredictability complicates recognition and management.

Survivorship and late effects of cancer treatment are increasingly recognised as a priority within UK healthcare policy. The NHS Long Term Plan[10] emphasises personalised follow-up, improved management of treatment-related consequences, and better integration of supportive care for people living with and beyond cancer. Similarly, the College of Radiographers[11] identified late effects of radiotherapy and their management as key research priorities, highlighting the need for evidence that informs holistic, multidisciplinary survivorship care. Despite this strategic focus, menopause-related late effects following pelvic radiotherapy remain inconsistently addressed in clinical pathways, and guidance specific to radiation-induced menopause (RIM) is limited.

Cervical cancer predominantly affects younger women,[12] making early menopause more likely to occur in this group of patients. Cervical cancer screening uptake remains variable across socioeconomic, ethnic, and geographic groups. Lower participation is associated with reduced early detection and later-stage presentation, which may increase the number of individuals requiring radical chemoradiotherapy.[13] As a result, inconsistent access to screening may contribute indirectly to the number of women experiencing RIM. Increases in late-stage presentation, unequal access to HPV immunisation, declining vaccine uptake,[14] and uncertainty about long-term protection highlight the ongoing relevance of treatment-related survivorship issues.[15] This scoping review aims to map and synthesise existing evidence on RIM focusing on patient experiences, quality-of-life impacts, and coping strategies.

Objectives

1. To identify and map the existing literature on the physical, psychological, and psychosocial experiences of cervical cancer patients undergoing radiation-induced menopause.
2. To explore how radiation-induced menopause impacts quality of life, including sexual health, emotional well-being, and social functioning in this patient population.
3. To examine the types of support, interventions, or coping strategies described in the literature that address the consequences of radiation-induced menopause.
4. To highlight gaps in the current research and provide direction for future studies focused on supportive care needs and survivorship planning for women with cervical cancer experiencing radiation-induced menopause.

Methods

To ensure no similar scoping reviews or projects had been registered or published on this topic, a preliminary search was conducted in JBI Evidence Synthesis and the Virtual Health Library before commencing this review. No relevant ongoing or completed projects were identified. This review followed a registered protocol (OSF: DOI 10.17605/OSF.IO/YEQD6) and followed PRISMA-ScR guidance.[16] This scoping review was conducted to map the extent, nature, and characteristics of the available evidence on RIM following cervical cancer treatment, and to identify key concepts and evidence gaps rather than to assess intervention effectiveness. Eligible populations were women diagnosed with cervical cancer of any International Federation of Gynecology and Obstetrics (FIGO) stage or histology.[17] Endometrial, ovarian, vulval, and vaginal cancers, other pelvic or childhood cancers were excluded due to differing menopausal trajectories, and surgery being the primary treatment causing menopause, with the focus being RIM for this scoping review.[18,19] Studies focused on natural menopause, or focusing on fertility preservation were excluded.

For inclusivity, the term individuals assigned female at birth (AFAB) was used. After this definition, the term women were used when referring to study populations that identify as such, as this reflects the wording of the original sources.

Eligible interventions included external beam radiotherapy, brachytherapy, and chemoradiation; surgically induced menopause was excluded because bilateral oophorectomy results in an immediate and complete loss of ovarian function, whereas radiation-induced ovarian insufficiency can be gradual, variable, and dose-dependent. Preliminary searches showed that surgically induced menopause was extensively studied in comparison to RIM. To ensure the review addressed a clear research gap, surgical menopause was excluded so that findings would not be obscured by a more well-established body of literature. No restrictions were applied to geography, publication date, or study design. All empirical designs (experimental, observational, qualitative), systematic reviews, opinion pieces, and grey literature were included to capture a broad evidence base.[20] Only English-language sources were considered.

Searches were conducted from January to May 2025 with librarian input across MEDLINE, CINAHL Complete, Scopus, APA PsycINFO, Cochrane Library, supplemented with Google Scholar[21] (first 50 results) and citation tracking. Records were managed in Zotero and Covidence. Two reviewers independently screened titles/abstracts and full texts (LJ and MC), resolving discrepancies with a third reviewer (PH). Formal inter-rater reliability metrics were not calculated, as discrepancies were resolved through discussion and consensus, consistent with scoping review methodology. Data extraction was piloted and refined, capturing participant, intervention, context, and outcome data (LJ).

Although methodological guidance for scoping reviews do not require formal quality appraisal,[22] an assessment of study quality was undertaken due to variation observed during full-text screening. Quality appraisal was conducted using the Quality Assessment with Diverse Studies (QuADS) tool[23] which is designed for application across both quantitative and qualitative study designs. Although study quality did not determine eligibility for inclusion, findings from higher-quality studies were prioritised in the interpretation and discussion of results, while lower-quality studies were used as contextual or supporting evidence. Results are presented with a PRISMA flow diagram (Figure A).

A descriptive thematic mapping process was undertaken to identify and organise key concepts across the included studies. This involved repeated reading of the extracted data and noting significant findings relevant to the review question. Similar concepts were grouped together to form provisional categories, which were charted in a summary matrix to allow comparison across studies (LJ). These categories were subsequently reviewed and refined into themes through discussion with co-authors (MC and PH). Independent parallel coding was not undertaken; instead, theme refinement was achieved through iterative team discussion and consensus. Four themes were identified across the included studies: (1) Multidimensional Impact of Radiation-Induced Menopause (2) Quality-of-Life Challenges; (3) Supportive Care, Interventions, and Barriers to Treatment; and (4) Research, Education, and Survivorship Gaps.

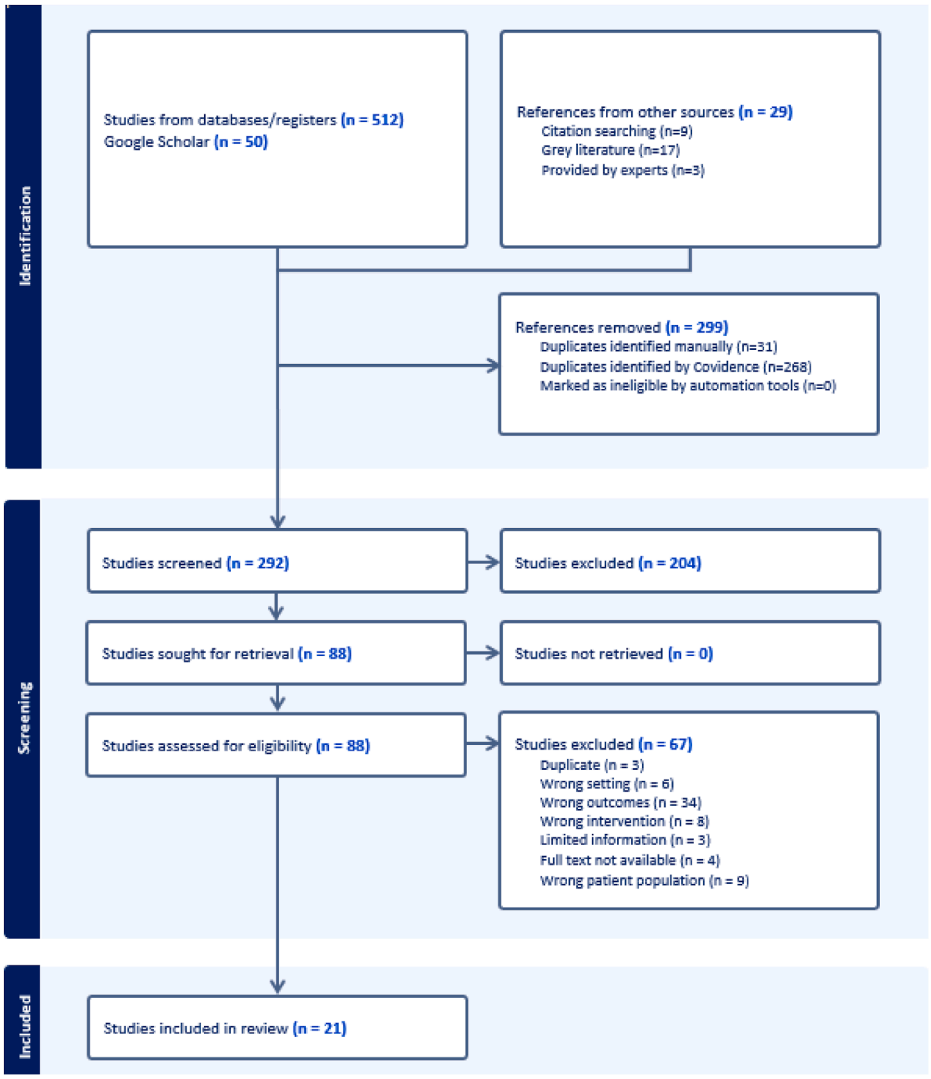

Figure A. PRISMA-ScR Flow Diagram of Study Selection. Flow diagram illustrating the number of records identified, screened, assessed for eligibility, and included in the scoping review, with reasons for exclusion at each stage, generated by Covidence.

Results

Study Selection and characteristics

From 528 records, 21 studies met inclusion criteria after screening (Table A). Publications ranged from 2006 to 2025, with increasing output after 2020 (Table B). Designs included qualitative interviews, surveys, Patient-reported outcome measures (PROMs) based cohorts, and retrospective chart reviews, with sample sizes ranging from 10 to 1826 participants (Figure B). Studies were conducted mainly in high-income countries (Figure C), with one LMIC contribution from Mexico.[24]

The clinical context was predominantly oncology or radiotherapy clinics, with a smaller number of studies situated in multidisciplinary survivorship or sexual health clinics, highlighting the acute-treatment focus of much of the literature.

Sample sizes varied considerably across studies: small qualitative studies included 10–25 participants, whereas retrospective cohorts included up to 1826 women. Data collection methods included PROMs, cross sectional surveys, retrospective chart reviews, longitudinal cohort follow-up, and semi-structured interviews, offering a blend of prevalence data and in-depth qualitative insights (Table C).

Table A
Eligibility criteria to guide reviewers for screening.

Population	Cervical or Endometrial Cancer	Ovarian cancer or vulval or vaginal or childhood cancers or any other cancers ex. anal (include if cervical or endometrial cancers also included)
Intervention	Radiotherapy or radiation therapy or chemoradiation or brachytherapy	Surgery or cryotherapy
Context	Early menopause or peri menopause or ovarian insufficiency	Natural menopause
Outcome	Sexual functioning or early menopause symptoms	Fertility preservation

QuADS scores varied widely (8/39–34/39), indicating inconsistent methodological quality. Higher-scoring studies[25,26] contributed the most robust evidence on symptom burden and psychosocial impact, while lower-scoring studies provided contextual insight. Sociodemographic reporting was limited, with under-representation of LGBT individuals, lower socioeconomic groups, and ethnic minorities.

Table B
Extraction table for selected articles including QuADS scores.

Citation	Country	Method Description	Sample Size (if appropriate)	Participant Group	Treatment Intervention	QuADS Score/39
Chuk et al. (2024)	Canada	Cross sectional study	73	Cervical cancer patients	Chemoradiation and MR-guided brachytherapy	17
Cotangco et al. (2020)	United States	Cross sectional study	34	Cervical cancer patients (pre-menopausal at the time of treatment)	Surgery or chemoradiation	18
Donovan et al. (2021)	Canada	Narrative review	–	Gynaecological cancer patients	Pelvic radiotherapy	13
Garcia–Garcia et al. (2023)	Mexico	Cohort study	114	Gynaecological or haematological cancer patients	Pelvic radiotherapy, systematic chemotherapy or oophorectomy	19
Hickey et al. (2023)	UK	Narrative review	–	Breast cancer, cervical cancer, endometrial cancer, lymphomas, and other malignancies	Chemotherapy, radiotherapy, ovarian surgery, or hormonal therapies	30
Letourneau et al. (2013)	United States	Narrative review	–	Breast, gynaecological and haematological cancers	Chemotherapy, radiotherapy or surgery	8
Li et al. (2021)	Australia	Cohort study	69	Gynaecological, rectal and anal cancers.	External beam radiotherapy, with or without brachytherapy	19
Moss et al. (2016)	UK	Narrative review	–	Cervical cancer patients	Chemoradiation	11
Naert et al. (2024)	Belgium	Qualitative research	15	Cervical cancer patients	Surgery, radiotherapy or chemotherapy	23
Pepin et al. (2025)	United States	Case series	–	Gynaecological cancer patients	Radiotherapy (alone or combination)	11
Rees (2006)	UK	Text and opinion	–	Gynaecological cancer patients	Oophorectomy, chemotherapy or radiotherapy	17
Rees et al. (2020)	Europe and North America	Position statement	–	Gynaecological cancer patients	Oophorectomy, chemotherapy or radiotherapy	16
Richardson et al. (2019)	UK	Systematic review	–	Gynaecological cancer patients	Surgery, chemotherapy, or radiotherapy	17
Silva Filho et al. (2025)	Brazil	Text and opinion	–	Gynaecological cancer patients	Bilateral oophorectomy, gonadotoxic chemotherapy, pelvic radiotherapy	30
Singh & Oehler (2010)	Australia	Economic evaluation	–	Gynaecological cancer patients	Oophorectomy, chemotherapy or radiotherapy	17
Smet et al. (2018)	Europe, Asia, North America	Cohort study	1176	Squamous cell carcinoma, adenocarcinoma, or adenosquamous carcinoma of the uterine cervix	Definitive radio-chemotherapy followed by MRI-guided adaptive brachytherapy (IGABT)	34
Sport et al. (2024)	United States	Qualitative research	21	Locally advanced cervical cancer	Radiotherapy with or without chemotherapy	31
Stroud et al. (2009)	United States	Text and opinion	–	Cervical cancer patients	Chemotherapy with or without radiotherapy	22
Suzuki et al. (2023)	United States	Cohort study	1826	Cervical cancer patients	Hysterectomy with bilateral oophorectomy or radiotherapy with/ without chemotherapy	20
Van de Hoef et al. (2024)	Netherlands	Cohort study	100	Cervical cancer patients	Radiotherapy	22
Vaz et al. (2011)	Brazil	Cohort study	107	Cervical or endometrial cancer patients	Pelvic radiotherapy	22

The included studies were published across a range of international journals, with the majority appearing in oncology, gynaecology, and radiotherapy-focused publications. A graphical summary (Figure D) illustrates the distribution of studies by journal, showing a concentration of evidence in a small number of key clinical journals and fewer contributions from interdisciplinary or public health domains.

Data were charted against a framework based on the review objectives and refined iteratively as new themes emerged. A descriptive thematic mapping process was used to categorise findings, map the range and nature of evidence, and identify cross-cutting themes.[27] Table D illustrates how the included studies align with and contribute to each of the identified themes.

Impact on quality of life

RIM was associated with substantial multisystem symptoms. Commonly reported issues included vaginal dryness, dyspareunia,

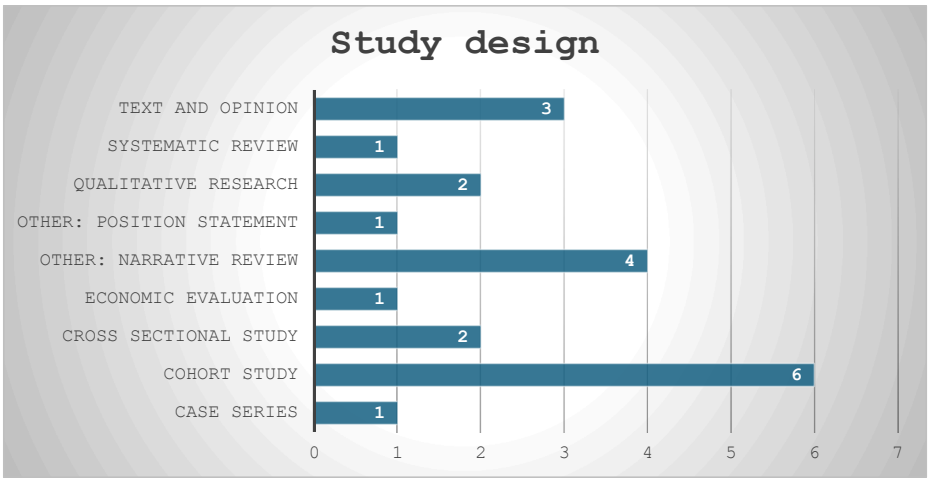

Figure B. Distribution of study design. Data and graph generated from Covidence from data extraction process.

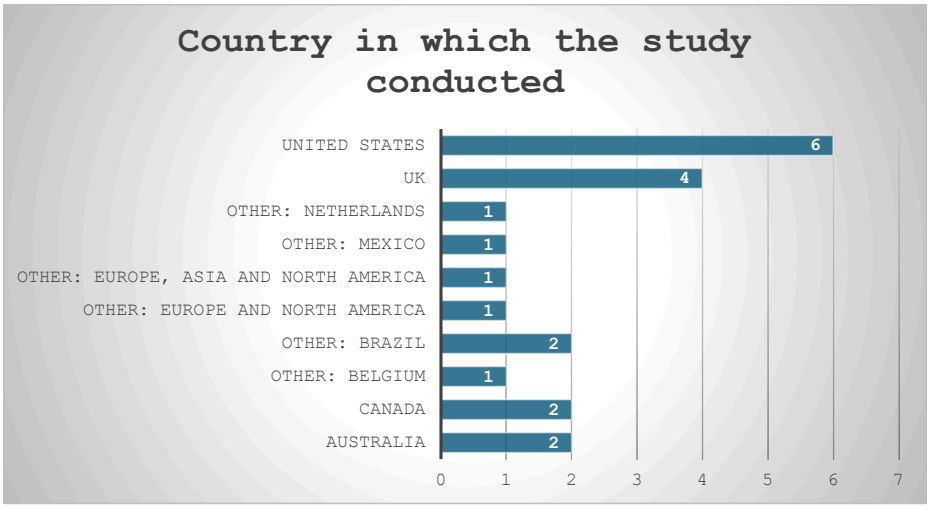

Figure C. Distribution of countries where study was conducted. Data and graph generated from Covidence from data extraction process.

sexual dysfunction, fatigue, sleep disturbance, vasomotor symptoms, and cognitive changes. Chuk et al. (2024)[28] found sexual dysfunction in 86 % and sexual distress in 55 % of participants, with younger women particularly affected, which was supported by further studies.[29,30] Psychological impacts included anxiety, depression, distress, body-image concerns, and infertility-related grief.[7,31] Qualitative studies described shame, relational strain, and limited safe spaces for discussion.[6,26]

Although sexual morbidity dominated reporting, several studies noted vasomotor symptoms, fatigue, insomnia, and "reduced mental clarity".[25,26,32] Musculoskeletal discomfort appeared in some PROMs.[25,32] PROMs revealed higher symptom levels than clinician-rated toxicity.[25] Longitudinal evidence was limited; Vaz et al. (2011)[33] reported some improvement in vaginal dryness, but dyspareunia persisted and continued to affect QoL.

Supports, interventions, and coping

Hormone replacement therapy (HRT) emerged as the most effective intervention but was underutilised in many contexts. Suzuki et al. (2023)[34] reported that only 39 % of women under 50 years received HRT within two years of treatment, with median use lasting just 60 days, despite guideline support and minimal safety concerns in cervical cancer. By contrast, van de Hoef et al. (2024)[35] observed uptake rates of 76–78 % in the Netherlands, where HRT users reported fewer symptoms, higher sexual activity, and better QoL, without evidence of increased recurrence. Nonhormonal strategies included lubricants, moisturisers, vaginal dilators, pelvic physiotherapy, and medications such as selective serotonin reuptake inhibitors (SSRI') and gabapentin.[35,36] However, evidence for these approaches was limited, and uptake of vaginal dilators was consistently low (<25 %), often introduced without adequate counselling.[6] Multidisciplinary models of care, such as sexual health clinics integrating oncology, gynaecology, and psychology, showed promise in improving sexual function, communication, and coping.[37] In the absence of structured support, many women relied on ad hoc strategies such as avoiding intimacy, tolerating symptoms, or turning to complementary medicine.[24,30] Survivors also described reframing experiences by accepting a "new normal" or prioritising survival over sexual function.[6]

Communication and equity

Nine studies emphasised the role of communication. Survivors often reported receiving little or no counselling about premature

Table C
Characteristics of included studies.

Author/Year	Study Design	Population	Context	Sample Size & Methods
Chuk et al., 2024	Quantitative, cross-sectional	Cervical cancer, mostly <50 y, post-chemoradiation	Single-institution, radiotherapy clinic	n~88; PROMs (FSFI, FSDS-R, HADS, MRS)
Cotangco et al., 2020	Qualitative interviews	Cervical cancer survivors, mixed age	Survivorship setting	n~20; semi-structured interviews
Donovan et al., 2022	Narrative review	Gynaecological cancer patients needing radiotherapy	Preventive oncology focus	Review of surgical outcomes (oophoropexy)
García-García et al., 2023	Quantitative, retrospective	Mixed gynaecologic & hematologic cancers, <40 y	Mexican tertiary center	$n = 88$; chart review + questionnaires
Hickey et al., 2024 (Lancet)	Review	Cancer survivors (focus on gynaecologic cancers)	Global, clinical practice	Evidence synthesis
Letourneau et al., 2013	Narrative review	Premenopausal women treated with pelvic RT/chemo	Fertility & survivorship focus	Review
Li et al., 2021	Mixed-methods evaluation	Women after pelvic RT	Multidisciplinary sexual health clinic (USA)	n~50; surveys + qualitative feedback
Moss et al., 2016	Review	Cervical cancer survivors	Survivorship care	Narrative review + patient adherence data
Naert et al., 2024	Qualitative	Belgian cervical cancer survivors	Oncology follow-up clinics	$n = 15$; in-depth interviews
Pepin et al., 2025	Review	Gynaecologic cancer survivors with POI	Clinical management focus	Narrative review
Rees, 2006	Clinical review	Gynaecologic cancer survivors	Menopause management	Review of HRT, bone health
Rees et al., 2020 (EMAS/IGCS)	Position statement	Cervical & endometrial cancer survivors	International consensus	Guideline development
Richardson et al., 2019	Review	Gynaecologic malignancy survivors	UK treatment units	Review & expert synthesis
Silva Filho et al., 2025	Position statement	Gynaecologic cancer survivors	Brazil (LMIC)	Clinical guidance
Singh & Oehler, 2010	Review	Gynaecologic cancer survivors	Clinical practice	Evidence synthesis
Smet et al., 2018	Quantitative cohort (EMBRACE)	Cervical cancer, premenopausal	Multicenter international	PROMs: Fatigue, insomnia, menopausal symptoms
Sport et al., 2024	Survey-based study	Locally advanced cervical cancer	Oncology clinics	Provider & patient survey
Stroud et al., 2009	Review	Women with ovarian function loss from cancer treatment	Survivorship & fertility focus	Evidence synthesis
Suzuki et al., 2023	Retrospective cohort	Cervical cancer <50 y, surgically/RT induced menopause	US population dataset	$n = 1826$; claims data, prescription records
Van der Hoef et al., 2024	Mixed methods	Cervical cancer <51 y, post-RT	Netherlands, academic center	$n = 293$ charts + $n = 100$ survey respondents
Vaz et al., 2011	Prospective cohort	Gynaecologic cancer survivors	Brazilian oncology centers	n~100; longitudinal QoL assessment

menopause, HRT, or sexual health.[6,24,26] Vaginal dilators, when introduced, were often described as "mechanical" or "medicalised," or lacking adequate explanation.[6] In contrast, women in multidisciplinary or specialist clinics valued open dialogue, validation, and partner inclusive counselling.[37] These findings suggest that early, clear, and consistent education is critical to effective survivorship care.

Discussion

This review demonstrates that RIM is a substantial survivorship issue affecting physical, psychological, and relational wellbeing. Patient-reported symptoms were consistently more severe than clinician-recognised toxicity, highlighting the need for patient-centred approaches. Interpretation considered variability in study quality, with higher scoring evidence[25,26] forming the basis of stronger conclusions.

Multidimensional Impact of Radiation-induced menopause

Across studies, RIM was described as abrupt, severe, and distressing, with clusters of vasomotor, urogenital, and sexual symptoms emerging soon after pelvic radiotherapy and often persisting for years. Younger women reported more severe menopausal symptoms and greater distress, consistent with the hormonal shock of POI. For example, Chuk et al. (2024)[28] documented high rates of vasomotor and sexual symptoms among younger cervical cancer survivors undergoing chemoradiation and brachytherapy.

Beyond vasomotor disturbances such as hot flushes and nocturnal hyperhidrosis, women reported fatigue, sleep disruption, cognitive changes, and weight gain, all with ripple effects on daily functioning. Cohort studies show these symptoms persist years after treatment: Hallqvist Everhov et al. (2014)[38] observed that cervical cancer patients treated with combined chemoradiation experienced long-term sexual and vasomotor sequelae despite ovarian preservation strategies.

Psychological sequelae were equally significant. Many survivors described grief, loss of femininity, anxiety, fear of recurrence, and difficulty adjusting to sudden changes in body and sexual identity. Qualitative work by Naert et al. (2024)[6] and Sport et al. (2024)[26] vividly captured these experiences, with women reporting shame, altered self-image, and challenges integrating survivorship with sexual and emotional wellbeing. These findings align with narrative reviews[31,36] that emphasise the unique psychological vulnerability associated with iatrogenic menopause in gynaecologic cancer.

Taken together, the evidence confirms that RIM is not a transient or purely a physical side effect, but a multidimensional experience affecting identity, emotional health, and long-term QoL. Survivorship planning must therefore move beyond a biomedical model to address these broader psychosocial impacts.

For therapeutic radiographers, these findings reinforce the importance of recognising menopausal and sexual health

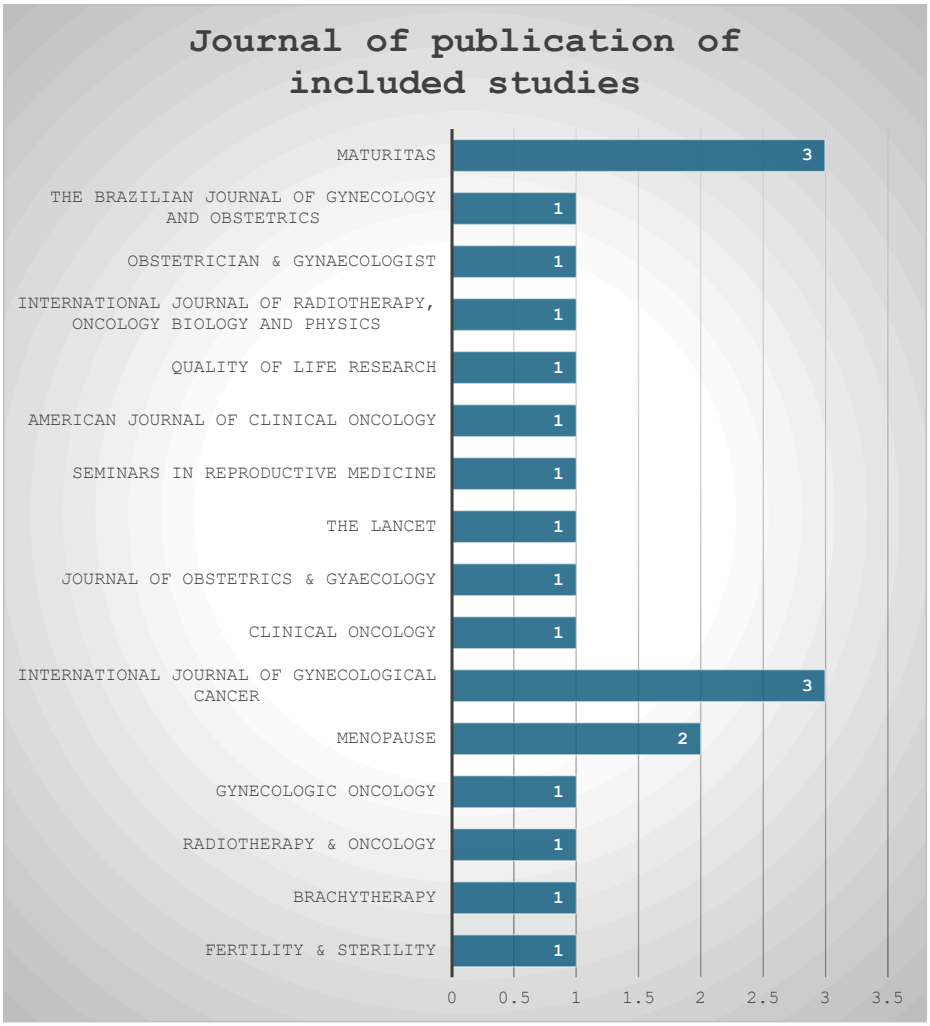

Figure D. Journal where included studies ($n = 21$) were published.

symptoms not as peripheral issues but as integral to radiotherapy care. As professionals who interact with patients throughout treatment delivery, radiographers are uniquely positioned to observe early symptom emergence, initiate sensitive dialogue, and facilitate onward referral to specialist support.

Quality-of-life challenges

Sexual dysfunction emerged as one of the most prominent and distressing consequences of RIM, reported in up to 78 % of survivors in some cohorts.[36]

Commonly described symptoms included vaginal dryness, stenosis, dyspareunia, reduced libido, and difficulties with arousal and orgasm. These persisted for years, suggesting they are not self-limiting and require active management. Cohort studies reinforce this pattern: Li et al. (2021)[37] reported long-term vaginal toxicity, while Smet et al. (2018),[25] in a large cohort of 1176 cervical cancer patients treated with MRI-guided brachytherapy, identified enduring vaginal morbidity with impacts on sexual functioning. Several studies highlighted discordance between PROMs and clinician-assessed toxicity scores. Oncologists frequently underestimated sexual morbidity, as shown by Chuk et al. (2024)[28] and Suzuki et al. (2023),[34] leaving many women with unmet needs. Qualitative research captured the psychosocial dimensions: Naert et al. (2024)[6] and Sport et al. (2024)[26] described how survivors framed sexual dysfunction in terms of shame, relational strain, and silence around intimacy, echoing findings in earlier qualitative survivorship work.

The QoL impact was considerable. Dyspareunia and avoidance of intercourse were consistently linked with poorer psychological wellbeing and lower scores in social relationship domains. Vaz et al. (2011)[33] found that persistent dyspareunia negatively influenced multiple QoL outcomes despite some improvement in vaginal dryness over time. For some women, relationships broke down due to unaddressed sexual difficulties, while others adapted by seeking alternative forms of intimacy or fostering open communication with partners. These findings reinforce that sexual health is integral to survivorship and must be embedded in follow-up care.

While sexual dysfunction is frequently emphasised in the literature, RIM was also associated with cognitive symptoms, fatigue, and musculoskeletal discomfort, which were less consistently highlighted but nonetheless well documented. The EMBRACE analysis[25] demonstrated significant increases in rates of fatigue and insomnia after chemoradiation and brachytherapy, alongside vasomotor symptoms, underscoring the systemic impact of RIM. Similarly, the quality-of-life studies reported fatigue and general physical discomfort as key contributors to reduced wellbeing.[33]

Cognitive changes, such as impaired concentration and memory ("brain fog"), were recognised features of menopause and may

Table D
Summary of evidence by discussion theme.

Study	Theme 1: Multidimensional Impact of Radiation-Induced Menopause	Theme 2: Quality-of-Life Challenges	Theme 3: Supportive Care, Interventions, and Barriers to Treatment	Theme 4: Research, Education, and Survivorship Gaps
Chuk et al. (2024)	✔ Severe menopausal symptoms, distress, underreporting due to stigma	✔ High sexual dysfunction prevalence; discordance with clinician grading	✔ Low counselling/HRT uptake; PROMs empower patient voice	✔ Calls for longitudinal data, inclusive PROMs, reconsideration of vaginal dose
Cotangco et al. (2020)	✔ Sudden symptom onset, limited awareness, misconceptions about HT	✔ Impacts intimacy, emotional wellbeing, social functioning	✔ Highlights need for education, counselling, HT integration	✔ Identifies provider and survivorship planning gaps
Donovan et al. (2022)	✔ Links ovarian dose to premature menopause, anxiety, distress	✔ Shows QoL benefit of ovarian preservation	✔ Preventive intervention (oophoropexy) described	✔ Notes limited long-term outcome data, need for preventive care research
García-García et al. (2023)	✔ Physical + psychological burden of early POI	✔ Infertility distress and intimacy challenges	✔ Reports HRT use, adjunct strategies (calcium, exercise)	✔ Calls for individualised survivorship plans and early risk ID
Hickey et al. (2024)	✔ Diagnostic complexity, symptom overlap	✔ 78 % sexual dysfunction prevalence; sociocultural barriers	✔ Summarises hormonal & non-hormonal options; multidisciplinary models	✔ Highlights limited evidence for non-hormonal interventions & LGBTQI + care
Letourneau et al. (2013)	✔ Links pelvic RT to POI, distress, identity loss	✔ Describes psychosocial & relational strain	✔ Highlights fertility preservation, HRT	✔ Calls for QoL-focused, longitudinal research
Li et al. (2021)	✔ Emotional burden of symptoms	✔ Improved intimacy and satisfaction post-clinic	✔ Demonstrates efficacy of multidisciplinary sexual health clinic	✔ Advocates for systematic integration of such services
Moss et al. (2016)	✔ Severe symptoms in young women, fear-driven HRT avoidance	✔ Long-term health risks when untreated	✔ Emphasises need for HRT, alternative interventions	✔ Highlights lack of adherence data, need for systematic models of care
Naert et al. (2024)	✔ Body image loss, emotional vulnerability	✔ Partnership strain, intimacy avoidance	✔ Highlights need for holistic counselling, better clinician communication	✔ Urges more qualitative and partner-inclusive research
Pepin et al. (2025)	✔ Covers physical & cognitive aspects of POI	✔ Mentions QoL domains affected	✔ Detailed guidance on HRT initiation and safety	✔ Calls for individualised strategies, long-term monitoring
Rees (2006)	✔ Physical risks (CVD, bone loss)	◑ Limited QoL detail	✔ Focuses on hormonal and bone health interventions	✔ Notes gaps in complementary therapy evidence
Rees et al. (2020)	✔ Acknowledges physical & psychosocial effects	✔ Notes sexual and emotional burden	✔ Recommends HT, SSRIs, multidisciplinary support	✔ Points to gaps in safety data, psychosocial interventions
Richardson et al. (2019)	✔ Details physiologic consequences	◑ Notes general QoL impairment	✔ Emphasises HRT as most effective treatment	✔ Highlights specialist access and guideline clarity gaps
Silva Filho et al. (2025)	✔ Notes importance of multidisciplinary approach	◑ Touches on social implications	✔ Advocates integrated care pathways	✔ Calls for better diagnostic tools & structured care lines
Singh & Oehler (2010)	✔ Psychological morbidity, emotional impact	✔ Notes sexual dysfunction impact	✔ HRT and non-hormonal strategies described	✔ Emphasises need for psychosocial outcome research
Smet et al. (2018)	✔ Fatigue, insomnia, vasomotor symptoms	✔ QoL reduction due to sleep/fatigue	✔ Suggests symptom management strategies	✔ Identifies lack of interventional and longitudinal studies
Sport et al. (2024)	◑ Focuses on communication around menopause	✔ Stresses importance of discussing sexual health	✔ Recommends involving psychologists and endocrinologists	✔ Highlights communication gaps, especially fertility discussions
Stroud et al. (2009)	✔ Comprehensive coverage of POI symptoms & distress	✔ Details psychosocial and relational impact	✔ HRT, fertility preservation, multidisciplinary support	✔ Calls for psychosocial research and guidelines
Suzuki et al. (2023)	✔ Highlights symptom burden post-treatment	✔ Notes QoL reduction from abrupt oestrogen loss	✔ Quantifies HRT underuse, racial/regional disparities	✔ Calls for strategies to improve uptake and prospective HRT trials
van der Hoef et al. (2024)	✔ Captures symptom prevalence and fear of recurrence	✔ Links HRT use to better QoL outcomes	✔ Reports patient preferences, alternative medicine use	✔ Notes need for menopause consultants, tailored regimens
Vaz et al. (2011)	✔ Longitudinal symptom tracking	✔ Shows QoL improvements but persistent dyspareunia effect	✘ No intervention data reported	✔ Implies research need for dyspareunia management

be exacerbated by oestrogen deprivation, chemotherapy, and sleep disturbance. These symptoms were acknowledged in menopause management guidelines, although they remain less frequently measured as primary outcomes.[2,36]

Muscle and joint aches were also associated with hypo-oestrogenism and were reported in survivorship quality-of-life assessments, potentially worsened by pelvic radiotherapy and treatment-related tissue changes.[4] The limited emphasis on these symptoms in the literature likely reflects research focus rather than true absence, or less representation in PROMs, supporting the need for broader, more holistic survivorship assessment.

While sexual dysfunction dominates the current literature on RIM, other physical and psychosocial consequences remain comparatively under-researched. This narrow focus risks under-recognising the cumulative burden of RIM on daily functioning and long-term health. Future studies should adopt more holistic outcome frameworks that capture cognitive, physical, psychological, and social domains alongside sexual health, ensuring survivorship care reflects the full lived experience of women affected by RIM.

Supportive care, interventions, and barriers to treatment

Despite guideline support from international bodies,[3] systemic or local HRT remains underutilised in cervical cancer survivors. Real-world uptake remains as low as 36–40 % in some cohorts,[34] with median use lasting weeks rather than years.

Barriers to uptake include clinician hesitancy—often rooted in outdated safety concerns—patient fears of recurrence or side effects, and limited access to menopause expertise. Importantly, evidence consistently demonstrates that HRT is safe in non–hormone-sensitive cancers such as cervical squamous cell carcinoma[30,39] and improves vasomotor, urogenital, and sexual symptoms as well as bone and cardiovascular health.[40,41]

Non-hormonal interventions, including vaginal moisturisers, lubricants, dilator therapy, SSRIs, and pelvic physiotherapy, are recommended for women unable or unwilling to use HRT. However, uptake is also low. Dilator programmes, for example, suffer from adherence rates below 25 % in some studies.[6] Survivors describe dilators as “mechanical” or inadequately explained, a theme echoed in qualitative research by Naert et al. (2024).[6]

Emerging care models show promise. In the Netherlands, Van de Hoef et al. (2024)[35] observed high HRT uptake (76–78 %), with users reporting fewer symptoms and better QoL. Dedicated sexual health clinics integrating gynaecologic oncology, psychology, and sexual medicine have been associated with improved outcomes,[26] while telemedicine and nurse-led survivorship interventions have been highlighted in reviews as scalable solutions.[31,36] However, such models remain limited in scope, leaving many survivors reliant on ad hoc or self-directed coping strategies.

Research, education, and survivorship gaps

This review revealed substantial gaps in the literature. Most studies were small, single-institution, or cross-sectional designs, limiting generalisability and precluding analysis of long-term symptom trajectories. Longitudinal data remain scarce: Vaz et al. (2011)[33] provided rare follow-up evidence suggesting partial improvement in vaginal dryness but persistent dyspareunia, yet such data are exceptions rather than the rule.

Inclusivity is another critical gap. Nearly all PROMs identified are heterosexual and binary. These risks marginalise LGBT survivors and culturally diverse groups.

Reviews[36,39] highlight the lack of PROMs adapted for diverse populations, while Garcia-Garcia et al. (2023)[24] demonstrated how cultural and socioeconomic factors exacerbate the burden of premature ovarian insufficiency in low- and middle-income country settings.

Another gap lies in the absence of standardised survivorship pathways integrating menopause care into follow-up. Despite consistent evidence supporting HRT’s safety and benefit, its use remains inconsistent across regions.[34,35] Few studies report structured counselling or decision aids, and partner-inclusive or psychosocial interventions remain under-evaluated, despite strong qualitative evidence of relational strain.[6,26]

Future research should prioritise:

- Development and validation of inclusive, culturally sensitive PROMs.
- Longitudinal cohort studies tracking symptom evolution.
- Randomised trials testing multimodal interventions (HRT, non-hormonal, psychosocial).
- Implementation studies evaluating integrated survivorship care models, including telehealth and nurse-led interventions.

Implications for practice and policy

Therapeutic radiographers can play a key role in recognising and supporting RIM. Incorporating brief, validated PROMs—such as the female sexual function index (FSFI)—into routine reviews allows early identification of symptoms. These tools can be used at various stages of the treatment pathway and into follow-up. Early conversations, ideally before treatment begins,[26,29] could help prepare women for potential physical and sexual changes. Regular check-ins during weekly reviews ensure emerging concerns are addressed.[33] Integrating PROM completion into electronic treatment review systems may also improve consistency and allow patterns of distress to be flagged automatically.[25,28]

As frequent points of patient contact, radiographers are well placed to screen for menopausal and sexual symptoms, using validated PROMs where available, and to initiate referral for early counselling before treatment begins. Education regarding menopausal changes and available management options empowers shared decision-making and improves survivorship experiences. Importantly, survivors frequently report that information and counselling are valued at the time of delivery. Intervention studies show that structured education increases adherence to rehabilitative behaviours (e.g., dilator use) and is linked to better sexual function and QoL, indicating a durable clinical benefit rather than only transient patient satisfaction.[40]

Optimal timing is essential. Early conversations—ideally initiated at pre-treatment or the first week of radiotherapy—can prepare patients for potential changes and reduce uncertainty. Evidence suggests that women benefit from anticipatory guidance on vaginal dilators, moisturisers, sexual health changes, and available HRT or non-hormonal options before symptoms manifest.[37,41] Given the established safety of HRT in cervical cancer survivors, its use should be encouraged until the age of natural menopause. Non-hormonal and supportive strategies could be promoted when considering patient empowerment and choice in shared decision-making, and menopausal changes not always being oestrogen-dependent, for example sexual dysfunction could be the impact of physiological and psychological changes. should help normalise conversations about sexuality, intimacy, and femininity reducing stigma and validating women’s concerns. Clear referral mechanisms also strengthen survivorship care. Radiographers are well placed to coordinate timely referrals to menopause specialists, gynaecology teams, pelvic health physiotherapists, psychosexual therapists, and specialist oncology

nurses. Developing local referral algorithms or decision-support flowcharts within radiotherapy departments can ensure consistent practice and reduce reliance on individual clinician confidence. Ongoing training in communication and menopause care, alongside investment in multidisciplinary and telehealth survivorship services, will strengthen the radiographer's role in delivering holistic, patient-centred care.

Targeted communication training can further enhance radiographers' confidence in discussing sensitive topics such as sexual health, premature menopause, or changes in intimacy.[42] Structured approaches—including the Permission, Limited Information, Specific Suggestions, and Intensive Therapy (PLISSIT) model, motivational interviewing techniques, and simulation-based training—may be value in improving staff competence and patient comfort. Radiotherapy departments may consider incorporating menopause-specific communication modules into continuing professional development programmes to normalise discussions and reduce stigma.

Future research will explore patients' experiences of RIM in greater depth using qualitative methods, with a focus on information provision and support. Findings will aim to enhance the evidence base for radiographers, informing integration of menopause-related care into radiotherapy treatment support and follow-up pathways. Additionally, to address limitations of the current scoping review and the lack of critical appraisal, a systematic review is planned to provide a more rigorous synthesis of the literature.

Strengths and limitations of the review

Strengths of this scoping review include a comprehensive database search, inclusion of both quantitative and qualitative evidence, and mapping across physical, psychosocial, and intervention domains. By synthesising patient-reported and clinical data, it provides a holistic view of survivorship. A transparent, systematic approach was used, with two reviewers independently screening studies and a third resolving disagreements, piloted data extraction, and structured thematic mapping across diverse evidence.

Limitations include reduced interpretive depth compared with formal qualitative coding and potential reviewer subjectivity during theme development. Only English-language studies were included, potentially omitting relevant international evidence and overrepresenting high-income, Western perspectives, while underrepresenting LMIC populations and LGBT survivors.[24,43] Much of the literature focuses on cervical cancer, with heterogeneous study designs limiting direct comparison; synthesis was conducted by a single reviewer which could introduce bias. This also reflected the lead-author design of this scoping review; however, theme development and interpretation were informed through iterative discussion with co-authors, which helped to enhance reflexivity and credibility. Attribution of premature menopause to radiotherapy is complicated when chemotherapy is also given. Evidence quality was variable, with QuADS highlighting limitations in sampling, analysis transparency, and confounding factor reporting.[27,34] lower-quality studies, including case series such as Pepin et al. (2025),[44] reduce generalisability. PROMs often reflect heteronormative assumptions,[35,38] survivorship care is fragmented,[27,28] and non-hormonal or psychosocial interventions remain underexamined. Publication bias may overstate symptom prevalence, severity, or intervention benefits, while some qualitative experiences may be underreported.

Conclusion

RIM severely impacts quality of life yet remains underrecognised and poorly addressed in routine care. Therapeutic radiographers have a pivotal role in closing this gap by facilitating early recognition, initiating sensitive communication, and promoting equitable access to survivorship resources. Coordinated, multidisciplinary strategies that integrate menopause and sexual health into radiotherapy follow-up will be essential to improving outcomes and ensuring holistic care for women treated for cervical cancers.

Ethics approval and consent to participate

This research did not require Institutional Review Board approval because it synthesised information from existing literature and publicly accessible documents, without the collection of new or identifiable human data.

Informed consent for patient information to be published in this article was not obtained because the study used only data extracted from previously published sources and did not include any identifiable individual patient information.

Guidelines for humane animal treatment did not apply to the present study because it did not involve the use of animals or any experimental research on animal subjects.

Availability of data

Data for this study were obtained from searches conducted in multiple publicly accessible databases, including MEDLINE, CINAHL Complete, Scopus, APA PsycINFO, Cochrane Library, and Google Scholar. The datasets generated and analysed during the current study consist of bibliographic records retrieved from these sources. These data may be made available by the author upon reasonable request.

Author contributions

LJ: Conceptualisation, Methodology, Formal analysis Writing – original draft, Visualisation,

MC: Validation, Formal analysis, Writing – reviewing and editing.

PH: Supervision, Writing – reviewing and editing.

Generative AI use

During the preparation of this work, the author used ChatGPT (OpenAI, GPT-5) to assist with refining wording, improving clarity in the manuscript and adaption of Table D. After using this tool, the author reviewed and edited the content as needed and takes full responsibility for the content of the publication.

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Conflict of interest

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