Poster: Opportunities and Challenges in Mental Health Mobile Applications

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Abstract—Numerous mobile applications aimed at helping users with mental health goals exist in current smartphone application stores, and they are widely downloaded. However, there is some debate about how effective these applications might be, given many suffer from high attrition and stigmas around discussing mental health. This work aims to understand current challenges with and opportunities for these applications. Sampling from a dataset of 200,972 user reviews, we analyzed a representational set of 3016 user reviews to identify users who self-identified as using these applications to support their mental health goals (696, 23%). In addition to looking at the sentiment of these reviews, we identify mental health needs currently being served and attempt to identify under-served user groups. Here, we describe preliminary insights derived from our initial coding, which can inform researchers and application designers working in the area of mental health applications.

Index Terms—Mobile Mental Health Applications, User Experience, Human-Computer Interaction, NLP, Sentiment Analysis, Healthcare Technology.

I. INTRODUCTION

Mental health applications (apps) offer therapeutic resources and support to individuals facing psychological challenges and it is estimated that approximately 20,000 mental health-focused apps exist [1]. Some of the most widely downloaded apps include Calm (50,000,000+ downloads), Headspace (10,000,000+ downloads), and Youper (1,000,000+ downloads). Range of care varies from mobile apps that provide users with simple methods to support their mental health (e.g., meditation, journaling, mood tracking) to allowing them to connect to professionals. Our work delves into user sentiment of these mental health apps. We employed a systematic search to find leading mental health apps and then collected user reviews. Our analysis aims to uncover underserved users, core attributes, and features that influence user experience.

II. PREVIOUS WORK

Research into mental health apps has investigated several ways to understand their efficacy. For example, Stoyanov et al. introduced the Mobile App Rating Scale (MARS) for evaluating quality and identified engagement, functionality, aesthetics, and information quality as critical components of a good mental health app [2]. Unfortunately, many apps that evaluate well seem to have sustained adoption issues (e.g., [9]). Recent critiques (e.g., [3]) suggest that the current

app ecosystem promotes a simplified view of mental health which does not work long-term for users. To understand users' perspectives and adoption issues better, others have turned to application reviews, which can be an informative way to evaluate apps. For example, a study by Robenson et al. indicates user tend to leave negative reviews when apps become repetitive, boring, or unhelpful [4]. Our work adds to the existing literature by examining user experiences and sentiment across applications and mental health conditions to identify under-served user groups.

III. METHOD

We used keyword searches to identify relevant apps on the Google Play Store. Mobile apps were selected based on a set of inclusion criteria e.g., ensuring the app is aimed at mental health or well-being. We then reviewed the "About" pages for each app returned by our search to understand the types of mental health issues they were aimed at and the techniques they employed. We then collected user reviews using the SerpAPI [5]. The final dataset contained 200k+ reviews from 73 highly downloaded mobile mental health apps.

A. DATA PREPOSSESSING AND ANALYSIS

From our final dataset, we selected a representational sample of 3016 user reviews from the 73 apps, including reviews with 1-5 star ratings. We then pre-processed the dataset using the Natural Language Toolkit (NLTK) [6] and anonymized personal information to ensure users' privacy. We then applied thematic analysis [8] starting with 1000 user reviews to generate a codebook for labeling the dataset. Labels included sentiments (positive, negative, neutral), user experience (good and bad features), and whether a mental health condition was mentioned in the review (e.g., anxiety). We used Datasaur.ai [7] for collaboratively labeling the reviews. After we labeled our dataset, 696 user reviewers (23%) were labeled as being from a user who indicated using the app to help manage a mental health condition; these reviews became the center of the analysis that follows.

IV. RESULTS

We categorized apps into two main groups: therapeutic apps offering interventions like CBT, therapist connections, or AI chatbots, and apps focused on mood tracking and journaling for self-monitoring. However, our analysis also identified potential gaps in service for specific user subgroups, highlighting
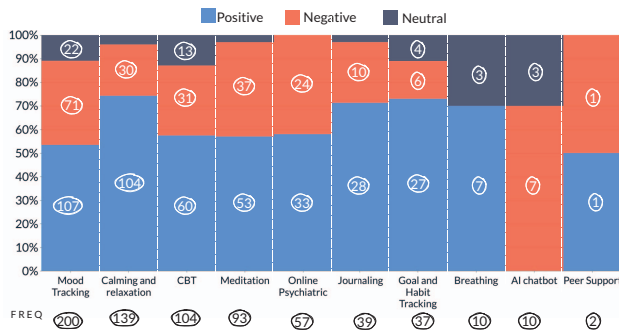
Fig. 1. Mobile app types and sentiment analysis.

Fig. 2. Sentiment by mental health condition.

opportunities for further development and refinement within the mental health app ecosystem.

A. APPLICATION TYPES AND SENTIMENT

Mental health applications in our sample received roughly 60% positive reviews, with mood tracking and calming apps being the most common types of apps by review frequency (Figure 1). This is unsurprising as many users utilize tracking apps to record and identify mental health triggers. However, examining sentiment across different app types, including journaling and online therapy, we estimate that 30% - 40% of users tend to leave negative or neutral reviews. And despite the innovative nature and recent popularity of AI chatbot apps, they often seem to attract negative reviews due to repetitive responses.

B. MENTAL HEALTH APPS AND OPPORTUNITIES

In Figure 2, we see mostly positive reviews for applications being used to support users with depression, anxiety, stress, and sleep issues. However, between 20% - 30% of reviews are negative or neutral, indicating room for improving these applications. Gives apps usually target these conditions, we found that some users in our sample were potentially under-served by current applications, such as those users who self-identify as having Bipolar Disorder, Post-Traumatic Stress Disorder (PTSD), Attention-deficit/hyperactivity disorder (ADHD), and Obsessive-compulsive disorder (OCD). As one user writes: *"I have bipolar and mine is both elation and irritability. While I love this app, it won't be able to accurately predict the type of mood I'm having if it is only elation..."*

C. MENTAL HEALTH APPS AND CHALLENGES

Our analysis extends to uncover challenges users face when using these apps. The most pressing technical concern is app reliability. With 141 reviews citing application malfunctions, there is a clear call to action for ongoing app maintenance and updates. Additionally, our data reveal other challenges that users face, potentially impeding mental health progress. For example, on the intrusive nature of notifications one user wrote: *"This app is ANNOYING. You constantly get notifications in the app to set an alarm no matter how many times*
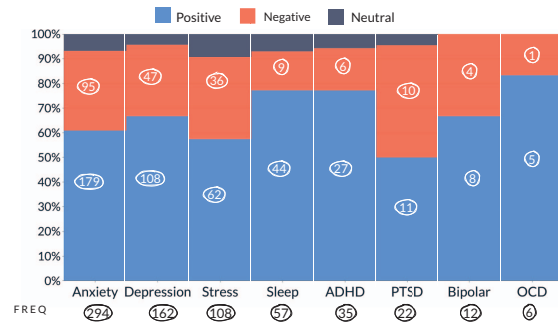
you dismiss it." Developers and researchers should consider redesigning features that provoke these frustrations.

V. CONCLUSION AND FUTURE WORK

Our preliminary results shed light on challenges and opportunities within existing mental health apps. Moving forward, our work will focus on analyzing more user reviews and investigating how supervised and unsupervised machine learning can help generate insights from the full dataset. In addition, we plan to conduct a user study with users of mobile applications to corroborate expected computational insights. This work is expected to tell us more about users of mental health apps, identify key features that directly impact adoption and use decisions, and provide guidelines for developing more efficacious health interventions and tools.

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