

Project Overview

The medical need: Fear of cancer recurrence (FCR) is a major source of distress among cancer survivors, particularly for the growing population of breast cancer survivors, with studies indicating that approximately 60% experience at least moderate FCR and nearly 20% report severe levels, impairing quality of life and increasing healthcare utilization. With breast cancer survival rates near 90% in high-income countries, hundreds of thousands of Canadian women live with ongoing psychological and functional consequences, making FCR one of the most frequently reported unmet needs in oncology.

Our proposed solution: To address this unmet need, this proposal aims to develop and pilot an AI-assisted, digital adaptation of Fear of Recurrence Therapy, expanding access of a rigorously developed and user tested CIHR funded, evidence-based intervention. By leveraging artificial intelligence, this solution provides 24/7, expert-curated support to cancer survivors and caregivers, reducing barriers linked to scheduling, staffing, and resource constraints while maintaining therapeutic quality.

Significance: This approach directly responds to urgent clinical and system needs by transforming a proven therapeutic model into a scalable online format, aligning with national priorities for technology-enabled care. The implementation and evaluation of an AI-powered FORT has the potential to significantly advance survivorship care, improve patient outcomes, and reduce undue strain on cancer care services, representing a pioneering step in mobilizing innovation and AI technology in psycho-oncology.

Background and Preliminary Data

Fear of cancer recurrence drives significant distress in cancer survivorship and ranks among the most frequently reported unmet needs.^{1,2} In 2022, there was an estimated 2.3 million new breast cancer diagnosis worldwide.³ In Canada, 318,428 women diagnosed between 2007 and 2021 were projected to be alive in 2022, representing ~2.1% of Canadian women.⁴ With survival rates approaching 90% in high-income countries, many survivors/patients living with cancer face lasting challenges, including diminished quality of life (QoL) and persistent physical and psychological sequelae.² Fear of cancer recurrence, commonly known as FCR, impairs functioning for individuals and burdens the healthcare system.⁵⁻¹⁰

Fear of cancer recurrence is defined as the “fear, worry, or concern about cancer returning or progressing”.¹¹ It presents with high levels of worry and preoccupation, and hypervigilance to bodily symptoms.^{5,12-15} A systematic review and meta-analysis found that 60% of cancer patients experience at least moderate levels of FCR, and 20% reported experience severe levels.¹⁶ High FCR impairs emotional well-being and daily functioning, contributing to clinically significant anxiety and depression, reduced QoL, increased demand on caregivers. The consequences extend to health systems; survivors with high FCR often seek repeated reassurance through additional tests, unscheduled visits, or consultations beyond clinical guidelines. This pattern increases healthcare utilization and costs while creating avoidable pressure on both primary care and oncology services. **FCR therefore represents both a personal psychological burden and a significant public health challenge.**

Fear of Recurrence Therapy (FORT) is a brief, in-person, evidence-based, patient-partner-designed group psychotherapy intervention to address this common and burdensome phenomena. Developed by Canadian researchers (Lebel and Maheu, Co-PIs) and funded by an initial CIHR catalyst grant over 15 years ago, numerous randomized controlled trials have demonstrated its efficacy in reducing FCR and improving quality of life among adult cancer survivors.^{6,17-20} Delivered over six weekly two-hour sessions, FORT combines cognitive-behavioural and existential therapy supported by a structured paper-and-pencil workbook of activities and homework tasks. The program

helps patients recognize triggers of FCR, replace maladaptive coping with adaptive strategies, challenge the function of worry, tolerate uncertainty, and distinguish between benign symptoms and signs of recurrence. It also addresses existential concerns by encouraging patients to confront their worst fears and reengage with values-consistent life goals.

Despite strong evidence of effectiveness, psychological interventions such as FORT are rarely implemented in routine psychosocial oncology care — that is, *translated from research studies into clinical practice*.^{21,22} To address this gap, Dr. Perez (NPA) piloted FORT with breast cancer patients ($n=19$) at the McGill University Health Centre (MUHC) in Winter and Spring 2025. This initiative was part of a larger national implementation study across five Canadian cancer sites: 1) the MUHC's Cedars Cancer Centre (Montreal, QC), 2) the Ottawa Hospital Cancer Centre (ON), 3) Princess Margaret Cancer Centre (Toronto, ON), 4) Tom Baker Cancer Centre (Calgary, AB), and 5) Newfoundland Health Services (St. John's, NL). The primary objective of this implementation study was to successfully deliver two FORT group interventions over a 10-month period at each of the five sites. Secondary objectives were to: 1) assess barriers and facilitators of FORT implementation; 2) adapt implementation strategies and tools for each clinical setting, and 3) evaluate implementation outcomes (reach, adoption, fidelity, and sustainability) using the RE-AIM framework.^{23,24} Preliminary evidence from the national implementation study among 102 participants²⁵ found that FORT showed a significant decrease in FCR scores from pre-to post-FORT, with Cohen's d of 0.73 indicating a medium-to-large effect size.²⁶ Implementation results from interviews from providers and patients show that FORT addresses a central survivorship need: the sense of abandonment that many experience by the system after treatment and are told they are “good to go.” Extensive media coverage about this program in French and English outlets, e.g., *Le Devoir*,²⁷ *The Gazette*,²⁸ and *CBC*²⁹, speaks to the evident interest and importance of FCR as an unmet healthcare need of cancer patients who still need support from cancer centres.¹

Experts have posited that the next global challenge in psycho-oncology is implementing and maintaining robust, evidence-based treatments in routine cancer care.^{30,31} Individual interviews ($n = 25$) with clinicians and administrators, along with post-intervention focus groups with participants from the 5 sites revealed key facilitators and barriers across sites. At our site, delivering the FORT program within a tertiary care setting presented a number of structural and operational barriers that limit scalability and sustainability. Securing confidential space for group sessions was difficult in a resource-constrained hospital environment, and coordinating schedules for multiple patients and clinicians compounded the logistical complexity. Patient participation was further challenged by the requirement to attend six lengthy 120-minute sessions during working hours, resulting in absences related to employment and transportation barriers. Compressing the full therapeutic curriculum into the six-session format also constrained opportunities for participants to reflect and process their survivorship experiences—an integral component of the intervention's effectiveness. In addition, the program requires availability of highly trained mental health professionals, who remain in short supply, as well as the dedicated participation of a specialized oncology nurse, which is difficult to reconcile with competing clinical demands. Collectively, these barriers underscore the resource- and personnel-intensive nature of FORT and illustrate the kinds of implementation challenges—staffing shortages, scheduling pressures, and structural constraints—that must be addressed to enable equitable access and long-term sustainability of FORT. *Expanding access to FORT requires innovative approaches that reduce dependence on scarce clinical resources while maintaining therapeutic integrity.* This has been identified among top international FCR research priorities.³²

In direct alignment with the CIHR 2021–2031 Strategic Plan priority to mobilize health system innovations through technology, virtual care, and artificial intelligence (AI), this proposal seeks to develop and pilot an AI-assisted digital version of FORT.³³ By leveraging AI, the program

can extend reach beyond clinic walls, offering patients and families 24/7 access to evidence-based, expert-curated content, while also easing the burden on healthcare providers. Early research on digital FCR therapies shows that asynchronous, guided interventions are feasible, effective, and valued by patients, particularly when navigation and examples are engaging—features that AI can enhance and personalize at scale.^{34,35}

Recent advances in natural language processing and large language models have transformed the ability of AI to communicate clearly, empathetically, and at accessible reading levels, often outperforming human-written responses.^{36–41} AI avatars and conversational agents represent the next generation of patient engagement by delivering information in relational, interactive formats—but their optimal applications and risks require systematic evaluation. While AI cannot replace the therapeutic relationship, it can complement in-person care by reinforcing coping skills and providing reliable survivorship support between visits.^{19,22} Our team is uniquely positioned to lead this work: at the MUHC Cancer Centre, investigators on this proposal are already testing AI-powered chatbots with cancer patients, demonstrating feasibility and acceptability.⁴² Building on this foundation, and in line with calls from FCR researchers to evaluate hybrid models blending technology with human support, the proposed AI-assisted FORT will address critical barriers to accessibility, scalability, and long-term sustainability.^{35,43}



Figure 1. Fear of Recurrence AI Navigator

Despite growing interest, few studies have evaluated whether avatar-assisted psychological interventions are an effective and acceptable strategy to support psychological well-being in oncology patients.⁴⁴ To responsibly integrate this technology into cancer care, it is critical to examine both its potential and its limitations. Large language models, for example, can generate errors, overly technical explanations, or responses that lack contextual sensitivity, and it remains unclear how comfortable patients may feel engaging with AI avatars on deeply personal, existential topics such as fears of recurrence or life values. With the long-term goal of optimizing cancer care patients' experiences and improving patient-reported outcomes, *we propose a multi-method, open-label feasibility study to*

develop and evaluate FRAN (Fear of Recurrence AI Navigator, shown in Figure 1), a novel AI-powered, avatar-based cancer information agent designed to deliver accurate, up-to-date, and evidence-based support for FCR. We will assess the accuracy of FRAN's responses using expert clinician raters, and evaluate patient perspectives on its acceptability, trustworthiness, and comprehensiveness, including its capacity to address fears, provide reassurance, and complement FORT both

informationally and therapeutically.

Research Question and Study Objectives

Our overarching research question of this pilot feasibility study is: Can we use advanced in digital technologies to deliver FORT in a more scalable way? From a **Feasibility & Acceptability perspective:** Is an AI-powered agent of FORT, FRAN, feasible and acceptable to breast cancer survivors, as measured by patient engagement, trust, and comfort in discussing their fears of recurrence through the AI platform? With respect to **Comprehensiveness & Accuracy:** How accurate, comprehensive, and clinically trustworthy are the information and responses provided by FRAN, as assessed by both expert raters and user feedback? In terms of **therapeutic Impact & Integration:** Can FRAN address patients' FCR and unmet informational needs; and to what extent does serve as an adjunct or alternative to traditional in-person FORT, particularly for issues of accessibility, scalability, and sustainability?

The project aims to:

1. Co-design and program FRAN with input from psychologists, oncologists, scientist, AI developers, patient partners, community partners and survivors.
2. Test and evaluate the usability, acceptability, accuracy, accuracy of FRAN among breast cancer survivors who experience FCR
3. Explore how cancer patients use FRAN to address their FCR and their unmet informational needs

Study Design and Overview. This is a multi-method, open-label feasibility study that will be carried out in three stages (see Figure 2 for study timeline). AI-enabled health interventions must be grounded in rigorous theory while also achieving high acceptability among diverse users. For FRAN, this means ensuring that the digital character respects users' autonomy and self-identified needs for support, enhances their sense of competence in managing FCR, and fosters a sense of relatedness with the avatar itself. These principles are central to the *person-based approach* developed by Yardley and colleagues⁴⁵ which has been widely applied in digital public health. Guided by this approach, the development of FRAN will proceed through three iterative phases: **Stage 1, Planning; Stage 2, Designing & Developing FRAN;** and **Stage 3, Piloting.** At each stage, the advisory group i.e., our entire research team of scientist, clinicians, knowledge users will ensure that FRAN's AI-driven responses remain theory-based, clinically credible, linguistically and culturally appropriate, and acceptable to end users.

Stage 1. Planning. In Stage 1, we will convene interdisciplinary advisory board meetings over 3 months with our 15-person research team of clinicians, clinician-scientists, patient partners, and not-for-profit organization members who focus on breast cancer populations. We will collaborate directly with CONNEXiONS Inc, a leading healthcare technology company that develops AI tools including AI-powered digital avatars to enhance communication in healthcare settings. Together, we will iteratively plan and refine our methods for adapting the FORT intervention content into a digital AI-powered digital character, known as the avatar, FRAN (see Figure 1 or [here](#)) FORT targets key vulnerability factors including internal and external triggers, exaggerated perceived risk of recurrence, hyper-focus on ambiguous physical sensations, maladaptive coping, uncertainty around cancer coming back, and beliefs about the benefits of worrying about one's health. Existing FORT materials will form the main foundation of FRAN's knowledge base; the advisory group will systematically review and adapt FORT's psychoeducational and cognitive-behavioural components for integration into FRAN. This includes therapist and patient manuals, nurse slide decks, handouts, images, and graphs, as well as discussions about nuanced content (e.g., pauses, exposure exercises). These materials will be used to support clinically credible responses that are evidence-based, linguistically and culturally appropriate for Canadian breast cancer populations.

Stage 2. Designing & Developing FRAN. CONNEXiONS Conversation Machine™ will develop FRAN as a proprietary software platform integrating a large language model, a digital avatar interface. FRAN will run on the OpenAI API (ChatGPT-4o) with responses restricted to this curated knowledge base. The platform will operate with zero data retention, ensuring that conversations are not stored or used to train the model. Importantly, FRAN will be developed in both English and French. Early prototypes will be pre-tested by all members of the advisory group, including our patient partners. This usability testing will assess clarity, accessibility, and overall acceptability. CONNEXiONS Inc will also engage in iterative assessment meetings for 6 months over Year 1 and 2 to incorporate adjustments to FRAN's content, usability, communication style, and clinical credibility. Clinicians experientially familiar with the FORT intervention will manually review transcripts of model responses to simulated patient queries for appropriateness and adherence to the source material. Structured feedback will be incorporated to improve the digital character's design, comprehensibility, sensitivity to the lived



Scan Code to Visit Demo

experience of breast cancer survivors, and overall feasibility, usability, and acceptability.

Figure 2. Study Timeline

Phase/Task		Year 1				Year 2				Year 3			
Quarter	Pre-award	1	2	3	4	1	2	3	4	1	2	3	4
Preparation: Onboarding trainee and RA, Protocol finalization, ethics approval													
Stage I: Planning FRAN, Advisory board meetings													
Stage II: Design and develop FRAN													
Stage III: Piloting of FRAN													
Stage IV: Knowledge Translation (KT) and dissemination													
Future Grant planning and Implementation													

Stage 3. Piloting.

Study Sample. We will recruit 40 individuals with a diagnosis of breast cancer who have completed primary treatment and who report FCR to their oncologist an ongoing concern. This sample is not intended for hypothesis testing but to generate sufficient data to assess feasibility, usability, acceptability, satisfaction, and to explore preliminary signals of efficacy.

Eligible participants will be at least 18 years of age, able to read and speak English or French, have completed their cancer treatment (radiation or chemotherapy), and experiencing clinical levels of FCR as determined by the validated single-item screener FCR-1.^{48,49} The breast cancer population was selected due to both the high prevalence of FCR in this group and the feasibility of recruiting a sufficiently large and diverse sample from the MUHC Cedars Cancer Centre.

Recruitment and Procedure. Recruitment will occur in the breast oncology clinics at the MUHC Cedars Cancer Centre. During routine follow-up visits, oncologists (co-A, Drs. Bouganim and Meguerditchian) will identify patients who express concerns about FCR and introduce the study. The research coordinator will then contact referred patients, provide an overview, and administer the FCR-1 screener to confirm eligibility.

Eligible individuals will be invited to review and sign informed consent, complete a sociodemographic questionnaire, and provide availabilities. Consenting participants will also complete a brief pre-session questionnaire before receiving a secure link to access FRAN. Participants may use their own device or a study-provided device if needed. The research assistant will be available to assist with technical issues and any study-related questions. Study-completing participants will receive a \$30 honorarium for each post-AI interaction post intervention questionnaire completed.

Measures.

Pre and post session Quantitative Data. The pre-questionnaire will contain validated socio-demographic characteristics (age, sex, gender, ethnicity, and education) and clinical details (diagnosis, stage, and treatment history). FCR will be assessed using the validated FCR Inventory–Short Form (FCRI-SF).⁵⁰ Patients will be asked to interact with FRAN for 3 visits of 1 hour each week. Following each interaction, participants will be emailed a questionnaire when they interacted with FRAN. **Post intervention questionnaire** will contain FCR and acceptability and usability measures. FCR will be measured with the FCRI-SF. Acceptability and satisfaction will be measured via: 1) the System Usability Scale (SUS),⁵¹ including Net Promoter Score (NPS),^{52,53} and 2) an assessment of veracity against source material content. Perceived benefits will be measured using 5 items used in avatar research,⁴⁴ e.g., “The experience was beneficial; I would participate in this experience again; I would recommend this experience This experience helped me to reflect on my past, present or future hopes; I was able to easily engage with my Avatar”.⁴⁴

Qualitative data. After 8 weeks of access to FRAN, all participants will be invited to participate in a focus group comprising of 6-8 participants. This will be optimal for this study to provide a productive environment for discussion.⁵⁴ We aim to recruit a minimum of 20 participants, with the potential to include all 40, if needed for saturation.^{46,47,55} This is formalized in the Context-Mechanism-Outcome configuration,⁵⁶ which posits that to understand an intervention, one must first identify 1) the specific mechanisms that the intervention triggers (e.g., acceptability, trustworthiness); and 2) the contextual factors that may modulate that mechanism (e.g., beliefs about AI). In the proposed study, we will complement our quantitative results with qualitative findings that identify the factors that influence usability, acceptability, satisfaction and utility with FRAN. Our proposed interview guide (see sample questions, Figure 3) will be structured around the REF, and the CMOc will be used deductively for analyses. A standardized interview guide has been developed by our entire research team. Focus groups will last ~90 minutes led by either Drs Perez, Sanders, Maheu and Lebel, who are all experienced in qualitative methods and can moderate discussions using the interview guide. Study-completing participants will receive a \$50 honorarium for participating in the focus group.

Figure 3. Sample Questions from Semi-Structured Interview Guide for FRAN

Section	Sample Questions / Script
General Impressions	How would you describe your overall experience using FRAN?
Addressing Fear of Recurrence	Were there times when FRAN's answers did not meet your needs regarding recurrence?
Content and Credibility	Did you find FRAN's information trustworthy?
Usability and Engagement	How easy or difficult was it for you to use FRAN?
Emotional Impact and Relationship	How did you feel emotionally while interacting with FRAN?
Suggestions for Improvement	What changes would make FRAN more useful for you? Would you recommend FRAN to other breast cancer survivors with similar fears? Why or why not?
Closing	Do you have any other comments or reflections about your experience with FRAN?

Multi-Methods Analysis Plan. The primary outcomes will assess the feasibility of delivering an avatar-facilitated intervention as determined by patient adherence, recruitment rate, acceptability and comfort of study procedures, and patients' perceived benefits. Adherence rates were determined as the number of patients able to complete pre-intervention questionnaires, post intervention questionnaire, and the two-month follow-up focus group. Acceptability of the study procedure will be measured by the ability technical feasibility, compliance with the protocol, benefit scores and self-reported comfort with the study through the focus groups. Quantitative analyses will include descriptive statistics to summarize socio-demographic and clinical characteristics, recruitment and retention rates, user engagement metrics (e.g., number, duration, and frequency of FRAN sessions), and completion rates for study measures. Paired-sample t-tests and non-parametric equivalents (e.g., Wilcoxon signed-rank tests) will be used to examine pre-post changes in fear of cancer recurrence (measured by the FCRI-SF). identify potential moderators of engagement and benefit. Quantitative and qualitative findings will be integrated to provide a comprehensive understanding of FRAN's feasibility, usability, acceptability, and optimize potential. This convergent multi-methods approach will allow triangulation of results, enhance validity, and identify areas where survey findings and interview narratives converge or diverge.^{57,58} Inductive and deductive thematic and comparative analyses will be employed. Deductive analyses will be informed by existing theoretical frameworks in psychosocial oncology, including the Health Belief Model,⁵⁹ which emphasize the interaction of contextual factors (e.g., prior cancer experiences, trust in the healthcare system, cultural beliefs), mechanisms (e.g., the need for reassurance, coping strategies, or reducing uncertainty), and the content and design of the intervention

(e.g., usability and perceived credibility of FRAN).

Inductive thematic analyses will be used to generate new themes grounded in participants' narratives, allowing us to capture emergent insights into how patients experience and evaluate FRAN. Raw qualitative data will be analyzed using a multi-stage analytical strategy to identify codes, subthemes, and overarching key themes. A qualitative analyst and a secondary reviewer will proceed with analyses under the supervision of the study's qualitative lead. This process will include: (1) reading and familiarizing with the transcripts, (2) creating initial codes, (3) grouping codes into subthemes, (4) defining overarching themes, and (5) identifying patterns across participants' experiences. Data analysis will be iterative, such that findings from early interviews will refine the coding framework and inform the analysis of subsequent transcripts. Once all interviews are completed, the research team will integrate analyses into a comprehensive thematic structure. A comparative approach will also be used to examine differences and similarities in themes across clinical subgroups, such as women earlier in survivorship compared with those further along in follow-up. Interview recordings will be transcribed verbatim using a professional transcription service, and NVivo will be used to support data management, coding, and organization.

Considerations: use of AI Avatars/Chatbots designed to be similar to a cognitive-behavioural existential therapy. AI virtual avatars have been studied in Canada as experimental digital mental-health supports, but only as adjunctive tools, not replacements for regulated professionals, under TCPS-2-compliant research ethics oversight.⁶⁰ Though literature supports advantages to this technology, there is a lack (and a need) of avatar-based studies in psychosocial oncology, with only 3 identified in a systematic review.⁶¹ The 2024 Canadian Psychological Association Briefing Paper on Artificial Intelligence and Psychology⁶² underscores that AI must be implemented with human oversight, ethical integrity, and transparency, ensuring that AI supports, not supplants psychologists' judgment. The application of the Canadian Code of Ethics for Psychologists to telepsychology reinforces that remote and digital services (inclusive of AI tools) must adhere to professional competence, confidentiality, and informed consent standards.⁶⁰ The Ordre des psychologues du Québec (OPQ) and the College of Psychologists of Ontario (CPO), of which Drs. Perez and Lebel are members of respectively, encourage a reflective, not prescriptive stance toward AI and emphasize the importance of evidence-based practice when considering AI tools in psychological care.^{63,64} This will be a priority discussion and refinement in our advisory group meetings where two of the research team.

FORT is completely evidence-based and has been tested and refined for the last 15 years.^{6,19,22} FRAN's AI is strictly bounded, i.e., all responses are restricted to its expertly vetted knowledge base, with hard-coded guardrails to prevent conversations from going astray from the subject at hand. The purpose of FRAN is not to replace psychologists, but to complement their work by offering scalable, supportive functions to decrease resources, increase access. For example, in FORT, each psychologist-led session ends with a mindfulness exercise that patients are encouraged to practice independently, an activity that FRAN could readily facilitate. Similarly, in Session 2 of psychologist-led, patients prepare questions for a nurse who joins in Week 3 to deliver a 45-minute presentation e.g., What is the difference between an MRI and a CT scan? Who do I call if I see a change in my breast? FRAN will be programmed with this evidence-based educational content, enabling patients to access accurate, tailored, and supportive information about fear of cancer recurrence at any time, in a way that is engaging, scalable, and responsive to individual needs.

Limitations, potential challenges and mitigation strategies. Ensuring equitable, diverse and inclusive (EDI) representation is a central priority of this first AI feasibility study. We will prioritize the recruitment of eligible individuals from these harder-to-reach populations (recent immigrants, racialized minorities, lowest SES). It is important to note that these are not rigid quotas but rather indicative targets, reflecting our dedicated efforts to ensure appropriate representation of diverse

minority groups in our study. As the MUHC welcomes patients from diverse, multicultural backgrounds with intersectionality, we believe that the 40 participants, will allow for EDI representation. If the research team observes that we did not represent certain socio-demographics, we will actively recruit more individuals to participate in this study. This study is a feasibility study and is not designed to have a control arm. Nonetheless, FORT is attempting to be maintained at the MUHC. We will likely be able to continue to draw clinical experiences from what patients and providers need or do not need from FRAN. We will also offer patients who participate to enroll in the psychologist-led FORT intervention if its being offered and/or if they maintain clinically significant scores on the FCRI-SF.

Ethical considerations. Ethical approval will be obtained from the Centre for Applied Ethics of the MUHC. Data governance will follow institutional and Tri-Council policies: minimal PII, de-identified logs/transcripts on secure servers, access controls, and no use of prompts/outputs to train external AI models.

Anticipated outcomes and importance of research. This project addresses a critical implementation gap: Although FORT is effective, it is resource-intensive and cannot reach all cancer survivors who need it. If shown acceptable, accurate, and safe, FRAN can serve as a scalable, empathic, empirically based adjunct to FORT and routine care, improving decision preparedness and information access between visits, while laying the groundwork for a larger multi-centre evaluation focused on clinical impact, equity, and sustainable implementation in Canada. The anticipated benefit of this research lies in its potential to significantly reduce FCR and thereby improve the well-being and quality of life of cancer survivors using AI avatars. By adapting and delivering FORT's evidence-based content through a digitally enabled platform (FRAN), the study will assess how therapy can be made more **accessible, scalable, and sustainable** across diverse survivorship settings. This research also aims to demonstrate how digital adjuncts can foster self-efficacy and emotional resilience in the face of uncertainty. By offering cancer survivors supportive tools outside of traditional group sessions, FRAN has the potential to promote a greater sense of control, reduce distress, and strengthen coping in day-to-day life.

Future Directions. We will use the findings from this study to (a) refine and improve the FRAN AI agent and (b) support a larger grant application for a pilot two-arm trial to establish the effectiveness of FORT in reducing FCR. In this future study, we will compare: (1) standard FORT delivered by a mental health professional and (2) a hybrid model combining FORT with FRAN as an adjunct.

Knowledge Translation Plan (Stage 4). We will implement an integrated KT (iKT) strategy co-designed with our advisory Board, patient partners, and community collaborators to maximize impact and uptake. Through iKT, our interdisciplinary advisory group—including psychologists, oncologists, AI developers, patient partners, cancer survivors, and More Than a Cure—will function as equal partners throughout the research process, from co-designing FRAN's communication style to interpreting findings and shaping dissemination strategies. This collaborative approach ensures FRAN is clinically credible, culturally sensitive, and directly usable by end users, addressing the well-documented gap between evidence-based psychosocial interventions like FORT and their real-world accessibility. The MUHC Communication Department will coordinate media engagement (press, radio, television) to raise public awareness of fear of cancer recurrence and digital solutions. More Than a Cure will host survivor-focused events and community forums to ensure accessibility across literacy, gender, and cultural contexts. TELUS Health will provide an industry perspective to inform opportunities for scaling and dissemination across broader digital health networks. Findings will be summarized in plain language (infographics, short videos) and shared via partner channels, social media, podcasts and public talks. Academic dissemination will include peer-reviewed publications and national/international conference presentations. Policy-aligned partners (e.g., Coalition Priorité Cancer

du Québec) will further ensure results inform survivorship care strategies at provincial and national levels.

Interdisciplinary Research Team. Led by **Samara Perez, PhD (NPA)**, early-career clinician scientist at the RI-MUHC, Asst. Professor of Oncology, McGill and clinical psychologist working in the Psychosocial Oncology program at the MUHC and has delivered FORT twice herself and is aware of the real-world challenges to implementation. She will lead study design and execution of the project, quantitative and qualitative analyses, working with the AI developers, patient partners, trainees and our entire team to ensure FRAN is clinically and empirically well designed. This would be her first PI-led CIHR-funded grant. **Christine Maheu, PhD (PA)**, Professor at McGill's School of Nursing and Senior-scientist at the RI-MUHC and **Sophie Lebel, PhD (PA)**, Professor of Psychology at the UOttawa, are the developers of FORT, leading researchers in fear of cancer recurrence and psychosocial oncology who will mentor Dr. Perez in all phases of the research endeavour. **Justin J. Sanders, MD, MSc, FAAHPM (Co-A)**, Chief of Supportive & Palliative Care at the MUHC and Associate Professor at McGill, is a physician-scientist focused on communication care in serious illness and an expert in AI. He will provide expertise in designing and implementing AI and multi-methods research. **Nathaniel Bouganim, MD (Co-A)**, Medical Oncologist at the MUHC and Associate Professor at McGill, will support recruitment of patients with breast cancer, advise on clinical integration, and contribute to interpretation of findings. **Ari N. Meguerditchian, MD, MSc, FRCS, FACS (Co-A)**, Surgical Oncologist at the MUHC and Scientific Director at St. Mary's Research Centre will support recruitment and brings expertise to support integration across hospital networks. **Armen Aprikian, MD (Co-A)**, Medical Director of the Cedars Cancer Centre and Clinical Lead of the Rossy Cancer Network, will support clinician engagement and implementation at a systemic level. **Juliet Guichon LLB, SJD (Co-A)**, health law and ethics scholar, will guide consent, privacy, governance related to AI, and support policy-relevant interpretation and dissemination. **Tibor Schuster, PhD (Co-A)** biostatistician, Canada Research Chair in Biostatistical Methods in Primary Care Research will oversee quantitative statistical analyses. **Julia Burnier, PhD (Co-A)**, mid-career scientist at the RI-MUHC and Asst. Professor at McGill, will advise on alignment with translational oncology research and EDI. **Brigitte Durieux (Co-A)**, trainee, will support AI development and coding. **Collaborators:** Patient partners with lived experience, **Mindy Weingsburg** and **Jennifer Freeza**, will be engaged in all phases of developing and designing FRAN to ensure cultural and linguistic clarity. Knowledge-users include the **Coalition Priorité Cancer du Québec** (Teresa Norris, President), a provincial alliance of over 70 non-profit organizations representing of cancer care across Québec, and the and a non-profit organization, **More Than a Cure** (Dr. Gafoor, founder and breast cancer survivor, and Dr. Heilpern) will contribute system and community partnerships to support recruitment, equity monitoring, advocacy, and policy-aligned dissemination. **CONNEXiONS INC.**, (Adam Blumenthal, co-founder) will provide the AI expertise and software to develop FRAN. **Workplace Options x TELUS Health** (Alan King, CEO, and Eric Santa, COO) will share an implementation perspective on FRAN, offering guidance on scaling it to global industry settings, including the largest Employee Assistance Program in Canada, an area urgently in need of evidence-based, scientist-led interventions like FORT.

SUMMARY OF PROGRESS

Productivity and Impact

Delivering FORT in Quebec

As an early-career scientist-clinician, I led the first ever delivery of group psychotherapy in the Psychosocial Oncology Program, Division of Supportive and Palliative Care, at the McGill University Health Centre. I successfully led the clinical implementation of 19 patients completing six-week *Fear of Recurrence Therapy (FORT)* sessions (winter and spring) and conducted the research evaluation, including pre/post questionnaires, focus groups, and fidelity checklists. The program reduced fear of recurrence (FCR), increased daily-life confidence, and received media coverage in *Le Devoir*, *Montreal Gazette*, and CBC Radio (*Daybreak Montreal*), raising public awareness of FCR as a critical but under-addressed survivorship issue.



Collaboration with FORT Developers, patient partners and NGOs

To ensure fidelity and sustainability, I established strong collaborations with FORT's original developers, Drs. Sophie Lebel and Christine Maheu. Their mentorship continues to guide my research program and supports broader implementation of FORT across Canada. I connected with NGOs and patient partners with lived experiences to guide my research program.

Research Program Narrative

I am a clinical psychologist and PhD-trained scientist with expertise in mixed-methods research, psychosocial interventions, and psychometrics. As one of very few non-MD clinician-scientists at my institution, I embody a *scientist-practitioner* model: my clinical practice informs my research priorities, and my research directly enhances the care I provide. My overarching goal is to improve outcomes for people affected by cancer through rigorous observation, intervention, and implementation-science research. My career began in cancer prevention, where I led the first longitudinal Canada-wide survey of $n=3,117$ parents' knowledge, attitudes and beliefs HPV vaccine decision-making for boys. Findings were instrumental in supporting the policy shift from female-only to gender-neutral HPV vaccination programs (Perez et al., 2017, *Vaccine*; Perez et al., 2013, *Preventive Medicine*). I also developed validated measurement tools such as the *Vaccine Conspiracy Beliefs Scale* and the *HPV Attitudes and Beliefs Scale*, which are now widely used nationally and internationally. I then pursued a Postdoctoral Fellowship at the Jewish General Hospital, studying the mental health needs of male cancer survivors through a digital phone app. Clinically, I trained in psycho-oncology, couple and family therapy, and grief counseling, including experience at the Balfour Mount Palliative Care Unit. This background allows me to address the psychosocial challenges of cancer patients and families comprehensively, from diagnosis through palliative care. My current practice at the Cedars Cancer Centre grounds my program in patient realities and ensures that my research remains responsive to survivor needs.

Building on this foundation, I aligned myself with Dr. Justin Sanders at the RI-MUHC. I re-directed my original efforts from the psychosocial and behavior aspects of cancer prevention to the psychosocial and behavioral aspects during cancer treatment/survivorship focusing on interventions, social determinants of health (SDH), and patient-reported outcome and experience measures. In support of this transition, I sought mentorship from Dr. Sanders and the Centre for Relationships in Serious Illness, whose expertise in implementing evidence-based interventions,

including digital health, has been instrumental in shaping my independent program. I am developing my research team including trainees and a program dedicated to improving equitable access to high-quality psychosocial care via robust PROM and PREM measurement tools and improving existing interventions.

Experience and Capacity

I have secured host seed funding (i.e., internal start-up early-career awards) totaling \$62,000 from the Cedars and MUHS Foundations, along with operating funds from CIRN and CAIRE, totaling over \$240,000 as PI/co-PI. I recently applied as a co-PI for a CIHR Bringing Biology to Cancer Prevention Team Grants, focusing on translating liquid biopsy into equitable implementation for HPV-related cancer prevention in Canadian populations using mixed-methods research and evidence-based implementation science frameworks. To date, I have published 46 peer-reviewed articles, co-authored book chapters, and built collaborations provincially, nationally, and internationally. I have supervised undergraduate and master's student in many disciplines (e.g., family medicine, psychology, nursing) as training and teaching are at the heart of my career. I serve on the board of directors of a registered charity called HPV Global Action. This combined trajectory demonstrates strong potential for leadership in practice-changing research in psychosocial oncology.

Impacts on Research Progress

I took parental leave from March 2018 to March 2019 and again from July 2021 to June 2023, the latter while caring for a child with a rare genetic disorder requiring significant medical care. As a primary caregiver, I continued to publish, but research productivity and activities were greatly impacted. For example, I had no first-author publications during these years. Since August 2023, I have returned full-time to both clinical and research positions, actively rebuilding momentum in my research program, receiving awards and applying for research funding.

Budget Contextualization

This project is novel for my research program. There is no overlap between funding currently held or pending and the present application. The funds requested in this application are essential to support the development of my budding research career: the real-world delivery, digital adaptation, and systematic evaluation of FORT. In Quebec, non-MD clinician-scientists often face challenges with fewer protected research pathways, less institutional funding security, and limited visibility compared to physicians, despite carrying dual clinical and research responsibilities. This makes building and sustaining an independent research program more difficult. We are requesting \$465 000 CAD to support my **first CIHR-funded project as PI**, which will enable me to recruit trainees and research staff and formally establish and grow my psychosocial oncology lab. These funds will also advance my research program by supporting the delivery of the first validated French-language measure of patient-provider relationship quality in oncology.

Anticipated Impact

This project represents the natural progression of my **early-career trajectory**: from prevention (HPV vaccination, screening), to measurement tools (5 scales developed), to survivorship interventions (FORT). Just as my HPV research informed Canadian vaccination policy (inclusion of boys), this work will generate actionable strategies to embed psychosocial interventions into survivorship care. The current request represents the first major investment dedicated specifically to scaling FORT in Quebec using AI.

References

1. Fitch M, Zomer S, Lockwood G, et al. Experiences of adult cancer survivors in transitions. *Support Care Cancer*. 2019;27(8):2977-2986. doi:10.1007/s00520-018-4605-3
2. Baker F, Denniston M, Smith T, West MM. Adult cancer survivors: How are they faring? *Cancer*. 2005;104(S11):2565-2576. doi:10.1002/cncr.21488
3. Arnold M, Morgan E, Rungay H, et al. Current and future burden of breast cancer: Global statistics for 2020 and 2040. *Breast*. 2022;66:15-23. doi:10.1016/j.breast.2022.08.010
4. Kirkham AA, Jerzak KJ. Prevalence of Breast Cancer Survivors Among Canadian Women. *J Natl Compr Canc Netw*. 2022;20(9):1005-1011. doi:10.6004/jnccn.2022.7028
5. Simard S, Thewes B, Humphris G, et al. Fear of cancer recurrence in adult cancer survivors: a systematic review of quantitative studies. *J Cancer Surviv*. 2013;7(3):300-322. doi:10.1007/s11764-013-0272-z
6. Maheu C, Lebel S, Courbasson C, et al. Protocol of a randomized controlled trial of the fear of recurrence therapy (FORT) intervention for women with breast or gynecological cancer. *BMC Cancer*. 2016;16:291. doi:10.1186/s12885-016-2326-x
7. members of the Conquer Fear Authorship Group, Butow PN, Bell ML, et al. Conquer fear: protocol of a randomised controlled trial of a psychological intervention to reduce fear of cancer recurrence. *BMC Cancer*. 2013;13(1):201. doi:10.1186/1471-2407-13-201
8. Williams JTW, Pearce A, Smith A “Ben.” A systematic review of fear of cancer recurrence related healthcare use and intervention cost-effectiveness. *Psycho-Oncology*. 2021;30(8):1185-1195. doi:10.1002/pon.5673
9. Champagne A, Ivers H, Savard J. Utilization of health care services in cancer patients with elevated fear of cancer recurrence. *Psychooncology*. 2018;27(8):1958-1964. doi:10.1002/pon.4748
10. Sarkar S, Sautier L, Schilling G, Bokemeyer C, Koch U, Mehnert A. Anxiety and fear of cancer recurrence and its association with supportive care needs and health-care service utilization in cancer patients. *J Cancer Surviv*. 2015;9(4):567-575. doi:10.1007/s11764-015-0434-2
11. Lebel S, Ozakinci G, Humphris G, et al. From normal response to clinical problem: definition and clinical features of fear of cancer recurrence. *Support Care Cancer*. 2016;24(8):3265-3268. doi:10.1007/s00520-016-3272-5
12. Mutsaers B, Butow P, Dinkel A, et al. Identifying the key characteristics of clinical fear of cancer recurrence: An international Delphi study. *Psychooncology*. 2020;29(2):430-436. doi:10.1002/pon.5283

13. Thewes B, Butow P, Zachariae R, Christensen S, Simard S, Gotay C. Fear of cancer recurrence: a systematic literature review of self-report measures. *Psychooncology*. 2012;21(6):571-587. doi:10.1002/pon.2070
14. Koch L, Bertram H, Eberle A, et al. Fear of recurrence in long-term breast cancer survivors--still an issue. Results on prevalence, determinants, and the association with quality of life and depression from the cancer survivorship--a multi-regional population-based study. *Psychooncology*. 2014;23(5):547-554. doi:10.1002/pon.3452
15. Lebel S, Beattie S, Arès I, Bielajew C. Young and worried: Age and fear of recurrence in breast cancer survivors. *Health Psychol*. 2013;32(6):695-705. doi:10.1037/a0030186
16. Luigjes-Huizer YL, Tauber NM, Humphris G, et al. What is the prevalence of fear of cancer recurrence in cancer survivors and patients? A systematic review and individual participant data meta-analysis. *Psychooncology*. 2022;31(6):879-892. doi:10.1002/pon.5921
17. Tauber NM, O'Toole MS, Dinkel A, et al. Effect of Psychological Intervention on Fear of Cancer Recurrence: A Systematic Review and Meta-Analysis. *J Clin Oncol*. 2019;37(31):2899-2915. doi:10.1200/JCO.19.00572
18. Hall DL, Luberto CM, Philpotts LL, Song R, Park ER, Yeh GY. Mind-body interventions for fear of cancer recurrence: A systematic review and meta-analysis. *Psycho-Oncology*. 2018;27(11):2546-2558. doi:10.1002/pon.4757
19. Lebel S, Maheu C, Lefebvre M, et al. Addressing fear of cancer recurrence among women with cancer: a feasibility and preliminary outcome study. *J Cancer Surviv*. 2014;8(3):485-496. doi:10.1007/s11764-014-0357-3
20. Maheu C, Lebel S, Bernstein LJ, et al. Fear of cancer recurrence therapy (FORT): A randomized controlled trial. *Health Psychol*. 2023;42(3):182-194. doi:10.1037/hea0001253
21. Lebel S, Ozakinci G, Humphris G, et al. Current state and future prospects of research on fear of cancer recurrence. *Psycho-Oncology*. 2017;26(4):424-427. doi:10.1002/pon.4103
22. Lamarche J, Sehabi G, Chu A, et al. The development and preliminary implementation evaluation of the Fear Of Recurrence Therapy intervention virtual training workshop. *Psycho-Oncology*. 2023;32(5):810-815. doi:10.1002/pon.6127
23. Glasgow RE, Harden SM, Gaglio B, et al. RE-AIM Planning and Evaluation Framework: Adapting to New Science and Practice With a 20-Year Review. *Front Public Health*. 2019;7. doi:10.3389/fpubh.2019.00064
24. Glasgow RE, Vogt TM, Boles SM. Evaluating the public health impact of health promotion interventions: the RE-AIM framework. *Am J Public Health*. 1999;89(9):1322-1327. doi:10.2105/ajph.89.9.1322
25. Lebel S, et al. Managing fear of cancer recurrence in clinical settings: an implementation study of the FORT intervention. Published online 2025 2022.

26. Lebel S, et al. Managing fear of cancer recurrence in clinical settings: an implementation study of a cognitive-existential group intervention for cancer survivors. Oral presentation presented at: International Congress of Behavioral Medicine; August 6, 2025; Vienna, Austria.
27. Morin-Martel F. Apprendre à vivre avec la peur de voir le cancer récidiver. *Le Devoir*. <https://www.ledevoir.com/societe/sante/825144/apprendre-vivre-peur-recidive-cancer>. December 4, 2024. Accessed September 9, 2025.
28. Schwartz S. Learning how to face the fear of cancer's return. *Montreal Gazette*. <https://www.montrealgazette.com/news/health/article775106.html>. March 1, 2025. Accessed September 9, 2025.
29. Why many cancer patients feel stressed after their treatments are finished | Daybreak Montreal | On Demand. *CBC Listen | Daybreak Montreal with Sean Henry*. Published online December 9, 2024. Accessed September 9, 2025. <https://www.cbc.ca/listen/live-radio/1-15-daybreak-montreal/clip/16114528-why-many-cancer-patients-feel-stressed-treatments-finished>
30. Rankin NM, Jacobsen PB. Implementation science and psycho-oncology: Advancing the translation of evidence into practice. *Psychooncology*. 2024;33(6):e6363. doi:10.1002/pon.6363
31. Rankin NM, Butow PN, Hack TF, et al. An implementation science primer for psycho-oncology: translating robust evidence into practice. *Journal of Psychosocial Oncology Research and Practice*. 2019;1(3):e14. doi:10.1097/OR9.0000000000000014
32. Shaw J, Kamphuis H, Sharpe L, et al. Setting an International Research Agenda for Fear of Cancer Recurrence: An Online Delphi Consensus Study. *Front Psychol*. 2021;12. doi:10.3389/fpsyg.2021.596682
33. Government of Canada CI of HR. *CIHR Strategic Plan 2021-2031*.; 2021. Accessed September 9, 2025. <https://cihr-irsc.gc.ca/e/52331.html>
34. Smith A “Ben,” Bamgboje-Ayodele A, Butow P, et al. Development and usability evaluation of an online self-management intervention for fear of cancer recurrence (iConquerFear). *Psycho-Oncology*. 2020;29(1):98-106. doi:10.1002/pon.5218
35. Smith A ‘Ben,’ Bamgboje-Ayodele A, Jegathees S, et al. Feasibility and preliminary efficacy of iConquerFear: a self-guided digital intervention for fear of cancer recurrence. *J Cancer Surviv*. 2024;18(2):425-438. doi:10.1007/s11764-022-01233-9
36. Clusmann J, Kolbinger FR, Muti HS, et al. The future landscape of large language models in medicine. *Commun Med (Lond)*. 2023;3(1):141. doi:10.1038/s43856-023-00370-1
37. Busnatu Ștefan, Niculescu AG, Bolocan A, et al. Clinical Applications of Artificial Intelligence—An Updated Overview. *J Clin Med*. 2022;11(8):2265. doi:10.3390/jcm11082265

38. Li H, Zhang R, Lee YC, Kraut RE, Mohr DC. Systematic review and meta-analysis of AI-based conversational agents for promoting mental health and well-being. *npj Digit Med*. 2023;6(1):236. doi:10.1038/s41746-023-00979-5
39. Antel R, Abbasgholizadeh-Rahimi S, Guadagno E, Harley JM, Poenaru D. The use of artificial intelligence and virtual reality in doctor-patient risk communication: A scoping review. *Patient Education and Counseling*. 2022;105(10):3038-3050. doi:10.1016/j.pec.2022.06.006
40. Chen D, Parsa R, Hope A, et al. Physician and Artificial Intelligence Chatbot Responses to Cancer Questions From Social Media. *JAMA Oncol*. 2024;10(7):956. doi:10.1001/jamaoncol.2024.0836
41. Tai-Seale M, Baxter SL, Vaida F, et al. AI-Generated Draft Replies Integrated Into Health Records and Physicians' Electronic Communication. *JAMA Netw Open*. 2024;7(4):e246565. doi:10.1001/jamanetworkopen.2024.6565
42. Sanders JJ, Perez S, Meti N, Basile CO, Schuster T, Durieux B. AI information agent to empower patients and promote shared decision making in patients with lung cancer: A multi-method pilot study. Published online 2026 2025.
43. Wu VS, Smith A 'Ben,' Russell H, et al. Assessing the impact of a self-guided digital intervention for fear of cancer recurrence (iConquerFear) in ovarian cancer survivors: a pilot randomised waitlist-controlled trial. *BMC Cancer*. 2025;25:1-14. doi:10.1186/s12885-025-13639-6
44. Dang M, Noreika D, Ryu S, et al. Feasibility of Delivering an Avatar-Facilitated Life Review Intervention for Patients with Cancer. *Journal of Palliative Medicine*. 2021;24(4):520-526. doi:10.1089/jpm.2020.0020
45. Yardley L, Morrison L, Bradbury K, Muller I. The Person-Based Approach to Intervention Development: Application to Digital Health-Related Behavior Change Interventions. *Journal of Medical Internet Research*. 2015;17(1):e4055. doi:10.2196/jmir.4055
46. Teresi JA, Yu X, Stewart AL, Hays RD. Guidelines for Designing and Evaluating Feasibility Pilot Studies. *Med Care*. 2022;60(1):95-103. doi:10.1097/MLR.0000000000001664
47. Hennink M, Kaiser BN. Sample sizes for saturation in qualitative research: A systematic review of empirical tests. *Social Science & Medicine*. 2022;292:114523. doi:10.1016/j.socscimed.2021.114523
48. Rudy L, Maheu C, Körner A, Lebel S, Gélinas C. The FCR-1: Initial validation of a single-item measure of fear of cancer recurrence. *Psychooncology*. 2020;29(4):788-795. doi:10.1002/pon.5350
49. Maheu C, Tock WL, Fisher P, et al. Systematic Review of Fear of Cancer Recurrence Patient-Reported Outcome Measures: Evaluating Methodological Quality and Measurement

Properties Using the COSMIN Checklist. *Healthcare*. 2025;13(17):2165.
doi:10.3390/healthcare13172165

50. Simard S, Savard J. Screening and comorbidity of clinical levels of fear of cancer recurrence. *J Cancer Surviv*. 2015;9(3):481-491. doi:10.1007/s11764-015-0424-4
51. Brooke J. SUS -- a quick and dirty usability scale. In: Jordan PW, Thomas B, Weerdmeester BA, McClelland IL, eds. *Usability Evaluation in Industry*. Taylor & Francis; 1996:189-194. Accessed September 9, 2025. https://www.researchgate.net/publication/319394819_SUS_-_a_quick_and_dirty_usability_scale
52. Adams C, Walpola R, Schembri AM, Harrison R. The ultimate question? Evaluating the use of Net Promoter Score in healthcare: A systematic review. *Health Expect*. 2022;25(5):2328-2339. doi:10.1111/hex.13577
53. Reichheld FF. The One Number You Need to Grow. *Harvard Business Review*. Accessed September 9, 2025. <https://hbr.org/2003/12/the-one-number-you-need-to-grow>, <https://hbr.org/2003/12/the-one-number-you-need-to-grow>
54. Krueger RA, Casey MA. *Focus Groups: A Practical Guide for Applied Research*. SAGE Publications; 2014.
55. Pawson R, Tilley N. *Realistic Evaluation*. SAGE Publications; 1997. Accessed September 9, 2025. <https://www.torrossa.com/en/resources/an/5409538>
56. Westhorp G. Realist impact evaluation: an introduction. Methods Lab. September 3, 2014. Accessed September 9, 2025. <https://odi.org/en/publications/realist-impact-evaluation-an-introduction/>
57. Creswell JW, Clark VLP. *Designing and Conducting Mixed Methods Research*. SAGE Publications; 2018.
58. O'cathain A, Murphy E, Nicholl J. The Quality of Mixed Methods Studies in Health Services Research. *J Health Serv Res Policy*. 2008;13(2):92-98. doi:10.1258/jhsrp.2007.007074
59. Stretcher VJ, Rosenstock IW. The health belief model. In: Baum A, ed. *Cambridge Handbook of Psychology, Health and Medicine*. Cambridge University Press; 1997.
60. Stewart DW, Shields RE, Sinclair C. Application of the Canadian Code of Ethics for Psychologists to telepsychology. *Canadian Psychology / Psychologie canadienne*. Published online 2025. doi:10.1037/cap0000416
61. Rodríguez-Guidonet I, Andrade-Pino P, Monfort-Vinuesa C, Rincon E. Avatar-Based Strategies for Breast Cancer Patients: A Systematic Review. *Cancers (Basel)*. 2023;15(16):4031. doi:10.3390/cancers15164031

62. Sandford A, Mulligan B, Gittens E, Norris M, Fernandes M. *Briefing Paper: Artificial Intelligence and Psychology - Canadian Psychological Association.*; 2024. Accessed September 9, 2025. <https://cpa.ca/briefing-paper-1-artificial-intelligence-and-psychology/>
63. Aubé W, Martineau Y. Psychologie et intelligence artificielle - Ordre des psychologues du Québec - OPQ. Ordre des psychologues du Québec. March 2024. Accessed September 9, 2025. <https://www.ordrepsy.qc.ca/-/psychologie-et-intelligence-artificielle>
64. Luxton DD, Anderson SL, Anderson M. Chapter 11 - Ethical Issues and Artificial Intelligence Technologies in Behavioral and Mental Health Care. In: Luxton DD, ed. *Artificial Intelligence in Behavioral and Mental Health Care*. Academic Press; 2016:255-276. doi:10.1016/B978-0-12-420248-1.00011-8