BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person.

NAME: Ilona Fridman

eRA COMMONS USER NAME (credential, e.g., agency login): I_Fridman

POSITION TITLE: Postdoctoral Researcher

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, including postdoctoral training and residency training if applicable. Add/delete rows as necessary.)

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
Saint Petersburg State University, Russia	B.A, M.A.	2003	Engineering
Brooklyn College School of Natural and Behavioral Sciences City University of New York	M.A.	2010	Organizational Psychology
Columbia Business School New York	Ph.D.	2017	Management and decision science

A. **Personal Statement**

As a health communication researcher and decision scientist, I am a passionate advocate for health communication that empowers informed decisions and enables high-quality equitable patient care. My career purpose is to provide solutions to public health problems by designing interventions that improve communication between patients and the healthcare system. My engineering education allowed me to acquire quantitative skills for advanced data analysis, while my graduate education in psychology and management equipped me well with theoretical knowledge of decision-making. This expertise applied to oncology care resulted in a strong research portfolio that includes the following contributions: a) Developing and testing a theoretical framework to understand and guide complex conversations between healthcare providers and patients during clinical encounters, b) Implementing an automated text analysis to identify systemic biases in decision-making during clinical consultations, and c) Developing a digital decision-support tool for patients with early-stage breast cancer to reduce overtreatment. I have authored over 20 publications, of which two-thirds I served as the first author. My work has been accepted into high-impact journals such as JAMA Oncology, Health Psychology, JMIR Public Health, and Surveillance. The latest project related to health misinformation was selected for a podium presentation at the Academy Health Research conference. I received prior funding from both internal and external agencies: T32 Cancer Care Quality Training Program (NIH), DukeDataPlus Program (2018), and the UNC NC TraCS pilot research award (2022).

Studying healthcare communication for more than a decade, I have observed that patients' decisions and well-being are strongly associated with the type and quality of health information they receive. In the current era of digital health information, two-thirds of patients receive information not only from their clinicians but also from many different sources of various credibility, according to the National Trends Survey conducted by NCI. In my previous research, I found that respondents who trusted sources with a high prevalence of misinformation had less accurate knowledge and were less likely to adhere to recommended behavior to protect their health. As a health communication researcher, I have the analytical skills and theoretical knowledge to help patients make informed decisions in the current era of publicly available health information of various qualities. To develop concrete solutions, such as patient-centered, clinically integrated interventions, I have to acquire skills that will allow me to assess stakeholders' needs and engage them in an iterative design process of intervention. Therefore, I am applying for K-22. In my protected time, I will learn qualitative research design and stakeholder engagement techniques, including design thinking approaches. Given the dual nature of communication, I also need to become familiar with testing multilevel interventions that target both parties in a communication process.

Current and completed research support that I would like to highlight includes:

T32 Cancer Care Quality Training Program (NIH)
Role: Trainee 2021-2023
Advisers: Dr. Bash E, MD
This funding allowed me to develop a novel research program that focuses on digital cancer information and misinformation. In two years, I have strengthened my understanding of cancer and patient clinical care through formal education such as coursework in Cancer Prevention and Control and regular research meetings dedicated to cancer care quality and outcomes. I became familiar with digital health communications by collaborating on a project led by Jennifer Elston Lafata. The team conducts a multilevel assessment of virtual visits. In qualitative research, the opinions of administrators, physicians, and patients are collected to evaluate in detail the practice of virtual visits. The project has a special focus on understanding disparities and hospital policies that prevent disparities in the implementation of virtual visits in clinical practice. More importantly, the T32 funding allowed me also develop my own research program that focuses on the digital health information and misinformation that patients discover beyond clinical settings and use it to make treatment decisions about cancer. I secured internal funding to support my research program and presented my work at Annual Research Meeting organized by AcademyHealth and in the Journal of Medical Internet Research Medical Education.

Empowering patients to evaluate online health misinformation related to prostate cancer.
Funding Source: NCtracs Lineberger Comprehensive Cancer Center;
Role: PI 2022-2023
Patients diagnosed with early-stage prostate cancer must become active decision-makers in their care, comparing treatment options with similar clinical outcomes and identifying the option that best fits their needs and preferences. To make the decision, patients and caregivers often use various sources of information. At times, to find credible information, they must sort through a large volume of cancer misinformation. Our work explores the type of misinformation patients encounter online. We have distilled the characteristics of misinformation to help patients identify misinformation more effectively. In the second ongoing phase, we are testing whether patients with cancer find the identified characteristics of misinformation helpful and usable for their online information search when they need to validate health information.

Complex Decisions, Real Numbers: Medical Decision-Making
Funding Source: Duke Data Plus Program
Role: co-PI with Marc Ryser 2018
We used machine-learning algorithms to identify aspects of clinical conversations that influence patient choices. The algorithm identified key themes of the clinical consultations about prostate cancer and presented them in the form of probability of occurrence in each conversation. This quantitative presentation allowed us to explore the association between the discussed themes, patient demographics, tumor characteristics, and patient choices. Our work provides a substantial translational impact by applying novel machine-learning tools to understand the codependence between the information presented in clinical conversations and patient decision-making.

The Mathematics of Breast Cancer Overtreatment: Improving Treatment Choice through Effective Communication of Personalized Cancer Risk
Funding Source: NIH K99/R00
PI: Marc Ryser; Role: Lead Researcher 2018-2021
This project addressed the emerging and growing burden of over-diagnosis and cancer over-treatment resulting from broad-based cancer screening. The evidence-based, personalized decision tool developed in this research is designed to improve risk communication, facilitate informed decision-making, and hence increase risk-concordant treatment selection and reduce overtreatment among patients with early-stage breast cancer, and ductal carcinoma *in situ* (DCIS).

B. **Positions, Scientific Appointments, & Honors**

2024 -	Assistant Member Scientist at the Center for Discovery and Innovation (CDI) and in the Cancer

	Prevention, Precision & Control Institute (CPPCI),
2021- 2024	Postdoctoral Fellow, Cancer Care Quality Training Program (CCQTP), Lineberger Comprehensive Cancer Center, UNC Chapel Hill
2020-2021	Project Director, Capstone Course Masters Student, Duke University
2017-2021	Postdoctoral Fellow, Center for Health Policy, Duke University
2013-2016	Research Volunteer, Memorial Sloan Kettering Cancer Center
2009-2011	RA, Management Department Columbia Business School
2010-2010	RA, Psychology Department Columbia University
2009-2010	RA, OBGYN Department, Maimonides Medical Center, New York
2009-2010	Intern, AIM-Strategies Consulting, New York
2006-2008	Director of Business Development, Panoramik (digital solutions), Russia
2003-2005	PR Manager, KNAUF (Production of construction materials), Russia

Honors & Awards

2022	Pilot Award, North Carolina Translational and Clinical Sciences Institute, (NC TraCS)
2022	Travel Award, Lineberger Comprehensive Cancer Center, UNC-CH
2020	Cope Duke Library grant for open-access publication
2018	Duke DATA + (co-PI) Complex Decisions, Real Numbers
2014	Deming Doctoral Research Fellowship Recipient
2011	Doctoral Program Fellowship, Columbia Business School
2009	Marge Magner Internship Honoraria
2009	SHRM HR Internship Scholarship
2008	Brooklyn College University Scholarship

C. Contributions to Science

1. Health Communication Theory: Information Framing to Palliative Care Practice. In my dissertation, I applied principles of information framing theory to address the issue of overtreatment in patients with advanced cancer. These patients often undergo burdensome cancer treatments that result in significant side effects without providing therapeutic benefits. The palliative care team at Memorial Sloan Kettering Cancer Center sought to optimize consultations for patients with advanced cancer. To achieve this, I proposed a revision of the information framing theory and developed a novel framework for approaching conversations that patients might find frightening or unpleasant. Collaborating with a team of physicians and behavioral scientists, I conducted a series of experiments using hypothetical scenarios involving volunteers and patients with cancer to test the effectiveness of the framework. The results strongly supported the proposed framework. We discovered that when physicians need to discuss unpleasant or frightening options, such as discontinuing cancer treatment, they should present this option not only as a means to avoid future losses but also as a potential pathway to achieving better well-being. This approach was found to reduce initial negative patient reactions and foster openness in discussing options they initially disliked, such as discontinuing cancer treatment.

Our work marked an important application of information framing theory to palliative care consultations, aiming to enhance informed decision-making. The research yielded theoretically-grounded recommendations for physicians when consulting about discontinuing cancer-directed treatment for patients with advanced cancer. Enhanced consultations in this area are crucial in reducing overtreatment among patients with advanced cancer. These recommendations gained recognition from medical experts and were published in reputable journals, including JAMA Oncology and the Journal of Pain and Symptom Management. Moreover, our work received the esteemed Columbia Deming Cup (student) award for its application of a theory-grounded approach to a practical problem.

a. **Fridman I,** Higgins E. Regulatory focus and regulatory fit in health messaging. In: Oxford Research Encyclopedia of Communication [Internet] Online: Oxford Research Encyclopedia; 2017.
b. **Fridman I**, Scherr KA, Glare PA, Higgins ET. Using a Non-Fit Message Helps to De-Intensify Negative Reactions to Tough Advice. Pers Soc Psychol Bull. 2016 Aug;42(8):1025-44. doi: 10.1177/0146167216649931. PMCID: PMC5610136.
c. **Fridman I**, Epstein AS, Higgins ET. Appropriate Use of Psychology in Patient-Physician Communication: Influencing Wisely. JAMA Oncol. 2015 Sep;1(6):725-6. doi: 10.1001/jamaoncol.2015.0980. PMID: 26181519.
d. **Fridman I**, Glare PA, Stabler SM, Epstein AS, Wiesenthal A, Leblanc TW, Higgins ET. Information Framing Reduces Initial Negative Attitudes in Cancer Patients' Decisions About Hospice Care. J Pain

Symptom Manage. 2018 Jun;55(6):1540-1545. doi: 10.1016/j.jpainsymman.2018.02.010. PMCID: PMC8725201.

2. *Influence of Framing in Health Communication on Patient Choices.* In my postdoctoral work in Duke University, I continued to focus on health communications and proposed a big data approach to analyzing clinical transcripts in the context of patient-physician consultations related to treatment decisions for early-stage prostate cancer. Theoretically, this work was built on the innovations developed in my dissertation. In particular, I planned to investigate how information framing in terms of gains and losses unfolds in actual clinical conversations and how information framing influences patients' medical decisions. To carry out the analysis of the transcribed clinical conversations, I completed data science coursework and successfully applied for and secured funds from Duke DataPlus, allowing me to collaborate with a team of computer scientists.

Our primary objective was to conduct a natural language processing analysis to identify framing biases that might hinder informed decision-making in a large cohort of transcribed consultations. We explored the gain/loss framing in the language used by physicians to describe outcomes. We also looked and how this framing was associated with patient preferences for immediate treatment of prostate cancer versus active surveillance, in which patients offered to wait without any interventions but undergo regular check-ups. We examined whether physicians choose to present outcomes focusing on cancer progression and death (loss outcome) versus cancer cure and survival (gain outcome) and whether their choice may sway the opinion of patients toward treatment or active surveillance. We discovered that patient preferences for immediate treatment (versus active surveillance) were associated with physicians' use of language emphasizing loss outcomes, rather than gain outcomes. Based on this work we proposed specific recommendations for physicians on how to enhance consultations for preference-sensitive choices, based on our findings. These recommendations aimed to empower physicians to overcome framing biases and better support patients in making informed treatment decisions. Overall, this research made notable contributions to the field of health communications and decision-making, shedding light on the impact of gain-loss framing in conversations on patient preferences and providing practical guidance for healthcare professionals.

Moreover, this work represented the first application of natural language processing to analyze clinical transcripts to identify barriers to informed decision-making. The significance of our research was recognized by experts in behavioral science and clinical professionals, as evidenced by its presentation at both the Society of Personality and Social Psychology conference in 2019 and the Society of Medical Decision Making conference in the same year. Additionally, our results were published in interdisciplinary Journals, such as the Journal of Behavioral Medicine and Health Psychology.

a. **Fridman I,** Fagerlin A, Scherr KA, Scherer LD, Huffstetler H, Ubel PA. Gain-loss framing and patients' decisions: a linguistic examination of information framing in physician-patient conversations. J Behav Med. 2021 Feb;44(1):38-52. doi: 10.1007/s10865-020-00171-0. PMID: 32725580.
b. **Fridman I**, Kumaresan V, Vijendra P, Seshadri P, Garland S, Kim G, Fagerlin A, Ubel PA, Ryser MD. Information Processing and Patient Decision Making: A Big Data Approach to Treatment Choice in Prostate Cancer Patients. In 41st Annual Meeting of the Society for Medical Decision Making 2019 Oct 22. SMDM.

3. *Health Communication and Decision Support Tool*. The overarching goal of this project was to develop a decision support tool that informed patients about the risks and benefits of treatment for early-stage cancer - ductal carcinoma in situ (DCIS) - and introduced active monitoring as a novel treatment option for DCIS. At the time of the study, the majority of women with DCIS underwent definitive surgery. However, 70-90% of them would not have experienced DCIS progression in their lifetime without intervention. Physicians and researchers were concerned that patients were overtreated and proposed treating eligible patients with active monitoring instead of immediate surgery. Patients who chose active monitoring did not receive surgical treatments unless regularly scheduled tests showed the progression of DCIS. While scientific evidence from clinical trials was yet to arrive, observational studies showed comparable outcomes for surgery and active monitoring. We hypothesized that women who received comprehensive information about treatment options would be more open to choosing active monitoring and, as a result, would avoid side effects associated with surgical options.

Dr. Ryser (PI) compiled data from multiple sources and built a mathematical model that predicts individualized risks for patients, including those who prefer active monitoring as their treatment option. My role was to interpret the models and present these risks in a patient-facing decision-support tool. I led and implemented comprehensive literature reviews, developed qualitative content, and planned, oversaw, analyzed usability testing studies. Additionally, we designed and planned steps for a randomized control trial to test the tool with women attending breast cancer clinics for a mammogram. Today, the tool stands as a unique instrument that allows patients to estimate their personalized risks of breast cancer progression for each treatment option based on the characteristics of their tumor, age, and comorbidities. Moreover, women can learn about the logistics of treatment, the frequency, and intensity of the most common side effects. This decision support tool is the first to provide comprehensive information about active monitoring as an alternative to surgical options for DCIS. This work represents an important step towards reducing overtreatment among women diagnosed with DCIS. It has gained recognition from medical professionals, was presented at the Society of Medical Decision Making conference in 2020, and has been published in the Breast Cancer Research and Treatment Journal.

a. **Fridman I,** Chan L, Thomas J, Fish LJ, Falkovic M, Brioux J, Hunter N, Ryser DH, Hwang ES, Pollak KI, Weinfurt KP, Ryser MD. A web-based personalized decision support tool for patients diagnosed with ductal carcinoma in situ: development, content evaluation, and usability testing. Breast Cancer Res Treat. 2022 Apr;192(3):517-527. doi: 10.1007/s10549-022-06512-8. PMID: 35107714.

4. *Cancer Misinformation.* The surge in publicly shared health information presents new opportunities and challenges for patients. The abundance of both accurate and inaccurate information complicates patients' ability to make informed choices, with inaccurate health information (or misinformation) representing a significant barrier. Studies indicate up to 30% of social media posts about cancer provide inaccurate or false medical information, with rates even higher for common cancers like prostate (70%) and breast (51%). To aid patients in navigating digital health information, I secured a competitive pilot grant from the North Carolina Translational and Clinical Science to explore cancer misinformation in depth. I assembled a team of computer scientists, physicians, and Ph.D. students to conduct a systematic literature review, extracted Twitter data, and performed natural language processing analysis. The results summarized the types, prevalence, and characteristics of cancer misinformation. We identified observable characteristics of misinformation that will inform the content of educational materials for patients, helping them identify misinformation during their personal information search and navigate publicly available health information safely. The results received an enthusiastic reception at the Academy Health podium presentation in 2023. The misinformation framework was published in JMIR Medical Education in 2023 (a), with a second manuscript currently under review that outlines the types, prevalence, and characteristics of misinformation. This work lays a foundation for future interventions aiming to support patients in the digital era of health information and misinformation.

a. **Fridman I,** Johnson S, Elston Lafata J. Health Information and Misinformation: A Framework to Guide Research and Practice. JMIR Med Educ. 2023 Jun 7;9:e38687. doi: 10.2196/38687. PMID: 37285192; PMCID: PMC10285617.
b. **Fridman I,** Boyles D, Chheda R, Wang Z, Baldwin-SoRelle C, Smith A, Elston Lafata J. Identifying User-Friendly Linguistic Characteristics for Detecting Cancer Misinformation on Social Media. (Under Review in JMIR Infodemic)

5. *Patient-physician communication about cancer misinformation.* To translate theoretical work on cancer misinformation into practical interventions, I explored patients' opportunities to validate the information they find outside of clinics. Specifically, we examined patients' experiences when they discuss information from non-clinical sources with their healthcare providers. We recruited respondents from online forums for individuals living with cancer. Our survey showed that around 37% of patients with cancer had negative experiences, including instances where their providers dismissed them or judged them negatively. Additionally, we conducted an experiment involving the same cohort of patients, presenting them with three hypothetical scenarios where a provider disagreed with information from non-clinical sources. Participants' evaluations of the provider's trustworthiness did not differ between the scenarios in which a provider dismissed the information and the scenario in which a provider shared scientific information. The scenario in which a provider was evaluated by patients as trustworthy incorporated relationship-building elements alongside scientific explanations. The relationship-building elements included acknowledging the information and assuring the patient of their ongoing support regardless of the patient's decision. This study represents the first experimental evidence outlining patients' positive perspectives regarding provider practices when a provider needs to disagree with the information they found in non-clinical sources. Currently, this research is under consideration for publication in JCO Oncology Practice.

a. **Fridman,** I., Smith, C., Barrett, A., Johnson, S., Bhowmick, A., Hayes, S., & Lafata, J. E. Navigating Disagreements on Health Information: How Cancer Patients Perceive Healthcare Providers' Approaches to Discussing Information from Non-Clinical Sources (Under Review in JCO Oncology Practice)

Complete List of Published Work in MyBibliography:
https://www.ncbi.nlm.nih.gov/myncbi/ilona.fridman.1/bibliography/public/