

# Emma Ricci-DeLucca

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Machine learning researcher with expertise in multimodal time-series modeling, statistical validation, and human-centered system design, currently applying these methods to physiological sensing and digital health

## SKILLS

<b>ML &amp; AI</b>	Python, scikit-learn, data analysis (NumPy, pandas, R, d3.js), feature engineering for physiological signals, linear mixed-effects models, time-series analysis, N-of-1 classification, SHAP, GroupKFold cross-validation
<b>HCD Design</b>	Double diamond, implementation science, ethnography, participatory design, IRB human-subjects research, Atlas.ti
<b>Languages</b>	Figma, Adobe CC, usability testing, human factors & product research, graphic design & illustration
	English (native), Italian (native), French (fluent)

## RESEARCH EXPERIENCE

### **DoulaConnect: AI-Enabled Health Platform, Dartmouth College** Sep 2025 – Present

- Managing a 5-person research team co-designing DoulaConnect, a digital intervention targeting postpartum depression in partnership with doulas, including mentorship of undergraduate RAs supported by competitive fellowships
- Leading front-end UX/UI design of an AI-enabled doula-facing dashboard in Figma, incorporating NLP-assisted session documentation to reduce administrative burden on community health workers
- Structured design process around Community Based Participatory Research and human-centered design frameworks, conducting iterative co-design sessions, prototyping, and usability testing with clinical and community stakeholders
- Winner of the 2026 Dartmouth Innovation Accelerator for Digital Health pitch competition (\$40,000 award), judged by top investors and executives in digital health

### **Multimodal Sensing ML Pipeline, Dartmouth College** Sep 2024 – Present

- Synthesized and PROBAST-assessed 30+ studies on ML and wearable sensor approaches to perinatal mental health, establishing a methodological framework for evaluating model bias and generalizability.
- Designed and evaluated multimodal Machine Learning pipelines for postpartum depression (PPD) detection using large-scale Fitbit wearable (HR/HRV, sleep metrics, activity intensity) and EHR data from the All of Us Research Program
- Conducted univariate analysis (Mann-Whitney U, FDR correction), multivariate logistic regression, and linear mixed-effects models to identify digital biomarkers associated with PPD
- Achieved mean AUC of 0.916 in N-of-1 PPD classification using Random Forest with SHAP-based feature attribution, identifying caloric expenditure as the top predictive biomarker
- Leading IRB-approved primary data collection with Northeastern, deploying wearables and EMA surveys to generate high-frequency multimodal datasets for prospective model validation

### **Human-Centered Qualitative User Research, Dartmouth College** Sep 2023 – Sep 2024

- Conducted 14 semi-structured interviews with pregnant and postpartum individuals, investigating symptom recognition, care-seeking behavior, and provider communication in the perinatal period
- Applied inductive thematic analysis in Atlas.ti, iteratively coding transcripts to surface themes and synthesized findings into design implications for sensing and intervention systems; resulting in manuscript currently under review at ACM IMWUT

## RELEVANT PROJECTS

### **Mechanoacoustic Wearable for Physiological Event Detection** Jan 2025 – March 2025

- Designed and prototyped wearable device combining inertial, mechanoacoustic, and thermal sensing to detect bruxism
- Identified optimal sensor placement strategies for capturing jaw-movement signatures associated with nocturnal grinding
- Built custom firmware and BLE data streaming, validating sensor performance through multi-channel measurements

### **Design Health Fellowship - Human-Centered System Design** Aug 2021 – Dec 2022

- Conducted ethnographic research in hospital emergency department, observing workflows and clinician-patient interactions
- Developed low-to-mid fidelity prototypes of platform, validated through iterative feedback sessions with clinical stakeholders

## MENTORSHIP

### **Graduate Student Mentor, Dartmouth College** Sep 2024 - Present

- Mentoring 5 undergraduate RAs on maternal and perinatal mental health research, recognized with "Outstanding Graduate Research Mentorship" Award
- RAs have secured a combined \$38,600 in competitive research funding across URAD (Undergraduate Research Assistantship), ERAS (Early Research Access in the Sciences), and E.E. Just Fellowship awards

## EDUCATION

### **Thayer School of Engineering, Dartmouth College, Hanover, NH** 9/2023 – 6/2028

PhD Candidate, Human Computer Interaction, GPA: 3.9

### **Pratt School of Engineering, Duke University, Durham, NC** 9/2021 – 12/2022

MEng in Biomedical Engineering & Medical Device Design, GPA: 3.8

### **Swarthmore College, Swarthmore, PA** 9/2017 – 5/2021

BS Engineering, GPA: 3.7

## PUBLICATIONS

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**Ricci-De Lucca, E.,** Batool, V., Jarsve, T., Moore, C., Heavey, K., & Murnane, E. L. "I Just Need My Skin to Be Free": Understanding Consumer Wearable Experiences and Design Opportunities for Perinatal Mental Health Monitoring. Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT). Under review.

**Ricci-De Lucca, E.,** Heavey, K., & Murnane, E. L. *Digital Phenotyping of Perinatal Mental Health: A Systematic Review of Machine Learning and Wearable Sensor Approaches*. 2026 Journal of Affective Disorders Reports. <https://doi.org/10.1016/j.jadr.2026.101111>

Moore, D., Tao, S., **Ricci-De Lucca, E.,** Tadin C. S., Tadin, D., Morgan, B., Nottelmann, M., & Murnane, E. L. *Family In The Loop: Enabling Family Involvement in Dementia Care at Long-term Facilities with Person-centered AI Tools*. 2025 ACM Conference on Computer Supported Cooperative Work and Social Computing (CSCW). <https://doi.org/10.1145/3757599>

**Ricci-De Lucca, E.,** & Murnane, E. L. *Wearable Biosensors for Early Detection and Continuous Monitoring of Postpartum Depression: A Human-Centered Approach*. Accepted at the 2024 CHI Conference on Human Factors in Computing Systems (CHI '24) Workshop on *PhysioCHI: Towards Best Practices for Integrating Physiological Signals in HCI* (non-archival). <https://empowerlab.dartmouth.edu/projects/maternal-mental-health>

**Ricci-De Lucca, E.,** Kelly, C., & Gall, K. *Review of In-Vivo Behavior of Porous Titanium Implants for Orthopedic Applications*. Journal of Medical Implants and Surgery, 6(6), e119.

Pfeifer, C. R., Tobin, M. P., Cho, S., Vashisth, M., Dooling, L. J., Vazquez, L. L., **Ricci-De Lucca, E.,** Simon, K. T., & Discher, D. E. *Gaussian curvature dilutes the nuclear lamina, favoring nuclear rupture, especially at high strain rate*. 2022 Nucleus (Austin, Tex), 13(1), 129–143. <https://doi.org/10.1080/19491034.2022.2045726>

## PRESENTATIONS

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E. Ricci-De Lucca, S. Chilakapati, J. Berch, M. Emerson, K. Heavey, A. Kim, S. Medikondla, E. Murnane, K. Fortuna. Bridging the Postpartum Cliff: Designing an AI-Enabled Doula-Facing Dashboard for Rural Maternal Mental Health. Poster presentation, UbiComp and Health Symposium. NYU Tandon School of Engineering, June 2026.

E. Ricci-De Lucca, S. Chilakapati, J. Berch, M. Emerson, K. Heavey, A. Kim, S. Medikondla, E. Murnane, K. Fortuna. DoulaConnect: Human-Centered Mobile App for Remote Maternal Mental Health Support . Poster presentation, Wetterhanh Symposium. Dartmouth College, May 2026.

E. Ricci-De Lucca, S. Chilakapati, J. Berch, M. Emerson, K. Heavey, A. Kim, S. Medikondla, E. Murnane, K. Fortuna. DoulaConnect. Poster presentation, The Future of Digital Health Panel. Dartmouth College, April 2026.

E. Ricci-De Lucca, V. Batool, R. Gonzalez, E. Murnane. From Population to Person: Individualized Wearable Biomarker Detection of Postpartum Depression. Presentation, Biomedical Engineering Research in Progress Workshop. Dartmouth College, March 2026.

E. Ricci-De Lucca, V. Batool, R. Gonzalez, E. Murnane. Predicting Postpartum Depression Using Wearable Sensors and Machine Learning. Presentation, NSF Research Traineeship Luncheon. Dartmouth College, February 2026.

E. Ricci-De Lucca, E. Murnane. Wearables for Rural Maternal Mental Health Monitoring. Poster presentation, Northern New England MedTech Conference. The Roux Institute, November 2025.

E. Ricci-De Lucca, V. Batool, C. Moore, E. Murnane. Perinatal Mental Health Tracking: Adoption Determinants and Design Strategies. Poster presentation, Implementation Science Symposium. Dartmouth College, September 2025.

E. Ricci-De Lucca, V. Batool, E. Murnane. Personalized postpartum mental health care through wearable multimodal sensing. Poster presentation, Biomedical Engineering Research in Progress Workshop. Dartmouth College, March 2025.

E. Ricci-De Lucca, E. Murnane. Wearable Biosensors for Maternal Health Monitoring. Poster presentation, Biomedical Engineering Research in Progress Workshop. Dartmouth College, March 2024.

C. Pfeifer, M. Tobin, S. Cho, M. Vashisth, L. Dooling, L. Vazquez, E. Ricci-De Lucca, K. Simon, D. Discher. Hypoosmotic Versus Hyperosmotic Microenvironments Respectively Suppress or Enhance Nuclear Rupture During Cell Migration Through Micropores. Poster presentation, Biomedical Engineering Society National Conference. Philadelphia, October 2019.

C. Pfeifer, M. Tobin, S. Cho, M. Vashisth, L. Dooling, L. Vazquez, E. Ricci-De Lucca, K. Simon, D. Discher. Hypoosmotic Versus Hyperosmotic Microenvironments Respectively Suppress or Enhance Nuclear Rupture During Cell Migration Through Micropores. Presentation, Center for Engineering Mechanobiology REU Summer Research Symposium. University of Pennsylvania, August 2019.