Gaining and Visualizing Mental Health Insights from Self-Report Data

Presentation of Insights from ESM Data into Client Conditions for Practitioners

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1 Introduction

- Increasing mental health problems put pressure on practitioners [8, 6].
- mHealth (mobile health) applications can relieve some of this pressure [2].
- Existing apps collect ESM data and provide interventions to help users [9].
- ESM has not been used much in practice by practitioners as a way to gain insights into their clients [7, 3].
- To best present insights, visualizations should be made for specific applications [10].

ESM: Experience Sampling Method

A momentary assessment technique that collects contextual mental health data by prompting participants with a short questionnaire multiple times a day at (semi-)random intervals [4].

2 Research Question

What methods of visualization do practitioners find most useful for interpreting meaningful insights from ESM data to identify mental health conditions, and why?
I.e. what do practitioners want to see when they ask themselves: How does my client relate to people with a certain mental health condition?

3 Method

a. Investigate existing literature.
b. Decide on design choices for the visualizations.
c. Create mock-ups of implementations of the design choices (See Figure 1 and Figure 2).
d. Create and distribute a user evaluation, containing the mock-ups, that investigates what practitioners think about the design choices, what they would improve, and why.
e. Perform a thematic analysis on the responses of the user evaluation.

3.1 User Evaluation

- Qualtrics
- Informed consent
- Question about professional background, age, gender
- Introductory text and scenario
- 6 open ended questions
- 8 participants
  - 6 psychology students
  - 1 mental health practitioner
  - 1 psychology researcher

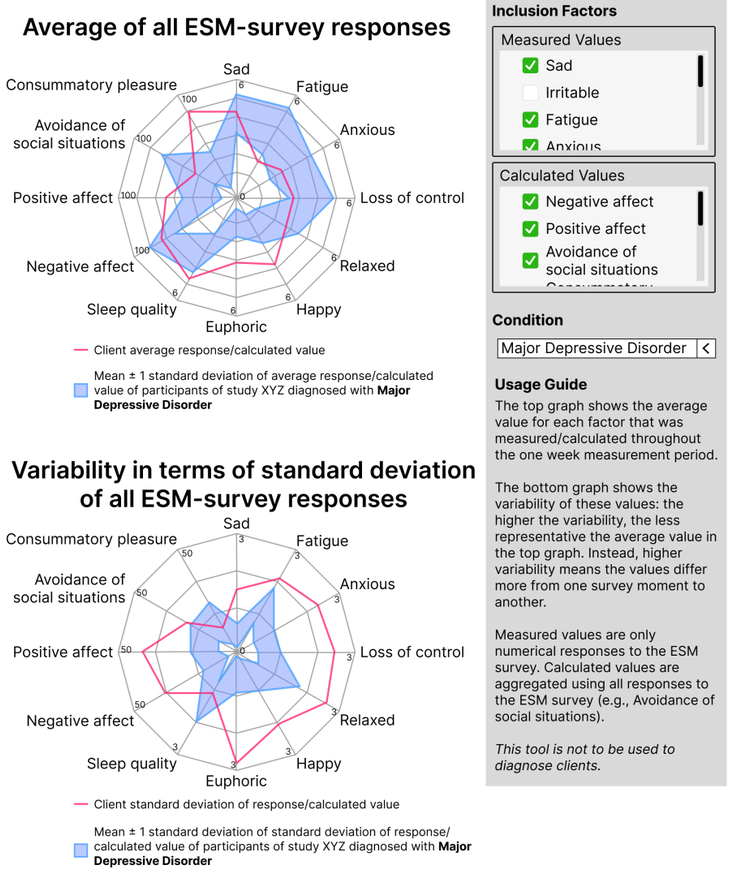

Figure 1: Mock-up of spider diagram to visualize ESM data comparison.

3.2 Thematic Analysis

- Braun and Clarke [1]
- Rich description
- Theoretical approach
- Semantic coding
- Essentialist/realist approach
- Interrater reliability by double coding [5]
  - Cohen's Kappa of $\kappa = 0.702 \pm 0.097$
  - 95% confidence interval

4 Results

- Three themes (see Table 1 for some quotes related to each theme)

Theme 1: Application in Therapy
Theme 2: Data representation and Visualization Methods
Theme 3: Improvements

Table 1: Quotes related to themes (Application in Therapy, Data representation and Visualization Methods, and Improvements) of responses to the user evaluation about ESM data visualization to identify mental health conditions

Participant	Quote
	Theme 1: Application in Therapy
Mental health practitioner	If I make a client fill something out, then I will use that information, otherwise I don't understand why I would make a client fill it out.
Psychology student	With an extreme score, you could ask about it, explore this research area, or perform further tests for a diagnosis, like in this case the BDI-II for depressive symptoms.
Psychology student	You can use these graphs in a session to discuss what has been going on lately.
Psychology researcher	These plots might be a bit hard to understand if you are not already familiar with them.
Psychology student	Would use it to discuss these factors together with the client and deepen our understanding of them. To research in which situation these occur and in which these don't. But I don't know if I would do this for multiple sessions.
	Theme 2: Data representation and Visualization Methods
Psychology researcher	I don't know if these graphs would be particularly useful for the patient, as I could only tell them "Hey, on average you are more depressed than the rest of the population." This is not helping in therapy.
Psychology researcher	I think the scatter plot is more easy to understand initially, but the spider plot is more useful overall.
Psychology student	Can actually be used to get insights into what the client suffers from most.
Psychology student	The idea of a scatter plot, I believe, is more intuitive than a spider diagram for the client.
Mental health practitioner	There is no explanation of what dimensions 1 and 2 are, so I don't know what I can read from this.
	Theme 3: Improvements
Psychology student Psychology researcher	Without context, you don't know if a factor is disproportionate on that moment. It would be important to see, how the emotions changed from day to day, as this only gives you the values for the entire week. it could be important to see if there were outlier days, if they were more happy on the weekend etc. If you want to go into more detail, you could also include a graph about emotions at each timepoints to compare e.g. morning vs. evening.

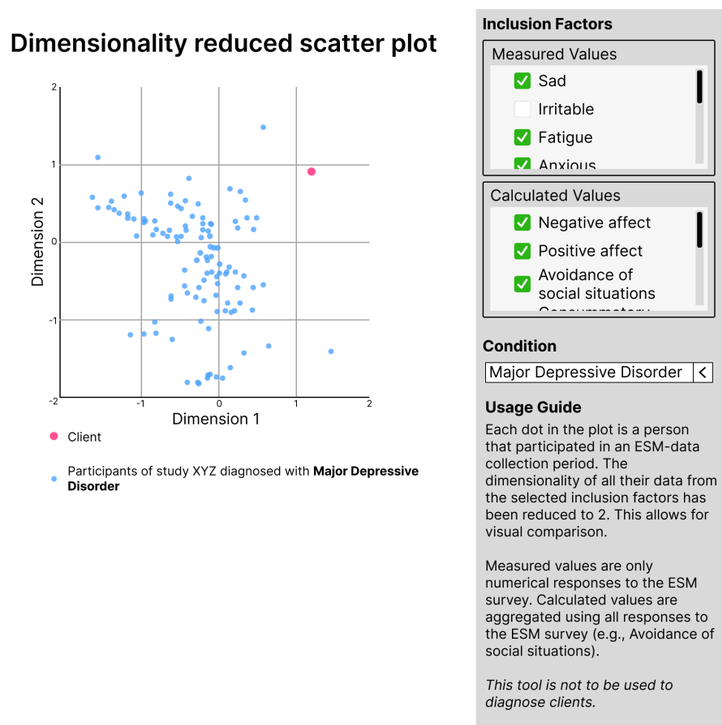

Figure 2: Mock-up of dimensionality reduction to visualize ESM data comparison.

5 Discussion

- Spider charts
  - Specific
  - Allow for getting insights at a glance
  - May be too complicated for clients
  - Use as a way to guide or augment one or more therapy sessions
  - Useful in multiple phases of care
  - Superior to scatter plot
- Average and variability statistic
  - Aggregate over the entire ESM data measurement period not as positively received
  - Variability adds to insightfulness
  - Average + variability provide useful insights
  - Improvement: Allow for finer temporal granularity (e.g. days, parts of days, individual ESM survey entries)
- Context (e.g. social) is very important for practitioners
- Calculated values
  - Allow to gain information about context
  - Not sufficient to replace direct information about context
  - Improvement: Add visualizations that show the relationship between emotions and contextual measured values or between emotions themselves
- Scatter plot
  - Provides overview at a glance
  - Unclear dimensions and not specific enough
  - Inferior to spider chart

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