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
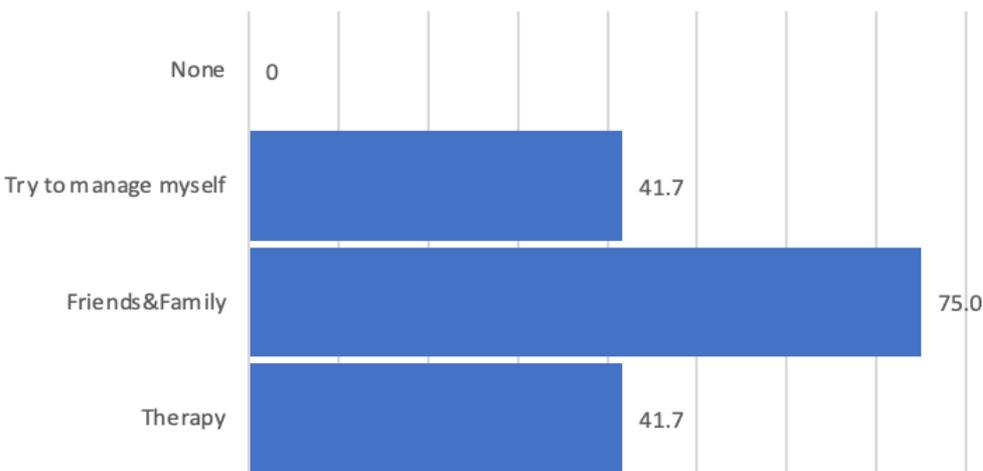
Questionnaire survey for lived experience candidates

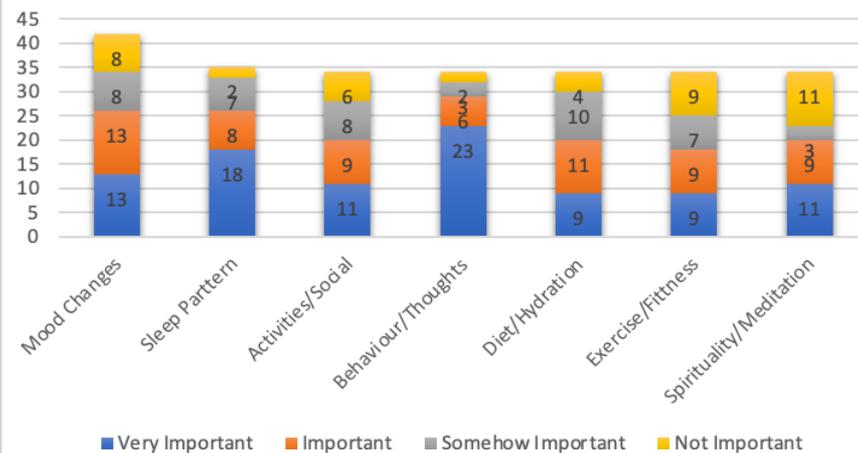| No	Questions
1	Have you ever been diagnosed with any mental health conditions?
2	If Yes, what kind of support do you receive?
3	Do you get support immediately available when you need it?
4	Generally, rank the order of importance of keeping track and monitoring the following in relation to mental health: mood, sleep, social activities, thought/behavior, diet, exercise, spiritual/meditation.
5	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).
6	Do feel regular self-monitoring of your lifestyle will enhance mental health and general wellbeing?
7	Do you ever or currently use any healthcare management app or SaMD?
8	What is your opinion on the current mental health care system?

Survey Results Explained

Mental Health Disorder	No of cases	Percentage of cases (%)
Depression	22	64.7
Anxiety	22	64.7
Substance use Disorder	1	2.9
Stress-related Disorder	6	17.6
Bipolar Disorder	1	2.9
Post-traumatic stress Disorder	1	2.9
Schizophrenia	1	2.9
Don't want to disclose	1	2.9

Types of mental health support received by candidates

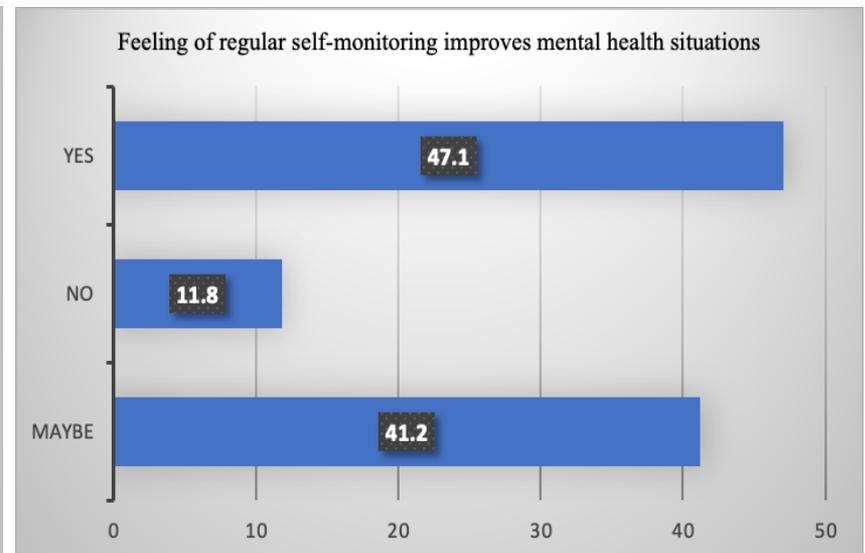|	
None	0
Try to manage myself	41.7
Friends&Family	75.0
Therapy	41.7

Ranking the elements of emotional self-awareness for mental health

Element	Very Important	Important	Somehow Important	Not Important
Mood Changes	13	13	8	8
Sleep Parttern	18	8	7	2
Activities/Social	11	9	8	6
Behaviour/Thoughts	23	6	3	2
Diet/Hydration	9	11	10	4
Exercise/Fittness	9	9	7	9
Spirituality/Meditation	11	9	3	11

■ Very Important ■ Important ■ Somehow Important ■ Not Important

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.

Top most options of managing own mental health

Option	Value
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 PROFFESIONAL ADVICE	12
PREFER TO MANAGE MY OWN LIFE	50

Feeling of regular self-monitoring improves mental health situations

Response	Value
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
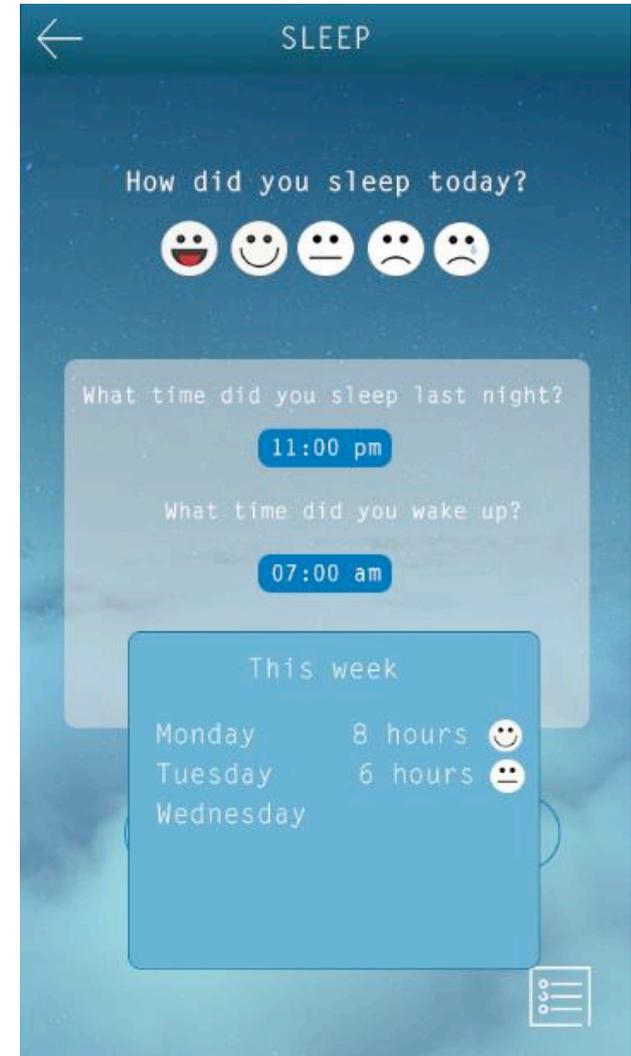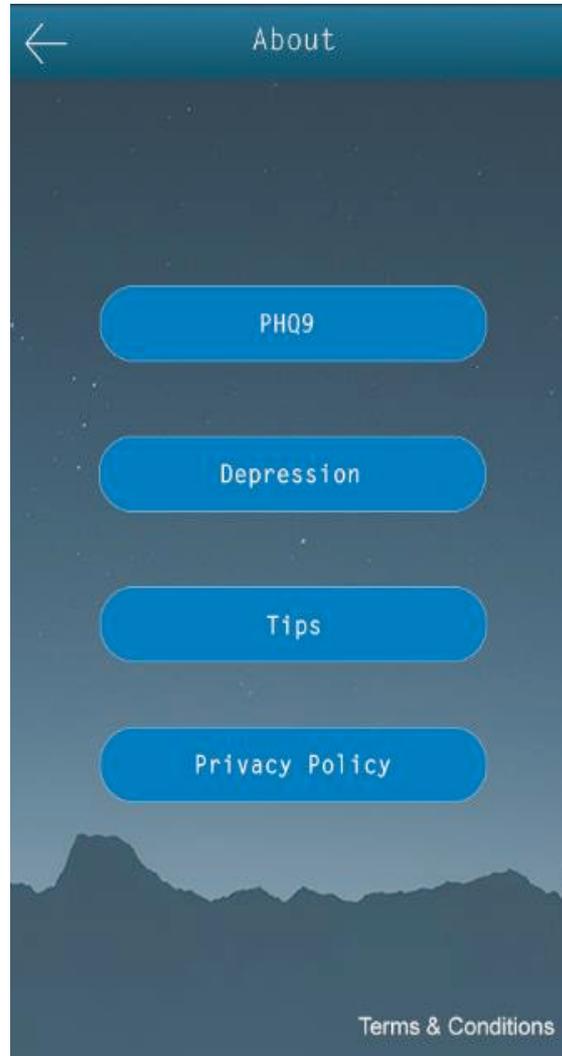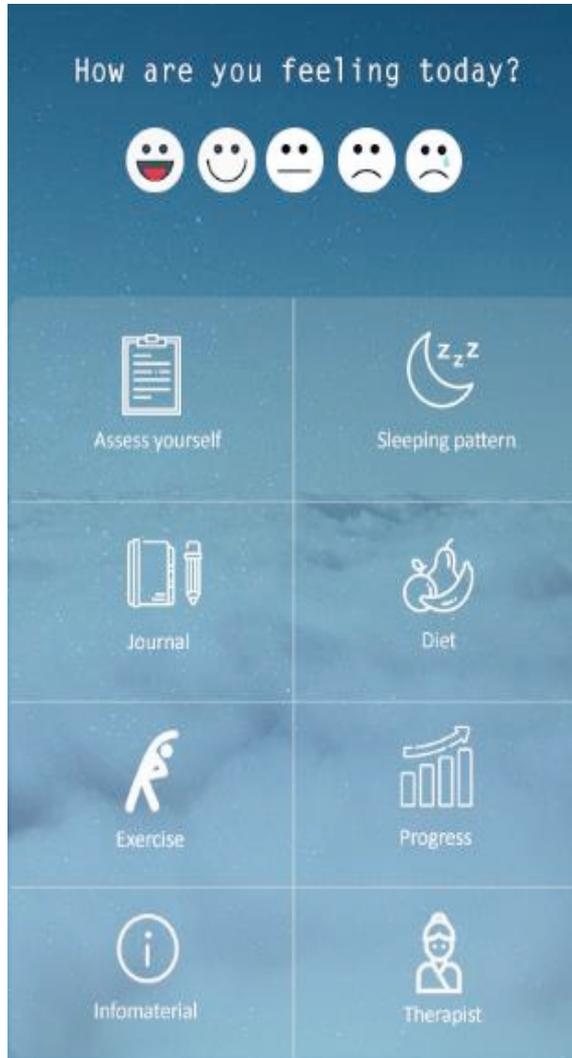
SAMBEDS-BASED SOFTWARE SYSTEM INTERFACE

SAMBEDS-BASED SYSTEM EVALUATION/RESULT

| Task No	Task Description	No of Screens	Time (S)	System Objective
1	Navigate to the registration page	3	20	Efficiency
2	Take the assessment, return score	4	20	Memorability
3	Click mood and go to Journal	2	10	Efficiency
4	Go to exercise screen, click goal and go back to home screen	2	20	Memorability
5	Access PHQ9 and return to information screen	2	10	Learnability
6	Check progress	1	10	Learnability
7	Check sleep hours	2	20	Efficiency
8	Contact therapist and read advice	1	10	Efficiency

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%).

Ease of activities completion vs Interface simplicity

complete task Interface simplicity
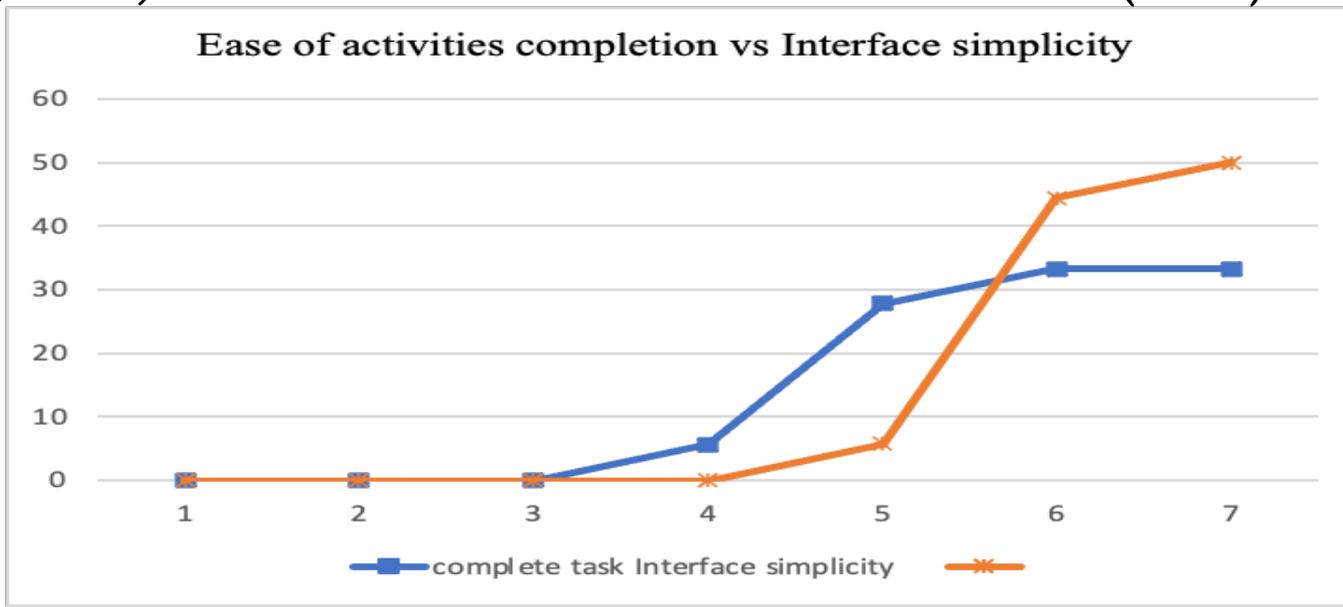
SAMBEDS RESULTS AND EVALUATION

- 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.

Ease of information access vs learnability

Information Ease — Easy of learning
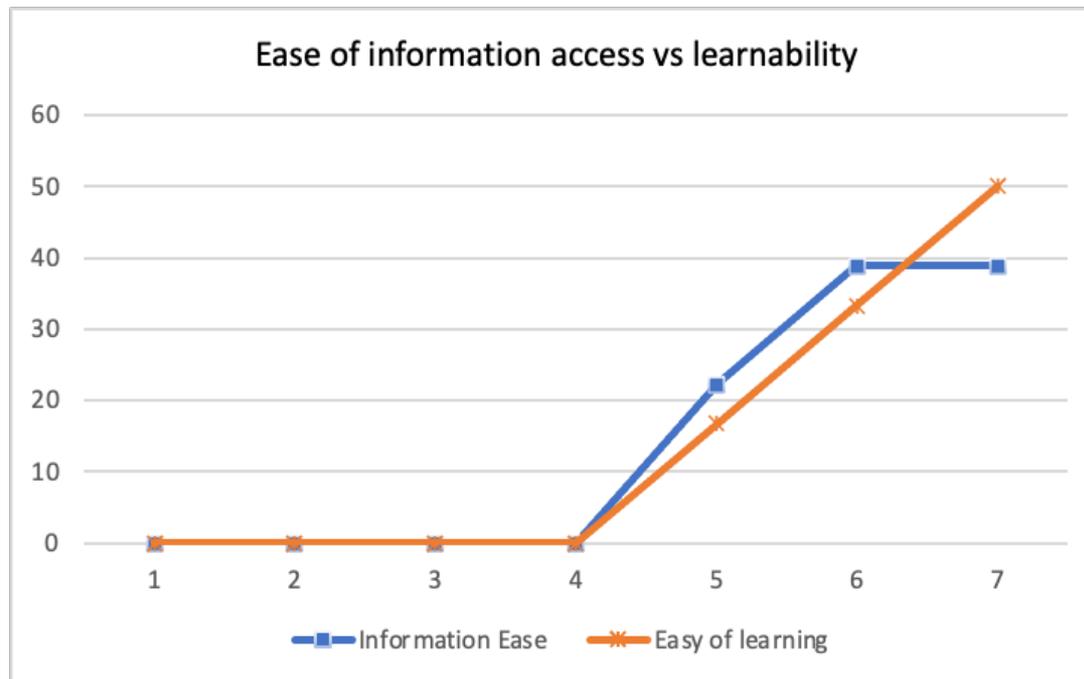
SAMBEDS RESULTS AND EVALUATION

- 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.

Overall Satisfaction vs Difficulty in Navigation
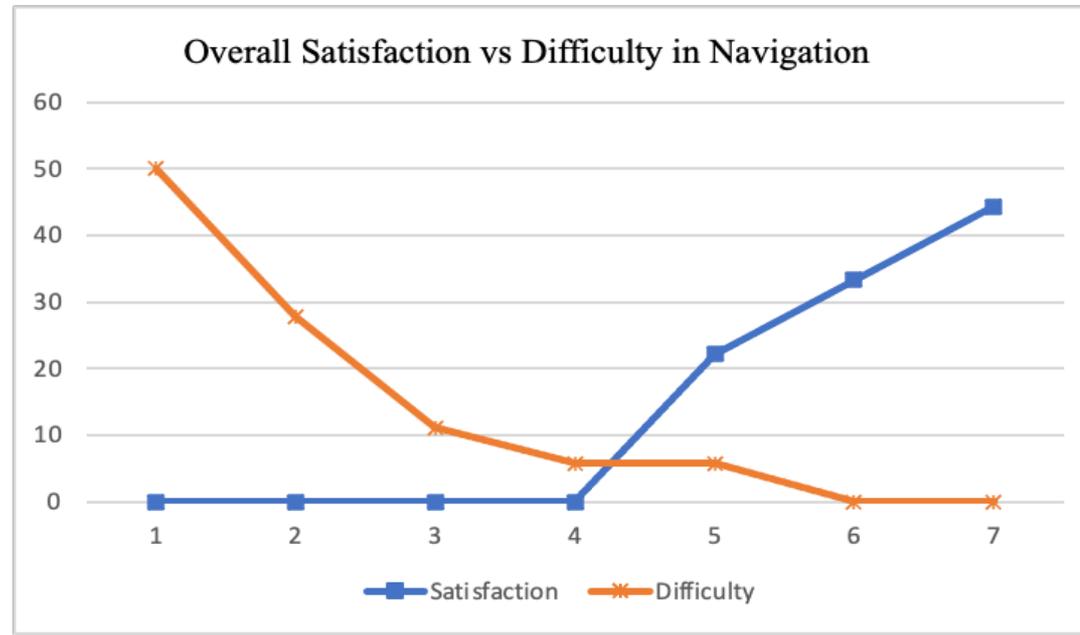
Conclusion and Future work

- 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.

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Resources

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End of Session

Any questions?