Closing the Gap: Biophilic Interventions in Radiation Oncology

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ASTRO ANNUAL MEETING 9/26-9/30 BOSTON | Data to Dialogue: Communicating Radiotherapy's Value to Advance Care

INTRODUCTION

- **Biophilic Interventions**: Design strategies that integrate **natural elements** into indoor environments to **connect humans with nature**. This includes natural light, window views, and indoor plants.
- Existing literature suggests there are benefits for patient experience, but evidence has not been synthesized for oncology-specific settings.

AIM

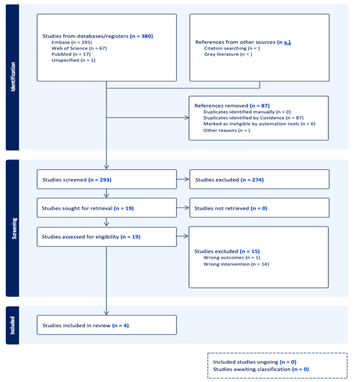
To evaluate the current evidence for **biophilic interventions** in **oncology care settings** and identify gaps for future research in radiation oncology and cancer care more broadly.

METHODS

Databases Searched: PubMed, Embase, and Web of Science

Eligibility Criteria:

- **Included:** Studies that evaluated intentional biophilic interventions in an oncology care setting
- **Excluded:** Virtual reality interventions



Screening:

- Titles/abstracts were screened followed by full-text review.
- Two independent reviewers extracted study design, population, intervention, and outcomes, with discrepancies resolved by consensus.

RESULTS

Across the 4 included studies, **daylight access, window views, and greenery** were consistently associated with lower self-reported stress, improved mood and relaxation, greater hope, increased confidence in quality of care, and higher environmental satisfaction.

- All 4 studies used a cross-sectional survey design with self-reported measures
- Only 2 used a previously validated tool (Fliege Perceived Stress Questionnaire)



Figure 1. Hospital and waiting room environments with and without biophilic interventions

Author & Title	N	Interventions	Outcomes	Key Results
Blaschke, 2017 *Artificial But Better Than Nothing*	143	Artificial plant arrangements, hanging installations, movable green walls, and a rock garden in the waiting room	• Mental health/mood • Environmental satisfaction	• 48% **positively affected by greenery** • 23% very positively affected by greenery • 81% liked the greenery • 81% agreed greenery brightened the waiting room
Tinner, 2018 *Perceived Importance of Wellness*	138	Perceived importance of building features: • natural light/nature views • indoor plants • rooftop garden • nature artwork/murals	• Mental health/mood • Survival • Quality of care	• Top needs for patients: ease of movement, thermal comfort, and **natural light** • Top needs for caregivers: access to private and quiet spaces
Wang, 2017 *Patient Needs and Environments for Cancer Infusion Treatment*	418	Patients' use and importance of environmental items	• Mental health/mood	• Window views during treatment had **higher levels of hope** and **lower levels of stress** than their counterparts (p<.05)
Wang, 2026 *Daylight Access and Waiting Experiences in Hospitals*	790	Daylight access vs windowless waiting area	• Mental health/mood • Quality of care	• Patients and family companions in areas with daylight **communicated more with peers** and had **less stress** compared to windowless areas ($p \leq 0.05$ and $p \leq 0.10$, respectively) • Daylight access and peer communication explained over 15% of the variance in stress levels

Table 1. Study findings for biophilic interventions in oncology units gathered via cross-sectional surveys in the 4 included studies.

CONCLUSIONS

- Biophilic exposure was linked to **reduced stress, improved mood, and greater confidence in care** across all 4 studies.
- These outcomes are valued by all institutions and providers, supporting biophilic interventions as a **low-risk addition** to oncology units.
- Radiation oncology patients return to the same treatment space repeatedly over many weeks, yet no studies have examined this setting.
  - Psychological stress during cancer treatment has been linked to poorer outcomes [5].
- Reducing patient stress and increasing confidence in care can **improve patient satisfaction** – a metric tied to reimbursement and institutional reputation.

FUTURE RESEARCH

- No rigorous research has been conducted in an oncology-specific setting, highlighting a **clear gap** and opportunity to explore **built environment interventions** in oncology settings.
- More data exploring the influence of **daylight on stress perception** and its potential to improve patient outcomes, posing potential financial benefit to hospital systems, is needed.
- An RCT is warranted to support the **patient benefits of biophilic design**, improved levels of hope and confidence in care, in an oncology setting and to justify investment in hospital design.

REFERENCES

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