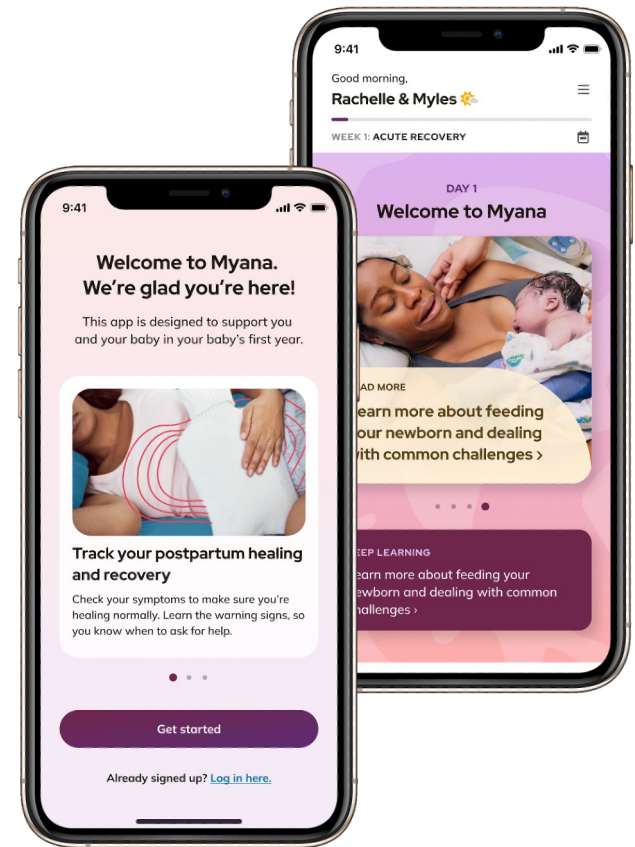# myana

MOTHERS, YOU ARE NOT ALONE.

Digital health tools to address maternal and child health equity needs in PA

Tamar Krishnamurti, PhD

Associate Professor of Medicine
University of Pittsburgh

The problem

- US severe maternal morbidity and mortality rates are high
- Many preventable deaths occur after hospital discharge
- Disparities in outcomes (and care) for Black and Brown birth-giving individuals and their infants are abysmal

| "delays in diagnosis and effective treatment" | "patients' knowledge of warning signs" | "not recognizing when to seek care" | "limited time with healthcare providers" |

- Better information, increased touchpoints, earlier risk prediction, and stronger connection to resources can benefit maternal (and infant) health

myana

Tamar Krishnamurti, PhD
University of Pittsburgh

Sonya Borrero, MD, MS
University of Pittsburgh

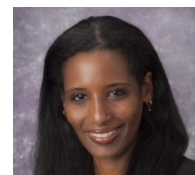**Lisa Callegari, MD, MPH**
University of Washington,

Raelynn O'Leary, MDes
Carnegie Mellon University

Ashley Deal, MDes
Carnegie Mellon University
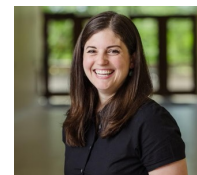
Traci Kazmerski, MD, MS
University of Pittsburgh

Mehret Birru Talabi, MD, PhD
University of Pittsburgh

Martina Anto-Ocrah, PhD,
University of Pittsburgh

**Liz Mosley, PhD, MPH**
University of Pittsburgh

Greer Donley, JD
University of Pittsburgh

- Grounded in evidence-based science
- Incorporates community stakeholders as partners in the design, development, and deployment
- Supports patient autonomy in managing their care
- Advances health equity

myana

Pitt and Commonwealth of PA

PA legislature approached University of Pittsburgh's Health Policy Institute about funding the development of an educational tool to supplement home visiting

- U of Pitt team (us!) already developing a postpartum support tool
- The State Legislative Initiative Grant supported further development of Myana
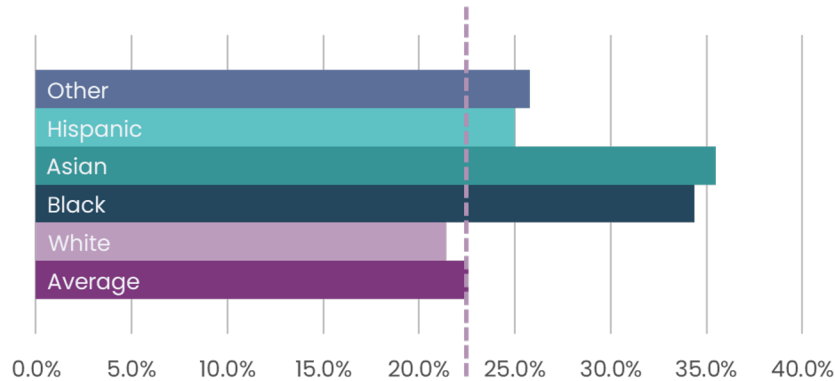 - $1 million over a 12 month period ending in September 2024.
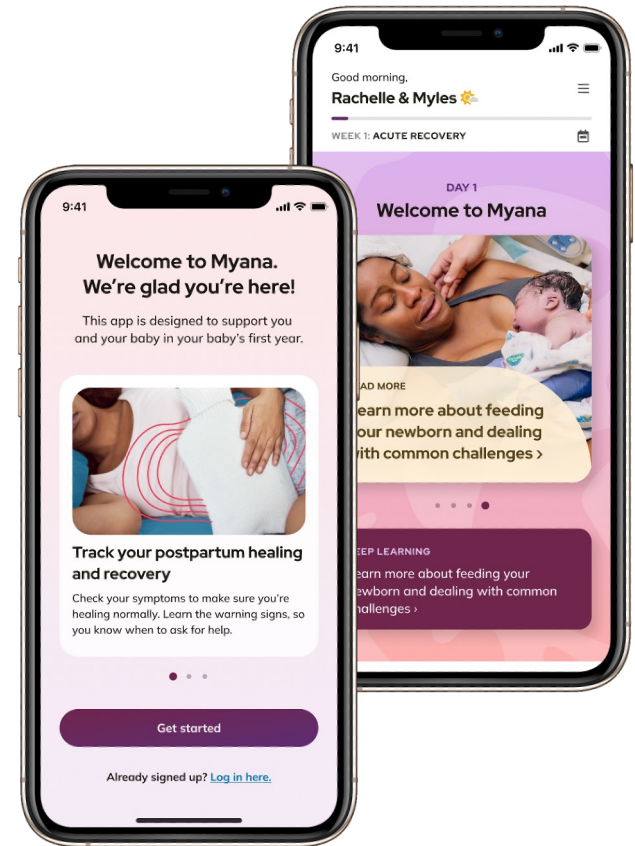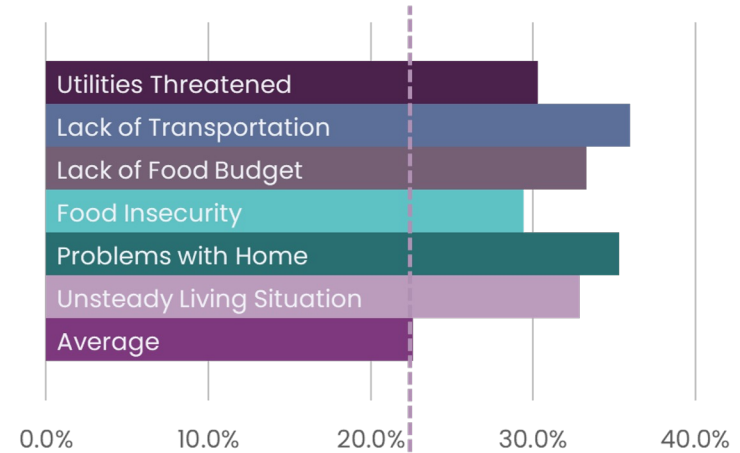
MyHealthyPregnancy digital platform
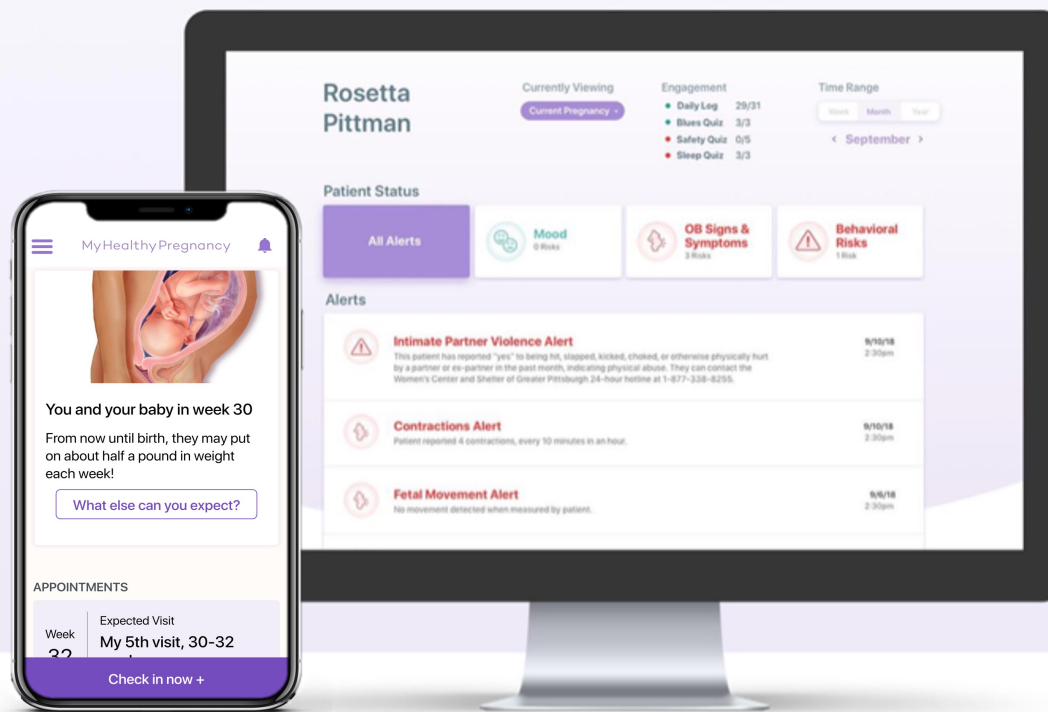
Made by PA moms, with PA moms, for PA moms
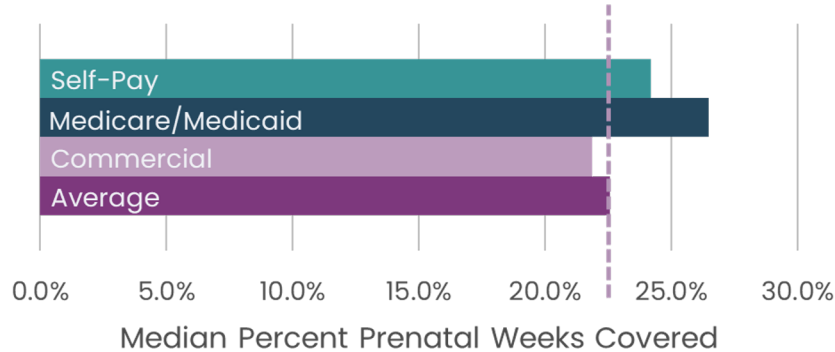
Accessing and engaging key groups

Engagement by Race

Other	
Hispanic	
Asian	
Black	
White	
Average	

0.0% 5.0% 10.0% 15.0% 20.0% 25.0% 30.0% 35.0% 40.0%

Engagement by Insurance Type

Self-Pay	
Medicare/Medicaid	
Commercial	
Average	

0.0% 5.0% 10.0% 15.0% 20.0% 25.0% 30.0%

Median Percent Prenatal Weeks Covered

Engagement by Social Needs

Utilities Threatened	
Lack of Transportation	
Lack of Food Budget	
Food Insecurity	
Problems with Home	
Unsteady Living Situation	
Average	

0.0% 10.0% 20.0% 30.0% 40.0%

MHP use is associated with a **significant increase in prenatal visits attended** and fewer cancellations

MyHealthyPregnancy

myana

6

Identifying and intervening on psychosocial risks

Screen

48% of users screened were at-risk for depression & 6% experiencing IPV

None of the cases of IPV captured within MHP were identified during usual care

Connect

MHP users **significantly more likely receive a behavioral health referral**

Outreach

1,231 patients at-risk **referred to Nurse Outreach Team**

13% connected to a nursing team for **mental health referrals and other care outreach**

Using app data, we can accurately **predict new instances of depression, prior to symptom onset, 93% of the time**

Using natural language shared in the app, we can **understand new triggers of depression onset**

My Healthy Pregnancy

myana

Identifying and intervening on clinical risks

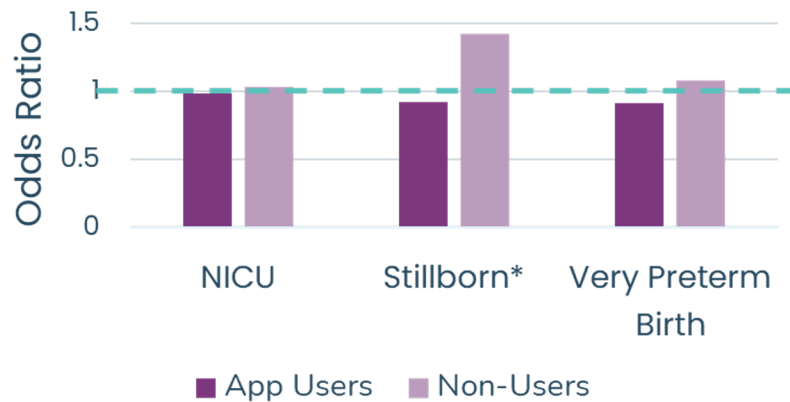Using in-app data, we accurately predict preeclampsia **70% of the time**

27% of high-risk patients had **no documented prophylactic aspirin prescription**

Among those with a documented aspirin prescription, **37% were unaware of it**

Best practice alert implemented for UPMC providers

Improving outcomes
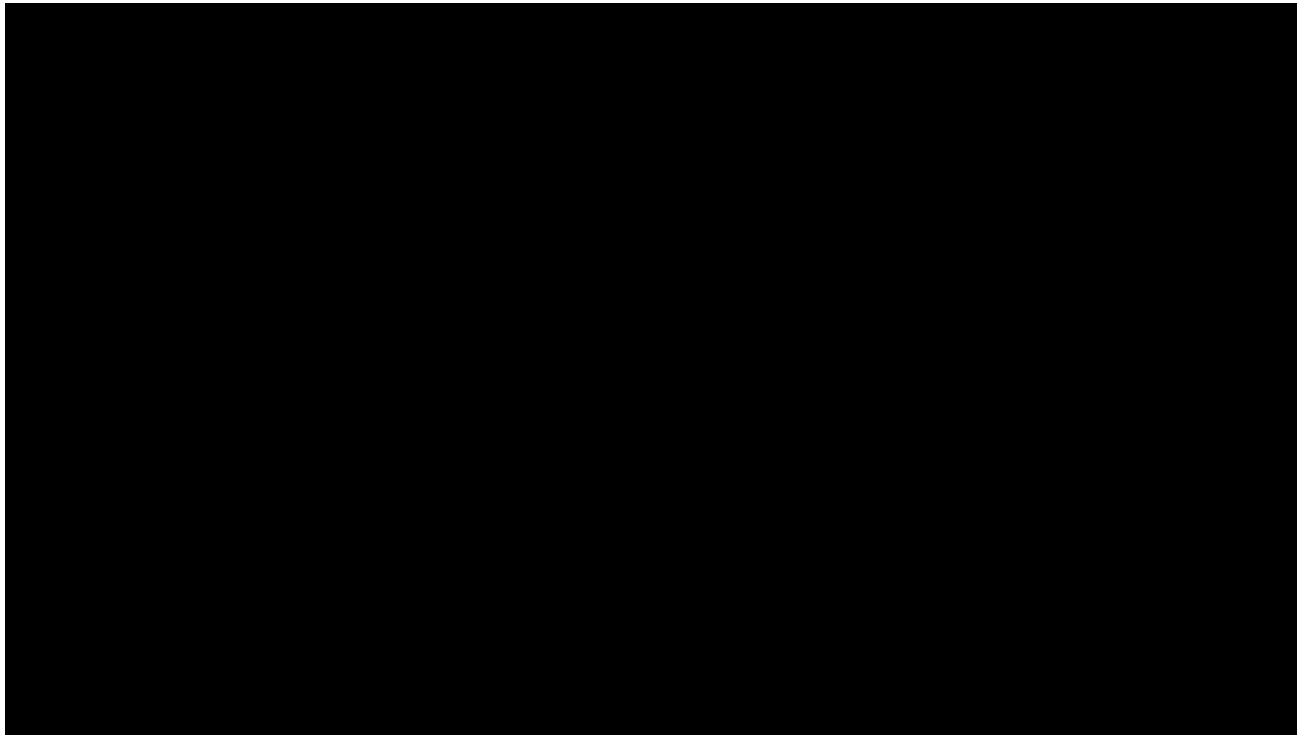

App Users ■ **Non-Users** ■

Increased weeks of use of MHP during the first 20 weeks of pregnancy **increased the number of gestational weeks** (C = 0.16, p < 0.001, CI = [0.09, 0.22])

Stillborn*

■ Kick Counter Effect ■ Onboarding Effect
■ Prescription Effect
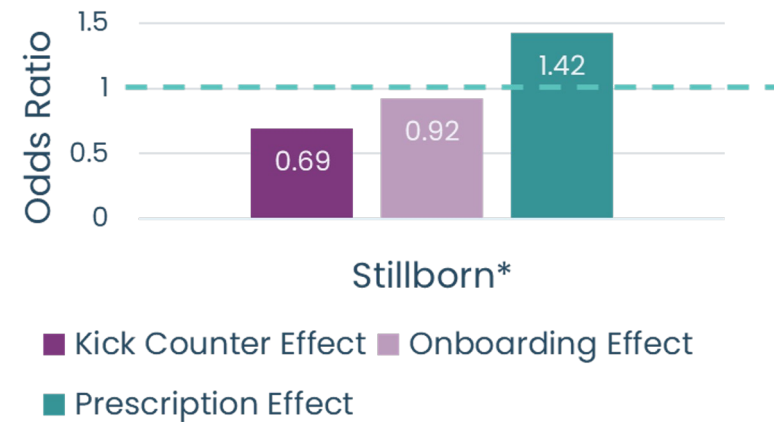
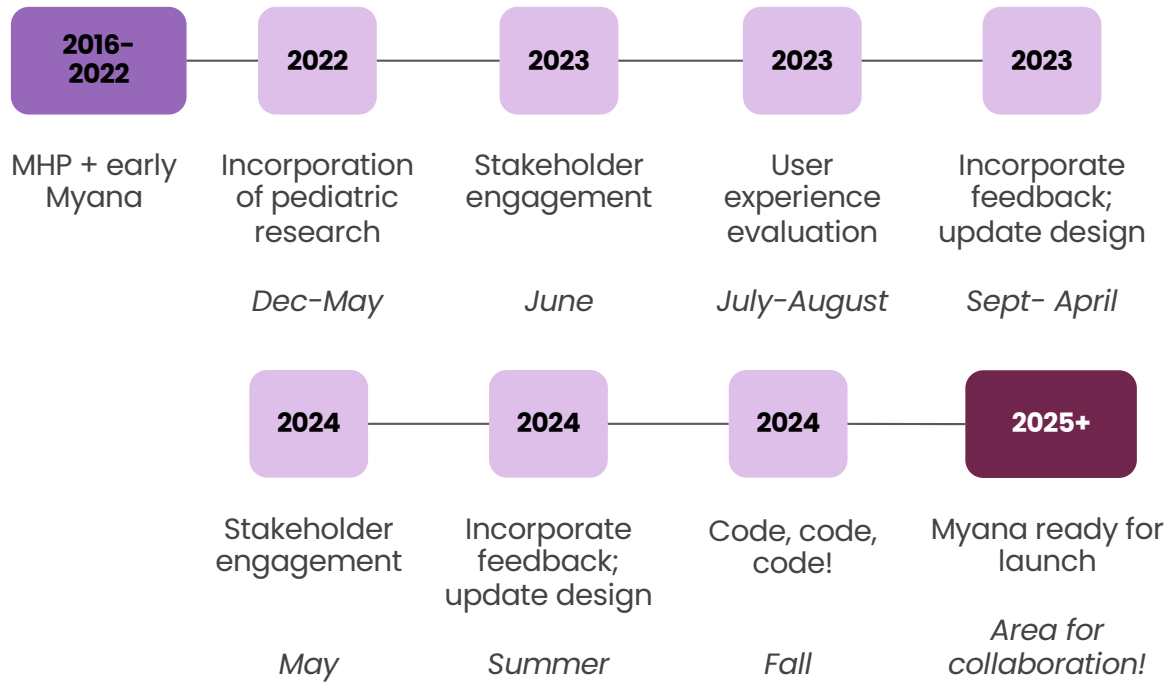Using the Kick Counter within MHP **reduces the odds of stillbirth by 31%**

*Detecting statistically significant differences is not possible due to the low overall event rate. Trends show clinical relevance

myana

Myana overview

Iterative, person-centered design and evaluation

Commonwealth- funded work

2016-2022	2022	2023	2023	2023
MHP + early Myana	Incorporation of pediatric research	Stakeholder engagement	User experience evaluation	Incorporate feedback; update design
	Dec-May	*June*	*July-August*	*Sept- April*

2024	2024	2024	2025+
Stakeholder engagement	Incorporate feedback; update design	Code, code, code!	Myana ready for launch
May	*Summer*	*Fall*	*Area for collaboration!*

myana

Postpartum journey overview

Week 1	Acute recovery	Baby's first few days
Week 2	Getting comfortable	Feeding your baby
Week 3	Mental health	Bonding with baby
Week 4	Sleep & self-care	Baby sleep
Week 5	Continued healing	Soothing strategies
Week 6	Halfway through the 4th trimester	Rapid growth and change
Week 7	Adjusting to your new normal	Tummy time
Week 8	Health maintenance	Vaccinations: what you need to know

Week 9	Family finances	Uncertainty in parenting
Week 10	Your mental health matters	Emotional development
Week 11	More healing	When to call the doctor
Week 12	Navigating social media	Supporting milestone development
Week 13	Living well	Creating routines
Week 14	Safety in the home	It's okay to ask questions
Week 15	Resource connection	Safety outside the home
Week 16	Health maintenance	Sleeping through the night

Month 5	Trying new things
Month 6	Responding to needs
Month 7	Exploring temperament
Month 8	Modeling distress tolerance
Month 9	Expanding worlds
Month 10	Creating safe spaces
Month 11	Setting limits
Month 12	New ways of communicating

myana

Functionality

	Birth parent	Baby
Symptom triaging	• acute postpartum risk factors	
Assessment/screening	• depression • intimate partner violence • social factors with health impacts	• developmental milestones
Education	• what to expect when becoming a parent • postpartum recovery • positive parenting • building a family care team	• newborn feeding • signs of illness and when to seek care • immunizations and screening • healthy growth and development
Resource connection	• mental health • substance use • support groups • health-related social needs	• early intervention • lactation • safety • childcare

Content development process

Clinical best-practices   Target user desires

Original Draft — Myana Team

Expert review — Maternal-Fetal Medicine | Pediatrics | Clinical Psychology | Other Domain Expertise

Incorporation of expert edits — Myana Team

Professional edit — Clinical Content Strategist | Reproductive Equity & Inclusion Expert

Incorporation of professional edits — Myana Team
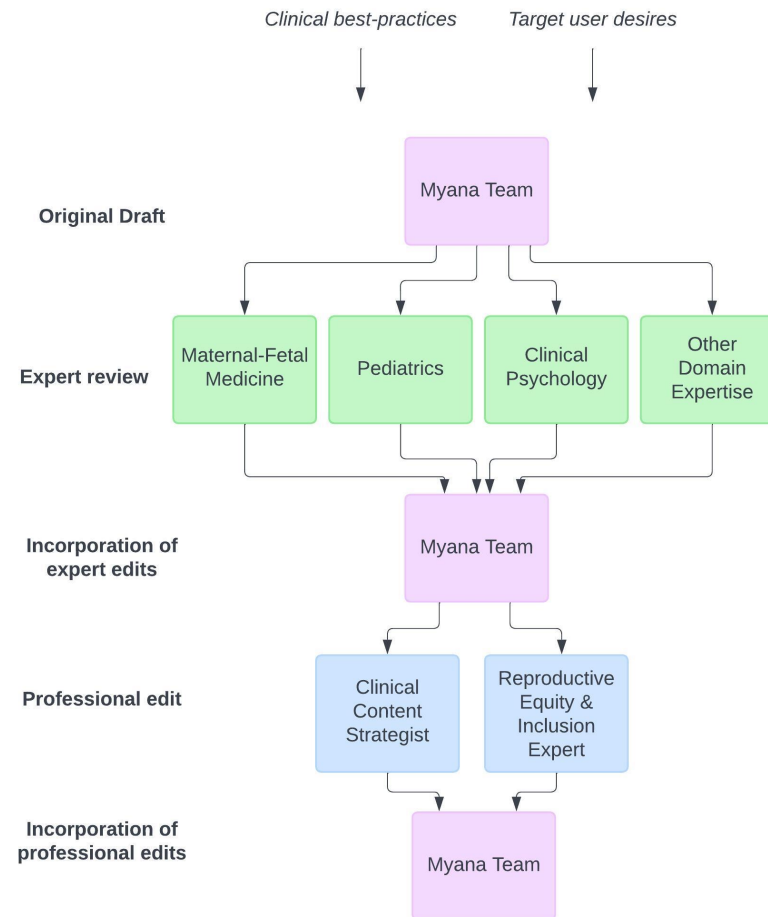
Myana team and contributors

Tamar Krishnamurti

Hyagriv Simhan

Kristin Ray

Sarah Burns

Michaella Wu

Sara Goulet

Ashley Deal

Raelynn O'Leary

Sam Shabaan

Liz Talago

Kelly Davis

Chloe Kelly

Anna Binstock

Jill Demirici

Katherine Guyon-Harris

Priya Gopalan

Marian Jarlenski

Elizabeth Krans

Deb Moss
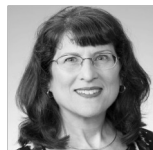
Evelyn Reis

Kelsey Schweiberger

Alyssa Vigliotti

Jenna Zarit

myana

Advisory Group

Michelle Altman
Clinical Social Worker, UPMC

Stacy Bartlett
Assistant Professor, Department of Family Medicine and faculty at the UPMC Shadyside Family Medicine residency

Jennifer Bixler
PA DOH, Newborn Screening & Genetics

Emily Berger
DHS Office of Developmental Programs, Special Populations Clinical Support

Amanda Flicker
Chair of PA ACOG Chair of OBGYN at Lehigh Valley Health Network

Giselle Hallden
PA DOH, Bureau of Family Health

Chelsea Hammond
Nursing Services Consultant NAS surveillance program, Dept. of Health's Division of Newborn Screening and Genetics

Staci Kenney
OCDEL, Bureau of Early Intervention Services and Family Supports

Jonathan McVey
PA DHS, Complex Needs Planning

Aasta Mehta
Medical Officer of Women's Health, Philadelphia Department of Public Health

Dara Mendez
Associate Professor, Department of Epidemiology, UPitt

Becky Mercatoris
Director, Allegheny County Department of Children's Initiatives

Sara Nelis
Project Manager, PA Perinatal Quality Collaborative & Safer Childbirth City Pittsburgh Project

Heather Powell
Family Support Consultant, Early Intervention Technical Assistance

Beth Quinn
UPMC Magee-Women's Hospital Senior Director of Women's Health Operations

Mae Reale
Health Education Specialist, PA Coalition Against Domestic Violence

David Silver
Director of Women's Behavioral Health, UPMC Lititz

Amy Verri-Peck
Lived-experience expert

myana

Opportunities to learn & reach out

1 **Quantify** experiences and health outcomes of new parents & infants with ecological momentary data

2 **Triage** symptoms to appropriate levels of care

3 **Learn** about risks *before* they happen
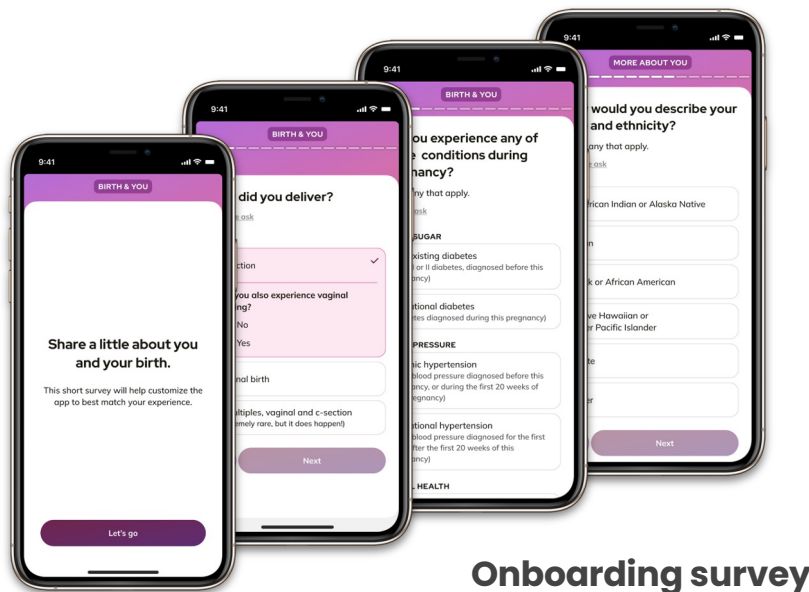
4 **Engage** postpartum individuals in care

5 **Personalize** access to resources
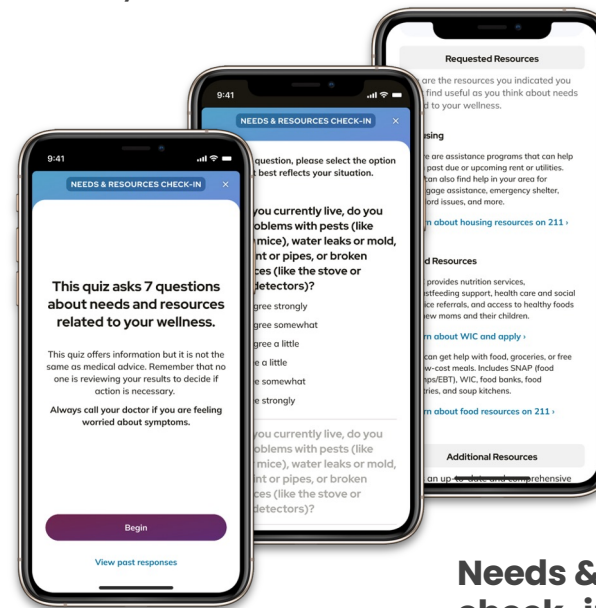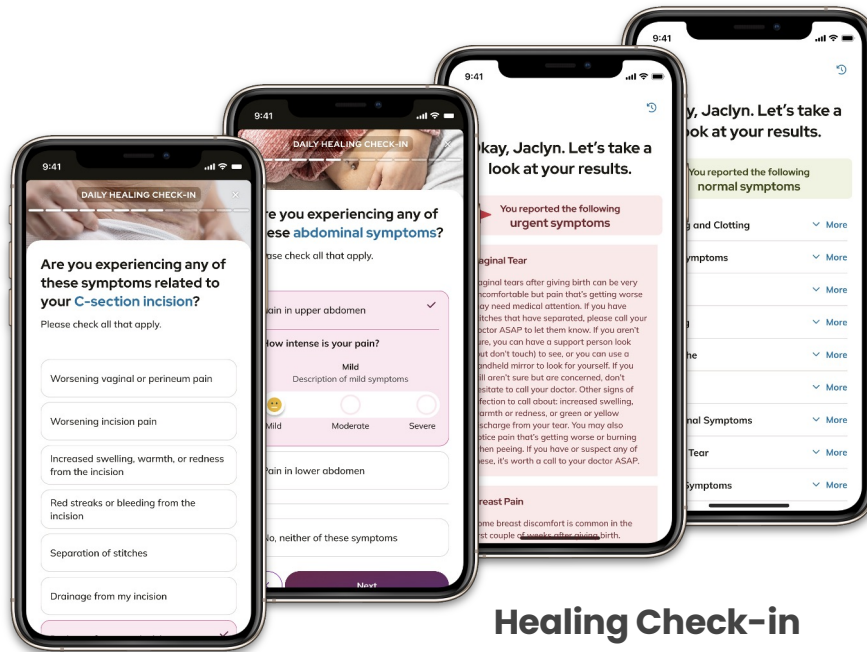
Opportunities to learn & reach out

1 **Quantify** experiences and health outcomes of new parents and infants with ecological momentary data

Onboarding survey

Needs & Resources check-in

myana

Opportunities to learn & reach out

2 **Triage** symptoms to appropriate levels of care

Healing Check-in
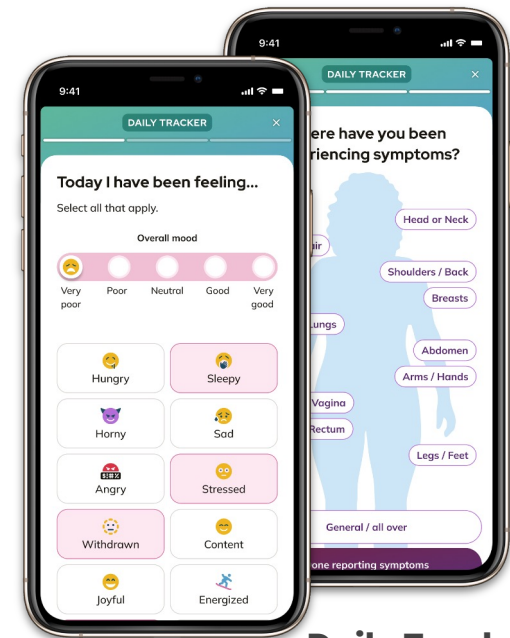
Daily Tracker

Opportunities to learn & reach out

3 **Learn**   about risks *before* they happen
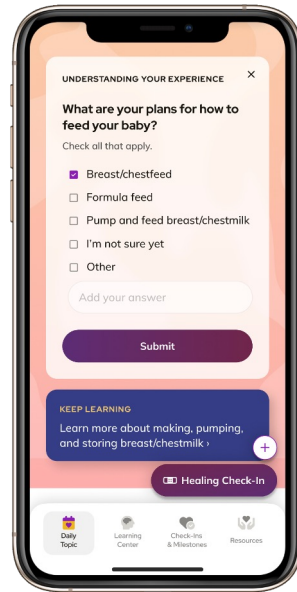
Interpretable machine learning methods can predict risk and suggest precision interventions

myana

Opportunities to learn & reach out

4 **Engage**   Postpartum individuals in care
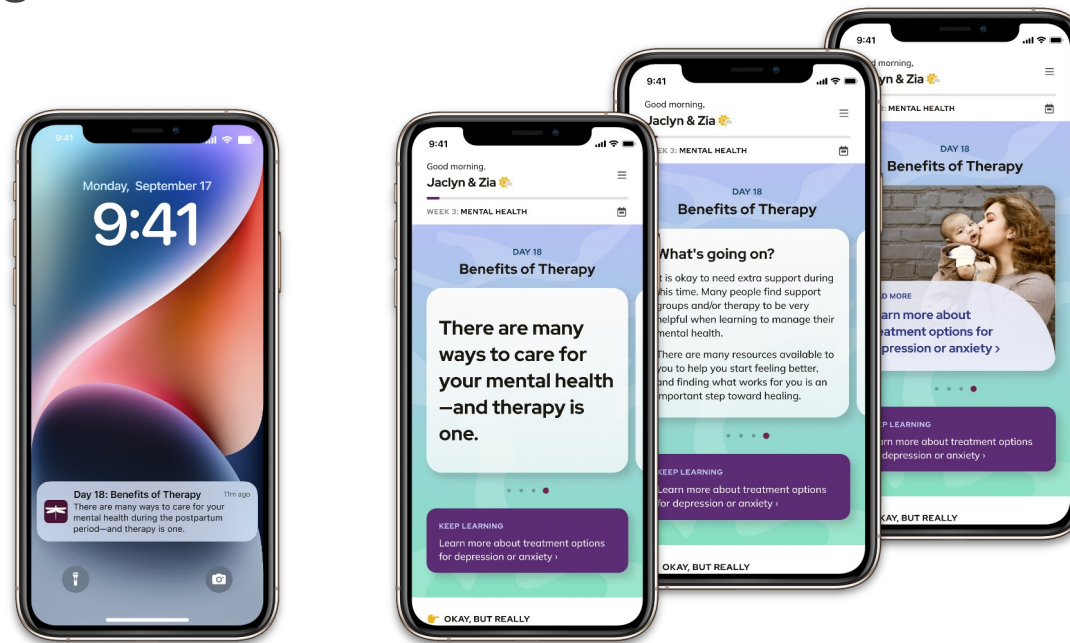
Opportunities to learn & reach out

5 **Personalize** access to resources based on need and location
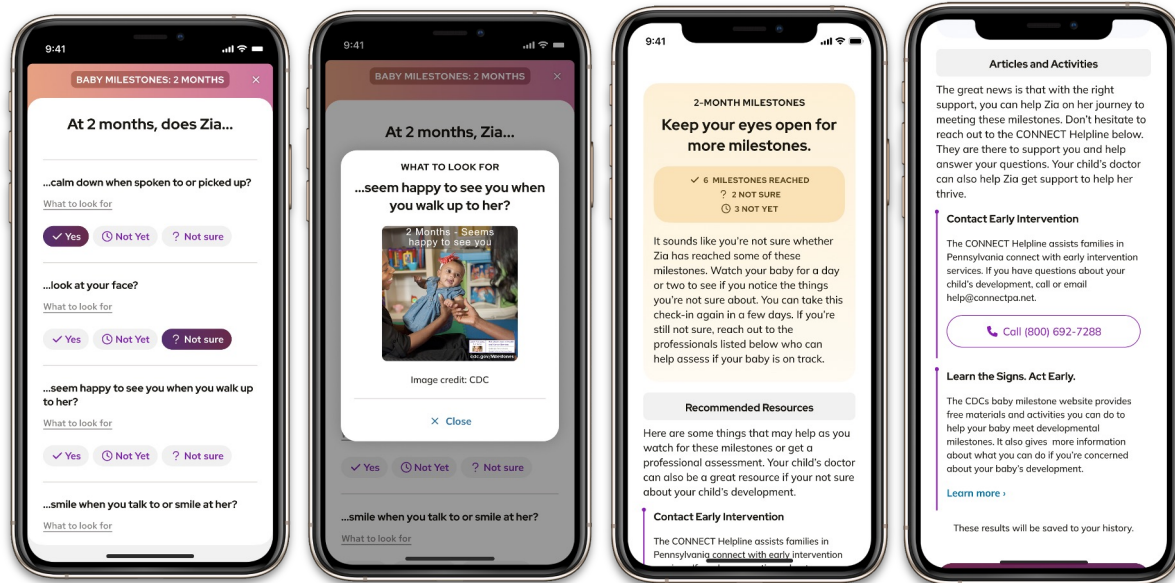
Furthering science through a living, learning environment

PRO + Data

Develop/ evolve

Digital Platform

Recommendations

Deliver clinical value, inform policies

myana
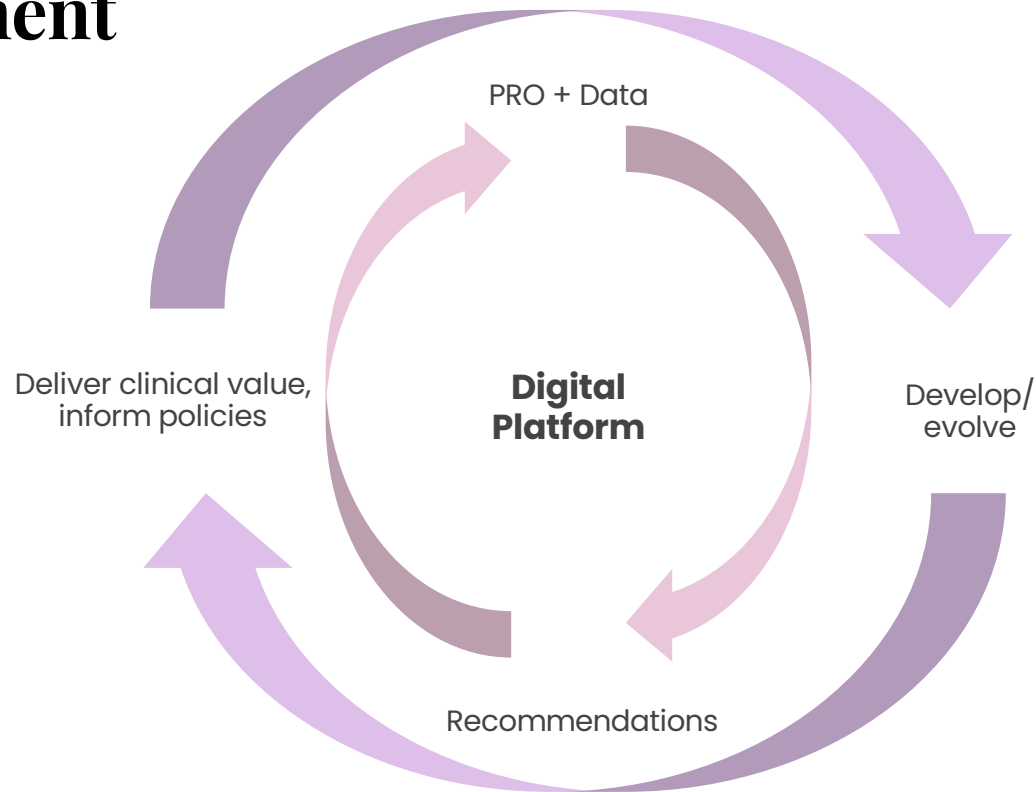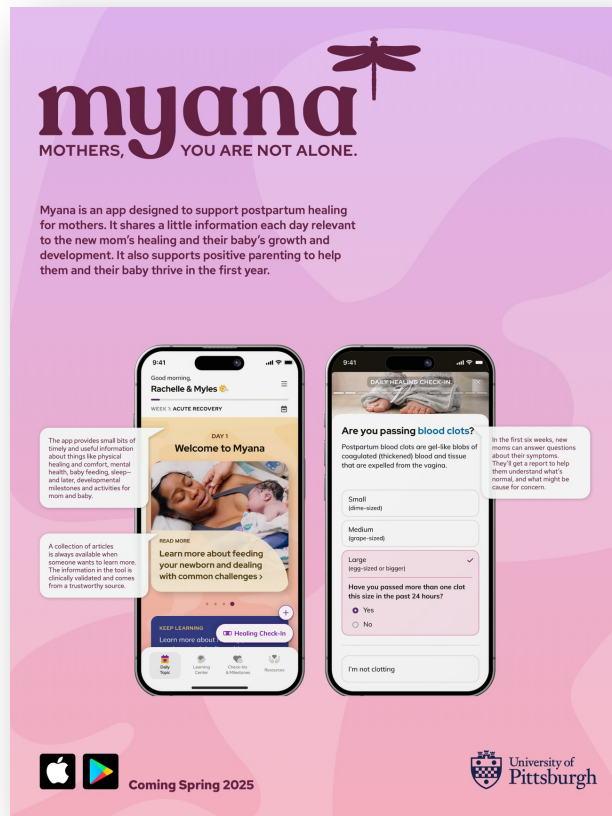
Next steps

Statewide implementation grounded in RE-AIM framework and operating through a health equity implementation framework lens

- ○ Brainstorming sessions with 'Implementation Facilitators' representing different state organizations
- ○ Community engagement studios with maternal health-based community organizations and Perinatal Individuals from diverse communities across the state.
- ○ Evaluation of use and outcomes

myana

Myana at OCDEL Home Visiting Conference

- Well-received: nearly 50 individuals signed up to participate in future Myana activities

"Let's get this in the hands of clients at prenatal visits."

"This would also be a great resource to offer to families who don't qualify for home visiting services."

"My clients are always Googling things, this would be a great resource for them."

"Fridge magnets aren't cutting it anymore."

We welcome feedback and collaboration

- Who should be at the table?
- What organizations or individuals may be Implementation Facilitators
- Other feedback?

Link to Survey

References

Krishnamurti T, Birru Talabi M, Callegari LS, Kazmerski TM, Borrero S. A framework for Femtech: guiding principles for developing digital reproductive health tools in the United States. Journal of Medical Internet Research. 2022 Apr 28;24(4):e36338.

Krishnamurti, T., Davis, A. L., Quinn, B., Castillo, A. F., Martin, K. L., & Simhan, H. N. (2021). Mobile Remote Monitoring of Intimate Partner Violence Among Pregnant Patients During the COVID-19 Shelter-In-Place Order: Quality Improvement Pilot Study. *Journal of medical Internet research*, *23*(2), e22790. https://doi.org/10.2196/22790

Krishnamurti, T., Rodriguez, S., Wilder, B. *et al.* Predicting first time depression onset in pregnancy: applying machine learning methods to patient-reported data. *Arch Womens Ment Health* (2024). https://doi.org/10.1007/s00737-024-01474-w

Allen K, Rodriguez S, Hayani L, Rothenberger S, Moses-Kolko E, Simhan HN, Krishnamurti T. Digital phenotyping of depression during pregnancy using self-report data. Journal of Affective Disorders. 2024 Aug 11.

Krishnamurti et al. JAMA Netw Open. 2021;4(10):e2130804. doi:10.1001/jamanetworkopen.2021.30804

O'Leary R, Deal A, Krishnamurti T. Observing Friction through Ethnography and Experience Prototyping in the Postpartum Period. EPIC People 2024

Bohnhoff J, Davis A, de Bruin WB, Krishnamurti T. COVID-19 information sources and health behaviors during pregnancy: results from a prenatal app-embedded survey. Jmir Infodemiology. 2021 Dec 7;1(1):e31774.