Postpartum Support-Bot: An Ethically Co-designed Chatbot for Mothers Experiencing or at Risk of Postpartum Mood and Anxiety Disorders

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Introduction

Simple, cost-effective approaches to provide support for postpartum mood and anxiety disorders are urgently needed.

In collaboration with the non-profit Postpartum Support International (PSI), we worked to develop a "chatbot" application to provide meaningful support to caregivers struggling with or at risk of PPMADs, specifically:

1. We conducted descriptive NLP analyses to understand support seekers' concerns, psychological states, and goals as shared on digital support platforms

1. We leveraged human-centered and ethical design principles to develop wireframes for an interactive chatbot interface

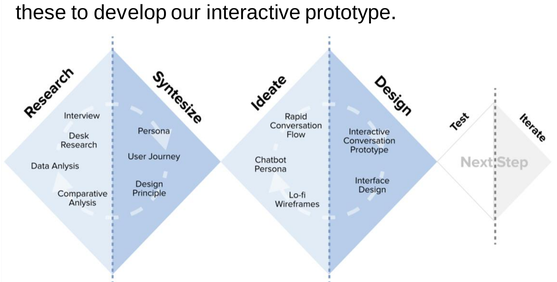
Methods

Descriptive Analysis

- We collected 7014 text conversations from PSI and 2074 Reddit posts (r/ppd and r/NewParents)
- We leveraged human annotation, dictionary models, and unsupervised techniques to gain insights into support seekers' concerns, psychological states, and goals. In particular, we
  - randomly annotated 407 PSI conversations and 218 Reddit posts for concerns, psychological states, and goals
  - used LIWC to analyze support seekers' positive and negative affect
  - performed sentence-level K-means clustering with features extracted from Latent Dirichlet Allocation (LDA) and BERT

Wireframes

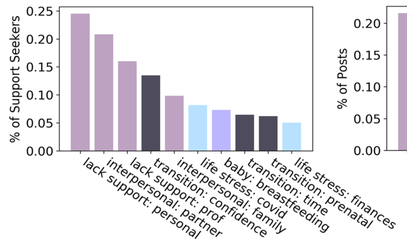
We leveraged human-centered and ethical design principles to obtain a nuanced profile of support-seeker user personas, experiences, and motivations. We used these to develop our interactive prototype.



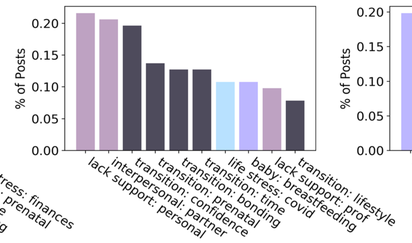
Understanding Support Seekers' Experiences

Distressed mothers described interpersonal problems and a lack of support most frequently

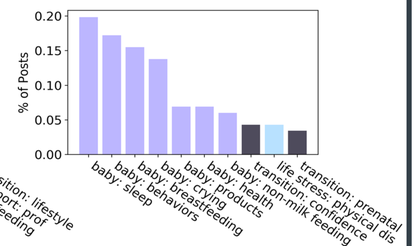
- Over 80% of "healthy" support seekers' concerns were focused on childcare
- "Distressed" mothers' top two concerns were a lack of support (22-24%) and interpersonal problems with their partner (21%)
- 9 - 15% of "distressed" mothers reported severe symptoms, such as suicidal ideation
- General support and venting or talking with someone were the top two annotated goals across "healthy" and "distressed" mothers
- Positive emotions increased and negative emotions decreased from start to finish of conversations in the helpline dataset but remained stable in Reddit posts



helpline



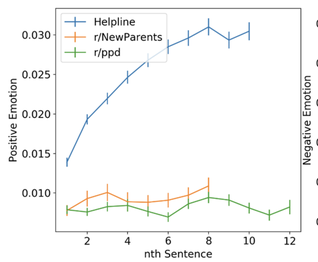
r/ppd

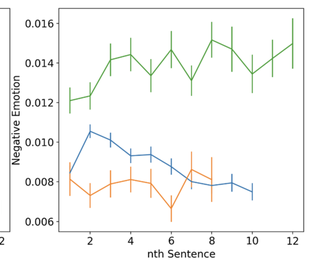


r/NewParents

Psychological States	Helpline	r/ppd	r/NewParents
Depressive Moods	51.35%	76.70%	18.80 %
Anxiety	40.54%	36.89%	16.24%
Severe symptoms	8.60%	14.56%	0 %

Goals	Helpline	r/ppd	r/NewParents
Local Coordinator	5.16%	0	0
Talk With Someone	34.40%	24.27%	10.26%
Health Care Provider	14.49%	0.97%	0.0
General Support	47.91%	51.46%	87.18%
Resource Barrier	7.86%	0.0	0.0
PSI Information	15.72%	0.0	0.0





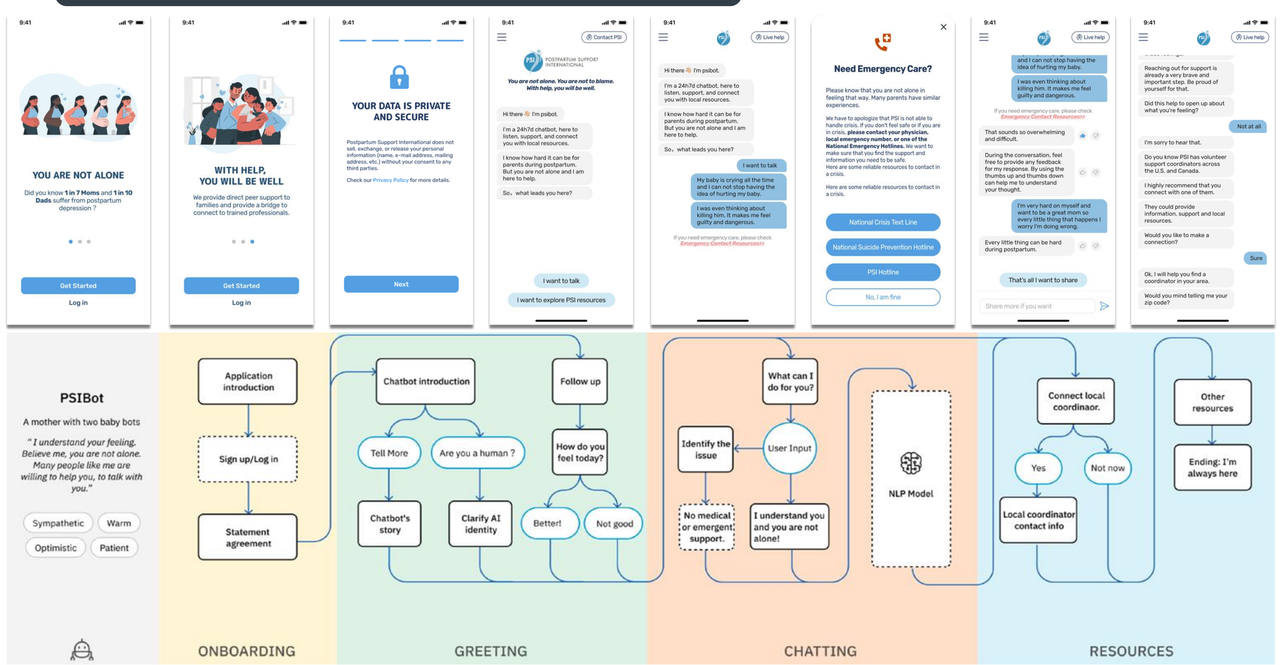
Design for Postpartum Support

Design Principles

- Personalize the chatbot but avoid pretending to be a human
- Set user expectations from the start
- Clearly define your purpose and make the conversation simple
- Maintain context awareness throughout the conversation
- Provide easy access to a human agent
- End the conversation gracefully
- Minimize data entry requirements

Conversation Flow

- We summarized the typical workflow of a chatbot based on guidance from mental health care professionals and researchers. The workflow is divided into four steps: onboarding, greeting, chatting, and providing resources for caregivers. We then received feedback from our team of clinical collaborators and iterated the flow of our MVP version.



Next Steps

Artificial Intelligence

We are working on a hardcoded "chatbot" with ethical design principles and cutting-edge natural language processing (NLP) techniques:

- Training a GPT-2 "chatbot" model with datasets containing support seekers' most common experiences
- Implementing "Plug and Play" technique to enforce the output of emotional statements in responses

Application

PSI is working with a developer to build out a postpartum support application based on our wireframes and a hard-coded logic flow. V1 of the application may include detection of safety concerns (harm to self or others) in free written text. If our AI efforts are approved by clinicians and PSI, we hope to incorporate the Plug and Play enhanced GPT-2 in V2 of the app to allow support seekers a more realistic interactive chat experience.

We thank PSI members Wendy Davis, Daniel Singley, Lianne Swanson, Kat Schuknecht, National Institute of Mental Health (NIMH) for funding

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