Emotional Self-Awareness System for Mental Health
(SAMBEDS: A lifestyle management model for depression and anxiety)

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Overview

Background and Introduction

Mental health and Existing approach

Research Question

Methodology

Survey Results

SAMBEDS Development

SAMBEDS Evaluation

Conclusion

Future work
Background

• Mental Health is defined as a state of wellbeing by which an individual can cope with the normal stress of life, recognises own abilities, work productively and contribute to own society.

• Lack of a consensus definition is attributed to the differences in values, cultural and social backgrounds among other attributes.

• Depression increasingly becomes a popular mental health condition
  • about 300 million people suffer globally.

• Labour Force Survey (LFS) in 2017/18 show 15.4 million workdays (57.3% of total days lost to ill-health) was lost to mental health-related issues.

• Furthermore, 43.4 million adults (17.9%) were estimated to suffer a form of mental illness in 2015 in the United States.
Introduction

• While various alleviation procedures have been proposed
• How a significant proportion of mentally ill candidates lack appropriate interventions or supports
• Factors hindering such support range from
  • a shortage of medical practitioners particularly, psychiatrists in rural areas
  • the lack of progress monitoring tools, and deficit in mental health budgets -
    • for instance, 78.9% of African countries spend less than 1% of health budget
    • Only 54% of European countries spend over 5% of their health budgets on mental health.
• Alleviation through ‘self-monitoring’ of thoughts and behavioural activities are know to improve depressive symptoms.
• Self-monitoring is one of the concepts of emotional intelligence (including self-regulation, empathy, motivation, social skill)
Research Question

• Considering the increasing access to technology and the surge in the adoption of Software as a Medical Device (SaMD) and medical apps
  • Can we develop an effective emotional self-aware system for managing Mental health factors?
  • What characteristics of mental health should be managed through self-awareness and how?
  • What evaluation method is best for the identified self-aware features and system

• This work proposes SAMBEDS model, a co-created depression and anxiety management system based on the Framework for Lifestyle Management pro Mental Health, FLMMHS.
Methodology

• Mixed methods approach involving techniques of qualitative, quantitative and engineering approaches
• The system development emulates the Framework for Lifestyle Management pro Mental Health Systems (FLMMHS) that adopts concept of Diagnosis, Prevention and Alleviation (DPA)
• A co-creation strategy to develop a prototype ‘effective emotional self-aware system’
Methodology

• Co-creating emotional self-aware elements
  • thirty-four lived experience candidates were randomly selected to participate in the development process.
  • feedback following a co-creation approach

• **SAMBEDS derivation and Document Analysis**
  • empirical knowledge from the examined documents or data
  • published data about anxiety and depression from publication platforms including IEEE Library, NCBI/PubMed (National Center for Biotechnology Information), American Journal of Psychiatry and BMC Public Health among others

• **Data collection**
  • the lived experience candidates participate in questionnaire surveys, prototyping and interviewing
Questionnaire survey for lived experience candidates

<table>
<thead>
<tr>
<th>No</th>
<th>Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Have you ever been diagnosed with any mental health conditions?</td>
</tr>
<tr>
<td>2</td>
<td>If Yes, what kind of support do you receive?</td>
</tr>
<tr>
<td>3</td>
<td>Do you get support immediately available when you need it?</td>
</tr>
<tr>
<td>4</td>
<td>Generally, rank the order of importance of keeping track and monitoring the following in relation to mental health: mood, sleep, social activities, thought/behavior, diet, exercise, spiritual/meditation.</td>
</tr>
<tr>
<td>5</td>
<td>Chose the three activities that you consider most relevant to you (manage own life, seek professional advice, be in control own life, keep diary, prefer face-2-face contact, dislike discussing own mental health and prefer to find own solution).</td>
</tr>
<tr>
<td>6</td>
<td>Do feel regular self-monitoring of your lifestyle will enhance mental health and general wellbeing?</td>
</tr>
<tr>
<td>7</td>
<td>Do you ever or currently use any healthcare management app or SaMD?</td>
</tr>
<tr>
<td>8</td>
<td>What is your opinion on the current mental health care system?</td>
</tr>
</tbody>
</table>
## Survey Results Explained

<table>
<thead>
<tr>
<th>Mental Health Disorder</th>
<th>No of cases</th>
<th>Percentage of cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression</td>
<td>22</td>
<td>64.7</td>
</tr>
<tr>
<td>Anxiety</td>
<td>22</td>
<td>64.7</td>
</tr>
<tr>
<td>Substance use Disorder</td>
<td>1</td>
<td>2.9</td>
</tr>
<tr>
<td>Stress-related Disorder</td>
<td>6</td>
<td>17.6</td>
</tr>
<tr>
<td>Bipolar Disorder</td>
<td>1</td>
<td>2.9</td>
</tr>
<tr>
<td>Post-traumatic stress Disorder</td>
<td>1</td>
<td>2.9</td>
</tr>
<tr>
<td>Schizophrenia</td>
<td>1</td>
<td>2.9</td>
</tr>
<tr>
<td>Don't want to disclose</td>
<td>1</td>
<td>2.9</td>
</tr>
</tbody>
</table>

### Types of mental health support received by candidates

- **None**: 0
- **Try to manage myself**: 41.7%
- **Friends & Family**: 75.0%

### Ranking the elements of emotional self-awareness for mental health

- **Mood Changes**
  - Very Important: 8
  - Important: 13
  - Somehow Important: 18
  - Not Important: 9
- **Sleep Pattern**
  - Very Important: 6
  - Important: 9
  - Somehow Important: 11
  - Not Important: 3
- **Activity/Social**
  - Very Important: 4
  - Important: 10
  - Somehow Important: 7
  - Not Important: 9
- **Behavior/Thoughts**
  - Very Important: 9
  - Important: 9
  - Somehow Important: 9
  - Not Important: 11
- **Diet/Hydration**
  - Very Important: 11
  - Important: 9
  - Somehow Important: 7
  - Not Important: 9
- **Exercise/Fitness**
  - Very Important: 3
  - Important: 11
  - Somehow Important: 9
  - Not Important: 3
- **Spirituality/Meditation**
  - Very Important: 11
  - Important: 9
  - Somehow Important: 9
  - Not Important: 3
Survey Results ‘explained

- about 35% of the participants responded to this question
- 75% of these occasions were these supports provided by families and friends
- 41.7% of each occasion, candidates seek to manage the situations by themselves or
- 41.7% of each occasion they opted for therapy or other medical options.

![Bar charts showing top options for managing mental health]

- Prefer to find own solutions: 21%
- Don’t like discussing my condition: 29%
- Life to keep a diary: 26%
- Prefer face to face contact: 47%
- Prefer to be in control: 41%
- Rather seek professional advice: 12%
- Prefer to manage my own life: 50%

![Bar charts showing feeling of self-monitoring improves]

- Yes: 47.1%
- No: 11.8%
- Maybe: 41.2%
DEVELOPING SAMBEDS BASED SYSTEM TO MANAGE ANXIETY AND DEPRESSION

• A User-Centered-Design, UCD approach is adopted for developing the software system

• The system is partitioned into multiple segments to manage different activities including
  • mood assessment,
  • progress check,
  • therapist support,
  • general information,
  • exercise,
  • diet,
  • sleep pattern
  • and journal

• Users can assess themselves and able to rate their feelings following the corresponding smiley
  (very happy, happy, indifferent, sad and very sad)
SAMBEDS-BASED SYSTEM INTERFACE
SAMBEDS-BASED SOFTWARE SYSTEM INTERFACE
<table>
<thead>
<tr>
<th>Task No</th>
<th>Task Description</th>
<th>No of Screens</th>
<th>Time (S)</th>
<th>System Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Navigate to the registration page</td>
<td>3</td>
<td>20</td>
<td>Efficiency</td>
</tr>
<tr>
<td>2</td>
<td>Take the assessment, return score</td>
<td>4</td>
<td>20</td>
<td>Memorability</td>
</tr>
<tr>
<td>3</td>
<td>Click mood and go to Journal</td>
<td>2</td>
<td>10</td>
<td>Efficiency</td>
</tr>
<tr>
<td>4</td>
<td>Go to exercise screen, click goal and go back to home screen</td>
<td>2</td>
<td>20</td>
<td>Memorability</td>
</tr>
<tr>
<td>5</td>
<td>Access PHQ9 and return to information screen</td>
<td>2</td>
<td>10</td>
<td>Learnability</td>
</tr>
<tr>
<td>6</td>
<td>Check progress</td>
<td>1</td>
<td>10</td>
<td>Learnability</td>
</tr>
<tr>
<td>7</td>
<td>Check sleep hours</td>
<td>2</td>
<td>20</td>
<td>Efficiency</td>
</tr>
<tr>
<td>8</td>
<td>Contact therapist and read advice</td>
<td>1</td>
<td>10</td>
<td>Efficiency</td>
</tr>
</tbody>
</table>
SAMBEDS RESULTS AND EVALUATION

• A rating scale is used to measure user’s experience. The rating scale is between 1 and 7 (7 being the highest and 1 the lowest).

• Specifically, 50% of the participants give the highest rating value, 7 for interface simplicity, while 40% rate with value 6, therefore, 90% of participants consider the interface to be simple enough for emotional self-awareness.

• Also, 66.6% of participants rated the ease of completing as high, i.e., 33.3% rated value 7 and value 6 (33%).
A total of 83% of users rated the high values, i.e., 50% and 33.3% of users rated the learnability of system 7 and 6, respectively (7 being the highest rating and 1 the lowest).

Similarly, 77.8% of users rated the access to all information with the high values within the targeted time (i.e., 38.9% each rated the values 7 and 6). While the ease of completion only recorded an instance (5.6%) of value 4 with no instance recorded below 4 for simplicity.
SAMBEDS RESULTS AND EVALUATION

• 77.8% of the participants perceived the difficulty in navigation (values 1 and 2) to be very low (as shown in Figure below), thus, participants find the system easy to use in accomplishing self-awareness about their mental health.

• Also, the recorded rating for the overall satisfaction appears between the values between 5 and 7, i.e., all the service users (100%) were highly satisfied with the system for the accomplishment of emotional self-awareness for mental health.
Conclusion and Future work

• Lifestyle factors including diet and exercise among other factors have been found to improve the quality of life and depression particularly, in overweight people.

• Also, a strong association has been established between improved mood and exercising. Similarly, a robust correlation between exercises and sleep has been noted in lifestyle psychiatry.

• This work presents SAMBEDS for emotional self-awareness in depression and anxiety management with seven core lifestyle elements.

• A co-created prototype system evaluated reflected that users derive satisfaction in managing factors that affect their mental health by themselves.
Conclusion and Future work

• All elements were considered equally important except for sleep patterns and mood changes, elements which are considered slightly more eminent.

• The behavioural and thought element is rated the highest among other SAMBEDS elements, but adequate management of all elements prove contributory to emotional self-awareness in relations to mental health states.

• A major challenge of the system is the digital characterisation of most activities, a mitigation approach is the contraction of users’ interactivity through automation.
Future work

• Future work must devise automatic means of extracting these core lifestyle data with minimal or no intrusion to the users’ daily activities.

• A further interesting research challenge is the development of automatic behavioural and thoughts algorithms that will synchronise mental health state with mood changes, exercises and sleep and other SAMBEDS elements.
References


• "
Resources


• P. Chandrashekar, "Do mental health mobile apps work: evidence and recommendations for designing high-efficacy mental health mobile apps", mHealth, vol. 4, pp. 6-6, 2018.
End of Session

Any questions?