



Understanding Client Support Strategies to Improve Clinical Outcomes in an Online Mental Health Intervention

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Microsoft
Research



SilverCloud



Trinity
College
Dublin

The University of Dublin



Outline

- Problem
- Solution
- Previous Work
- Research Goal
- Dataset
- Methods and Results
- Discussion



Mental Health Crisis – Widespread!

- ▮ Leading cause of suicide and disability.
- ▮ Lifetime occurrence



- ▮ Current: Depression in employees



- ▮ Current: Depression in college students





Mental Health Crisis – Huge Cost!



**long-term
sickness
absence**

in England attributed
to mental ill health



Total Socioeconomic Cost
in England is estimated to
be £105 billion.



In 2016,
42.7%
employment rate
for those who report mental illness
as their main health problem (Mental
illness, phobia, panics, nervous
disorders (including depression, bad
nerves or anxiety). **Compared to**
74% of all population



Mental Health Crisis – Lack of access!





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Mental Health Crisis – A Solution!



Online Mental Health Services.

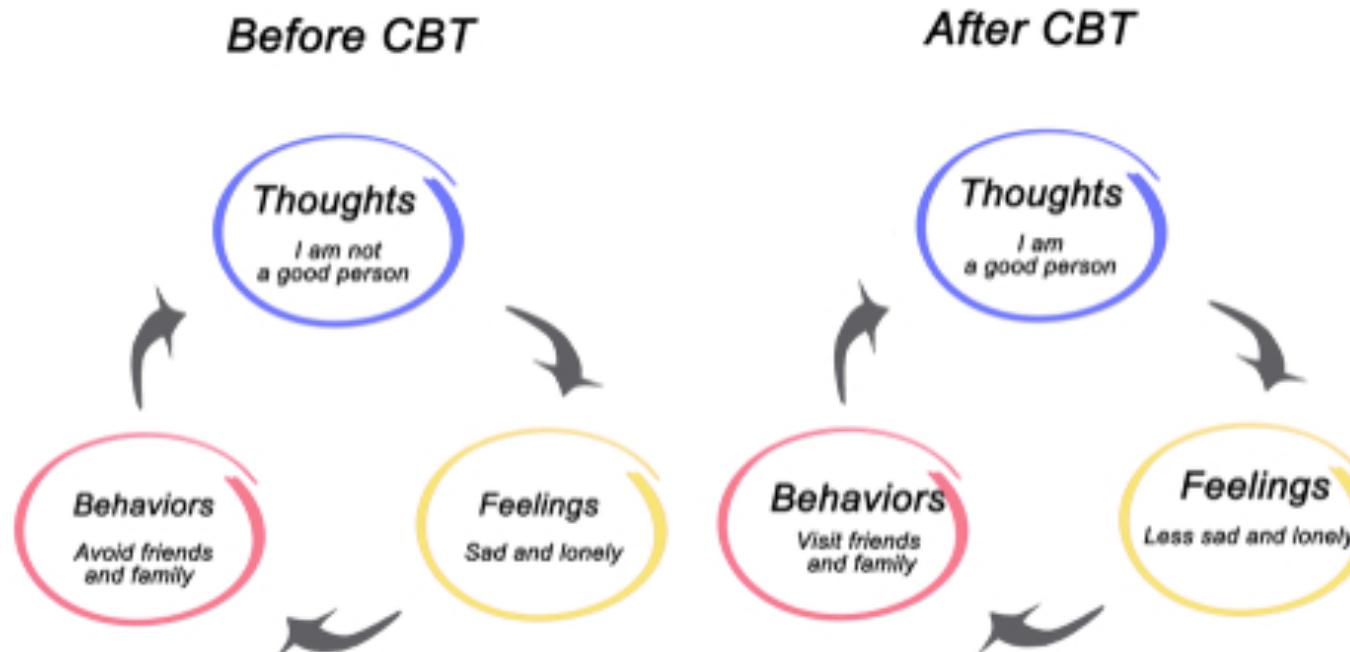


CBT → Very structured --> Software!



E.g.

Internet-based Cognitive Behavioral Therapy (iCBT)

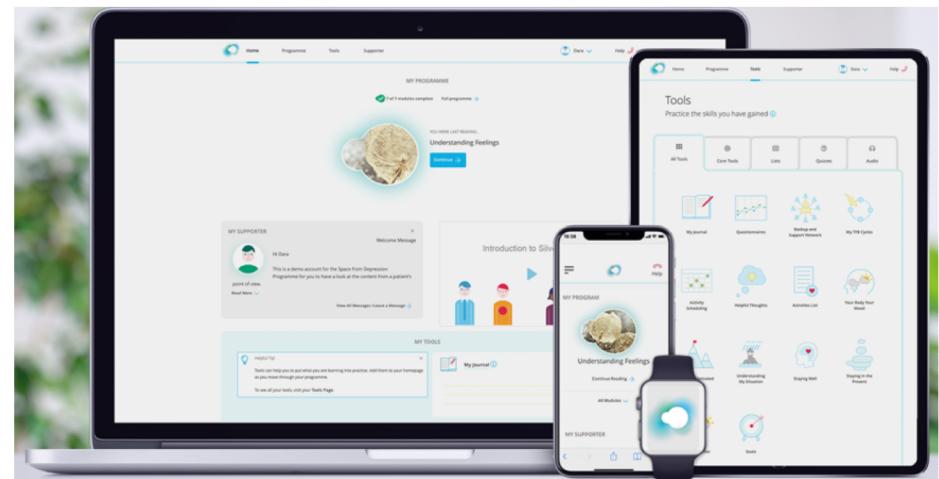




SilverCloud Health



SilverCloud



Space from

Anxiety



Space from

Depression



Space from

Chronic Illness



Space from

Eating Issues



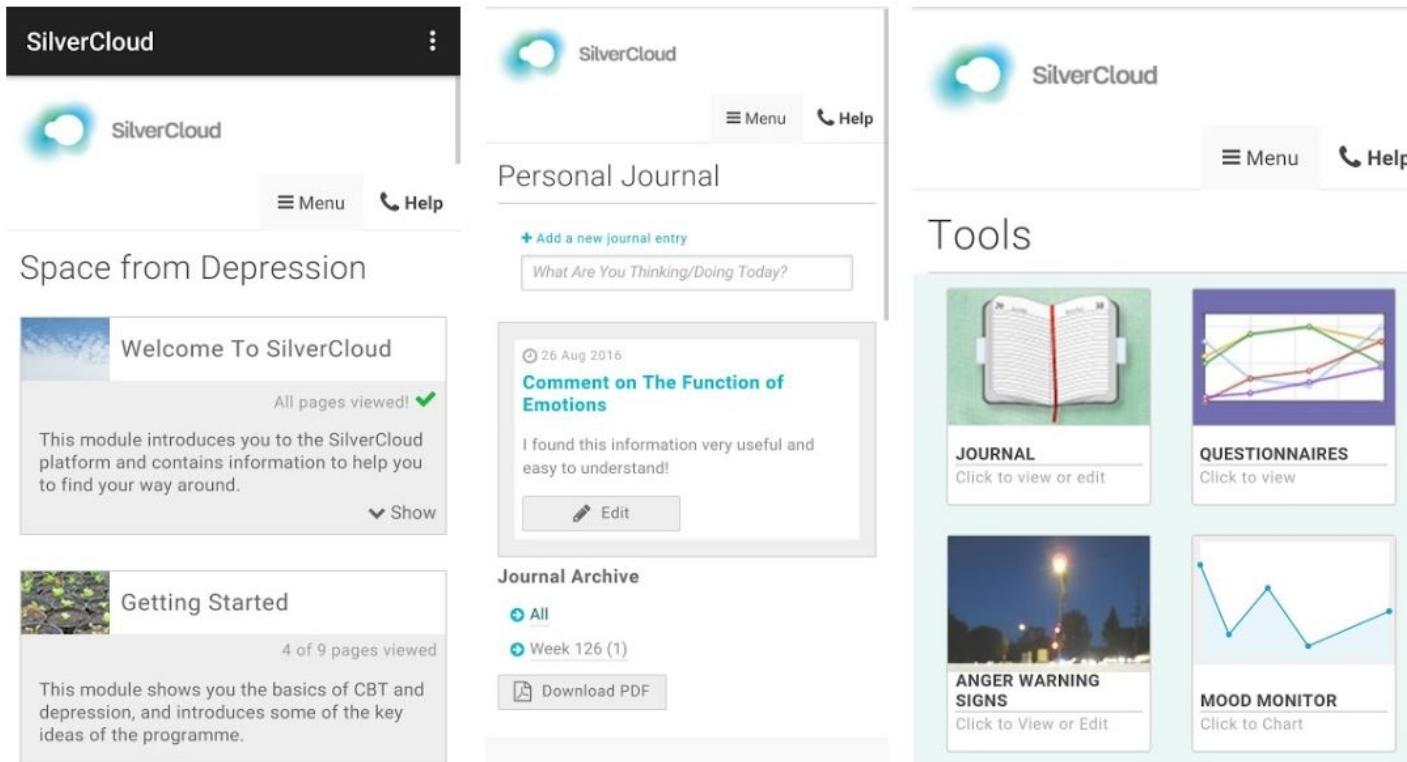
Space from

Stress



SilverCloud – An Introduction

-  Content: a “online course” like structure.
-  Tools: accessed any time.
-  Supporter



The image displays three screenshots of the SilverCloud platform:

- Dashboard:** Shows the "Space from Depression" module. It includes a "Welcome To SilverCloud" section with a message about viewing all pages and a "Getting Started" section with a message about viewing 4 of 9 pages.
- Personal Journal:** Shows a journal entry for "26 Aug 2016" titled "Comment on The Function of Emotions". It contains a note: "I found this information very useful and easy to understand!" and a "Edit" button.
- Tools:** Shows four tools: "JOURNAL" (represented by an open notebook icon), "QUESTIONNAIRES" (represented by a line graph icon), "ANGER WARNING SIGNS" (represented by a night scene with a street lamp icon), and "MOOD MONITOR" (represented by a line graph icon).



SilverCloud – Content



“Space” or program dependent, and “prescribed”.

The screenshot shows a module titled "Understanding Feelings" with a sub-header "1 of 10 pages viewed". The main text describes the module's purpose: "This module takes a closer look at moods and emotions. In this module you can explore different aspects of emotions, physical reactions, action and inaction, and see how they are all connected." Below the text is a list of ten topics, each with an icon and a brief description:

- ✓ Introduction
- ❓ Emotions & Your Body Quiz
- 📄 Understanding Emotion
- 📄 Physical Body Reactions
- 📄 Lifestyle Choices
- 👤 Personal Stories
- ⌚ The TFB Cycle
- 📍 Mapping Lifestyle Choices
- ⌚ Staying In The Present
- ⌚ Review





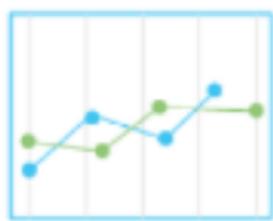
SilverCloud – Interactive Tools



Accessible anytime



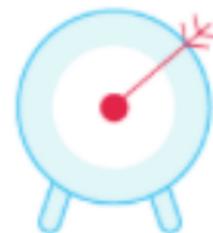
My Journal



Questionnaires



Backup and Support Network



Goals



Staying in the Present



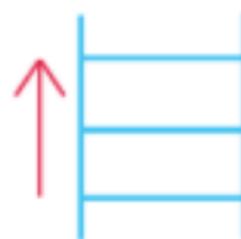
Goals



Mood Monitor



My TFB Cycles

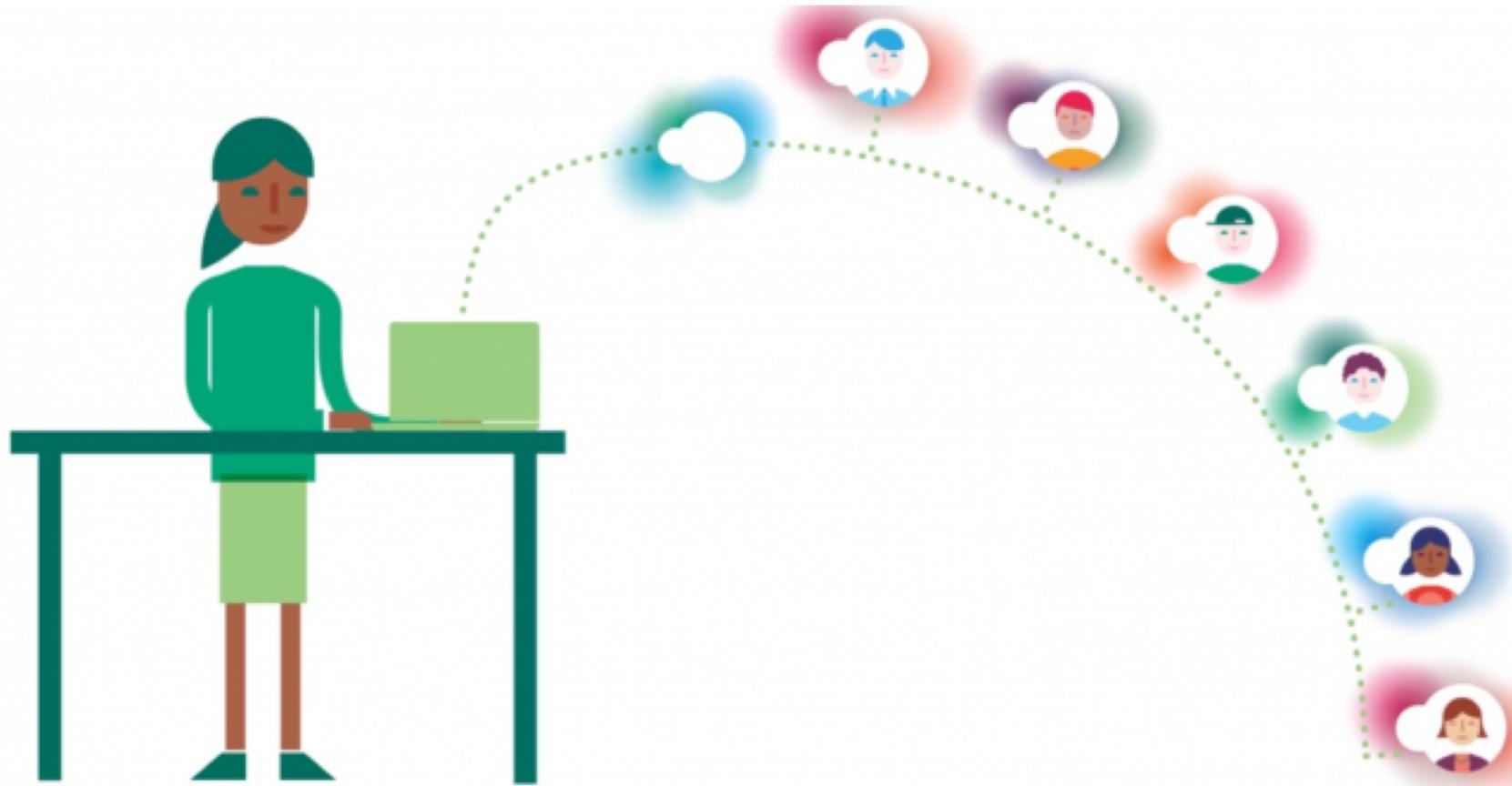


Hierarchy of Fears



SilverCloud – Supporter

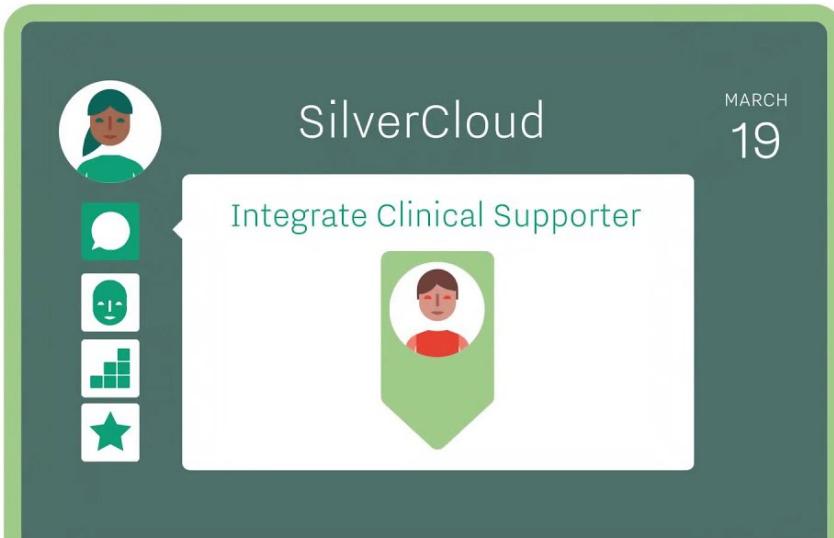
- 💡 Adherence and Attrition Issues
→ Human supporter
- 💡 Increased accountability



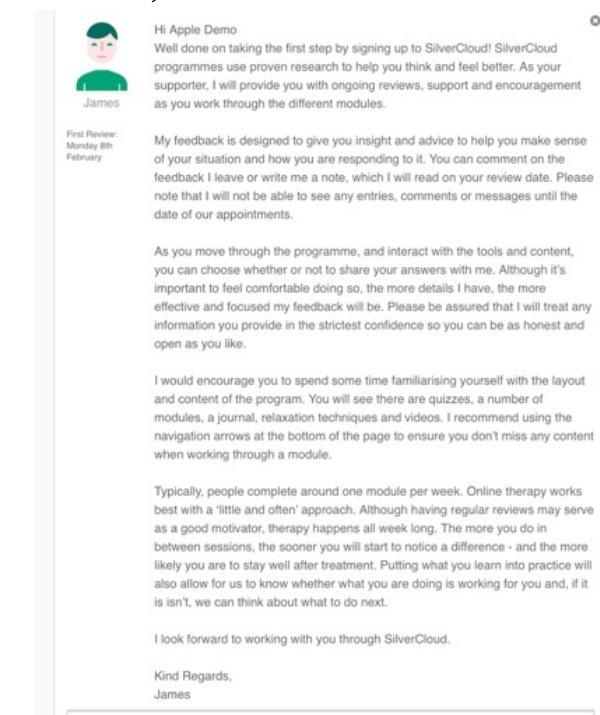


SilverCloud – Supporter (contd.)

-  Reviews progress weekly. Provides feedback.
 -  Should spend 10 min per message.
 -  Should send 6-8 such messages.
 -  Other guidelines (e.g. answer questions, promote engagement with platform, be positive)



The image shows a screenshot of the SilverCloud mobile application. At the top, there's a circular profile picture of a person with dark hair and a teal headband. To the right of the profile picture, the word "SilverCloud" is written in a white sans-serif font. Below this, the date "MARCH 19" is displayed. A large white speech bubble is centered in the middle of the screen. Inside the speech bubble, the text "Integrate Clinical Supporter" is written in a teal font. Below this text is another circular profile picture of a person with short brown hair and a red shirt. To the left of the main content area, there's a vertical column containing four icons: a white speech bubble, a green smiley face, a bar chart, and a gold star.



A screenshot of a mobile messaging interface. On the left, there's a small circular profile picture of a person with short brown hair. To the right of the picture, the name "James" is written. Above the name, the text "Hi Apple Demo" is displayed. Below the name, there's a timestamp "First Review: Monday 8th February". To the right of the profile picture, a block of text begins with "Well done on taking the first step by signing up to SilverCloud! SilverCloud programmes use proven research to help you think and feel better. As your supporter, I will provide you with ongoing reviews, support and encouragement as you work through the different modules." Further down, another block of text starts with "My feedback is designed to give you insight and advice to help you make sense of your situation and how you are responding to it. You can comment on the feedback I leave or write me a note, which I will read on your review date. Please note that I will not be able to see any entries, comments or messages until the date of our appointments." At the bottom of the message, there's a signature "I look forward to working with you through SilverCloud." and "Kind Regards,
James".

SilverCloud – Outcome-based

- 💡 Clients also fill out weekly surveys that measure symptoms of depression and anxiety.





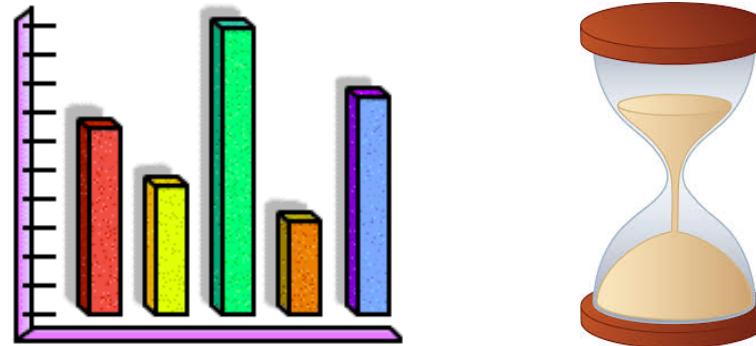
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Previous Work – In Short

-  Previous work focusses on duration and frequency of human support.



-  Little is known about how supporter behaviors impact client outcomes.



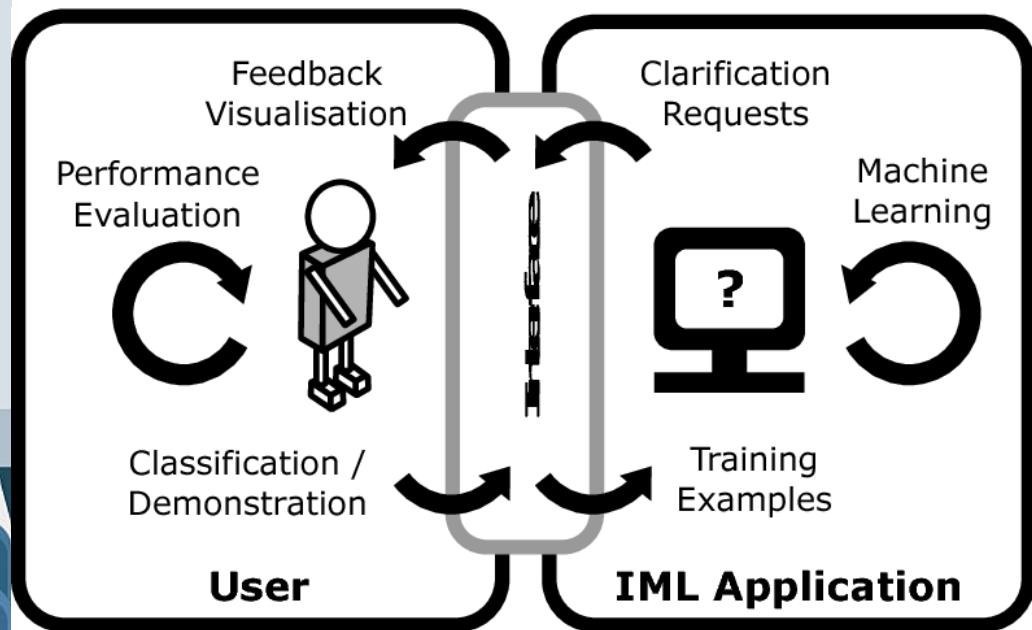


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Research Goal

- 💡 More nuanced understanding of supporter behaviors:
 - 💡 → Better Supporter Training.
 - 💡 → ML for Recommending Supporter Behavior.





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Dataset

- Space for Depression and Anxiety.
- >200,000 messages sent by ~3500 supporters to ~50,000 clients.



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Clustering Supporters
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Clustering Supporters – Method

Compute 4 outcome measures for each supporter and cluster them using K-means with K=3.

**Message-level
change**

**Client-level
change**

**Message-level
improvement rate**

**Client-level
improvement rate**



Clustering Supporters – Method (contd.)

1. Message-level Change (MC): Average change in scores across all messages sent by supporter s .
2. Message-level Improvement Rate (MR): Percentage of messages sent by supporter s that were followed by an improvement.



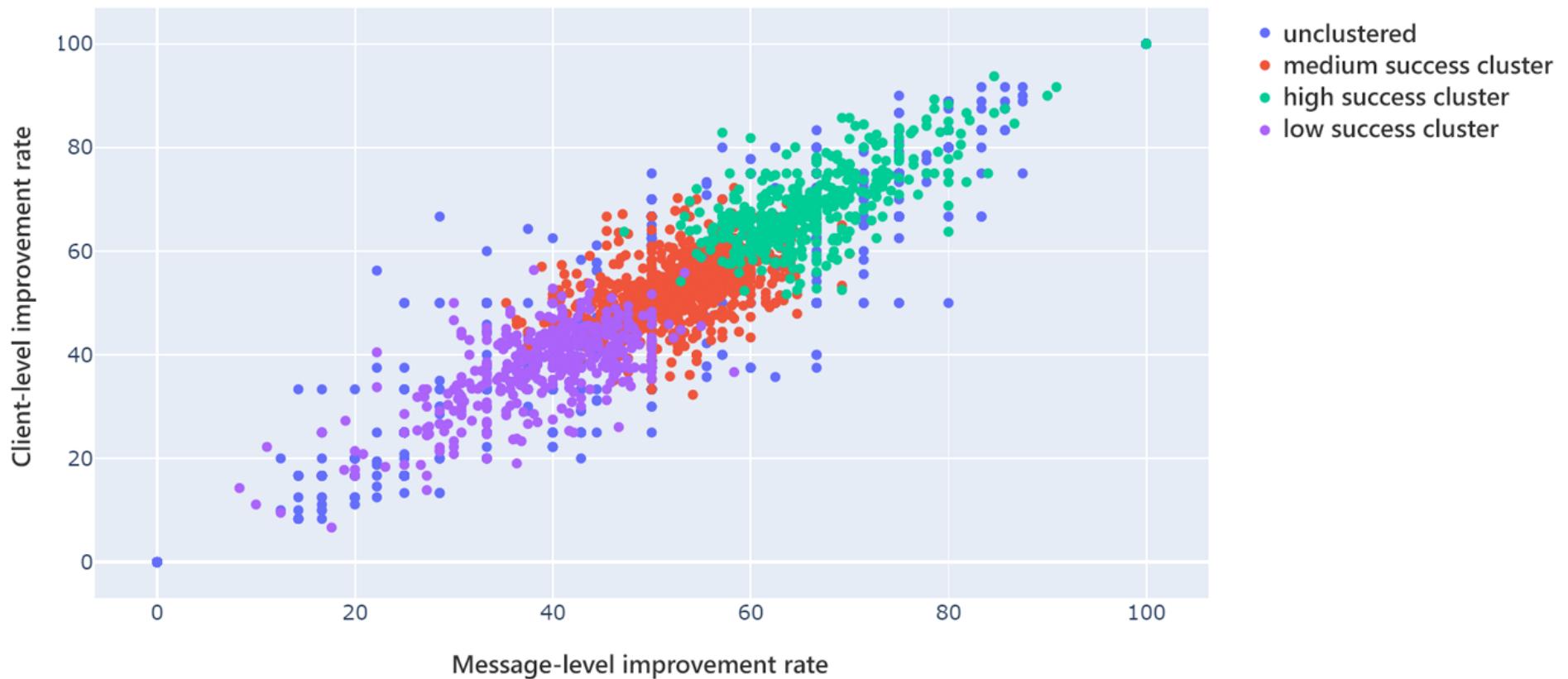
Clustering Supporters – Method (contd.)

Better account for client-level differences:

3. Client-level Change (CC): Compute Message-level Change for each client, and average it.
4. Client-level Improvement Rate (CR): Compute Message-level Improvement Rate for each client separately, and average it.

Clustering Supporters – Results

K-means with K=3





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Successful Support Strategies – Features

- Client <Context> Variables:
 - 5 Variables:
ContentViews,
Shared,
MessageNumber,
CurrentPHQ-9, and
CurrentGAD-7.
 - BINNED





Successful Support Strategies – Features (contd.)



Hi Apple Demo

Well done on taking the first step by signing up to SilverCloud! SilverCloud programmes use proven research to help you think and feel better. As your supporter, I will provide you with ongoing reviews, support and encouragement as you work through the different modules.

First Review:
Monday 8th
February

My feedback is designed to give you insight and advice to help you make sense of your situation and how you are responding to it. You can comment on the feedback I leave or write me a note, which I will read on your review date. Please note that I will not be able to see any entries, comments or messages until the date of our appointments.

As you move through the programme, and interact with the tools and content, you can choose whether or not to share your answers with me. Although it's important to feel comfortable doing so, the more details I have, the more effective and focused my feedback will be. Please be assured that I will treat any information you provide in the strictest confidence so you can be as honest and open as you like.

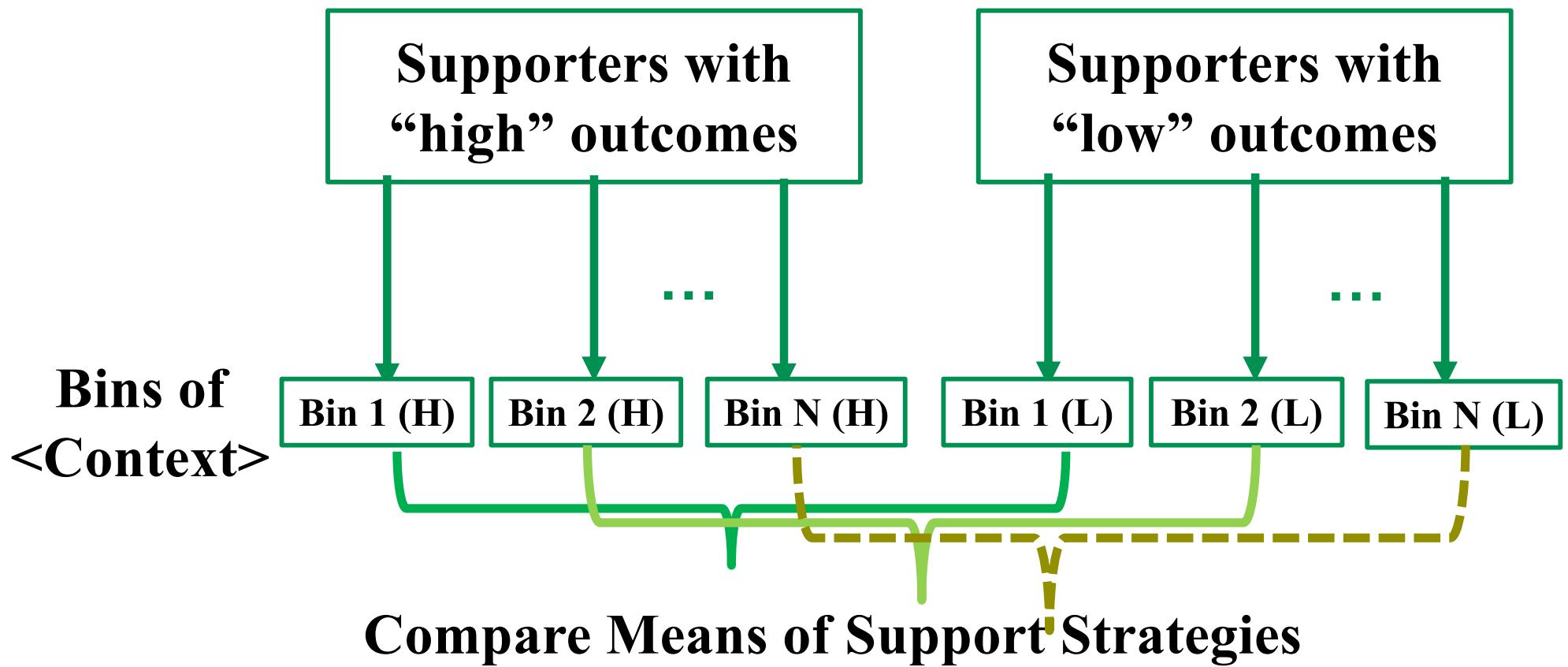


- Support <Strategy> Variables:
 - 23 variables calculated using validated lexicons and NLP techniques.
 - Can be divided into 6 categories: Sentiment, Emotion, Pronouns, Encouraging Phrases, Mental Processes & Behaviors, and Quantity.



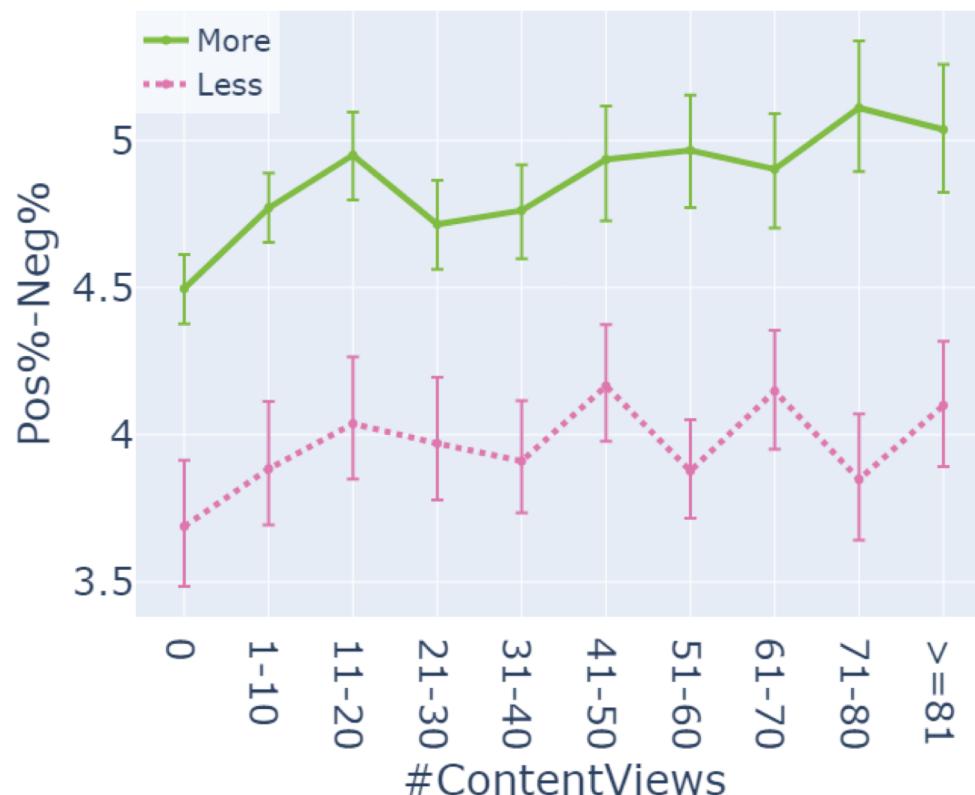
Successful Support Strategies – Method

- For each <context, strategy> pair ($NP=23*5=115$),
 - Divide messages as follows:



Successful Support Strategies – Results

- More successful messages had:
 - Used **more positive** and **less negative** words.
 - Used **less** words associated with negative emotions such as **sadness** and **fear**.



Successful Support Strategies – Results

- More successful messages had:
 - Used **more 1st person plural pronouns** (e.g. we), and had greater difference between frequencies of 1st person plural pronouns and 2nd person pronouns.



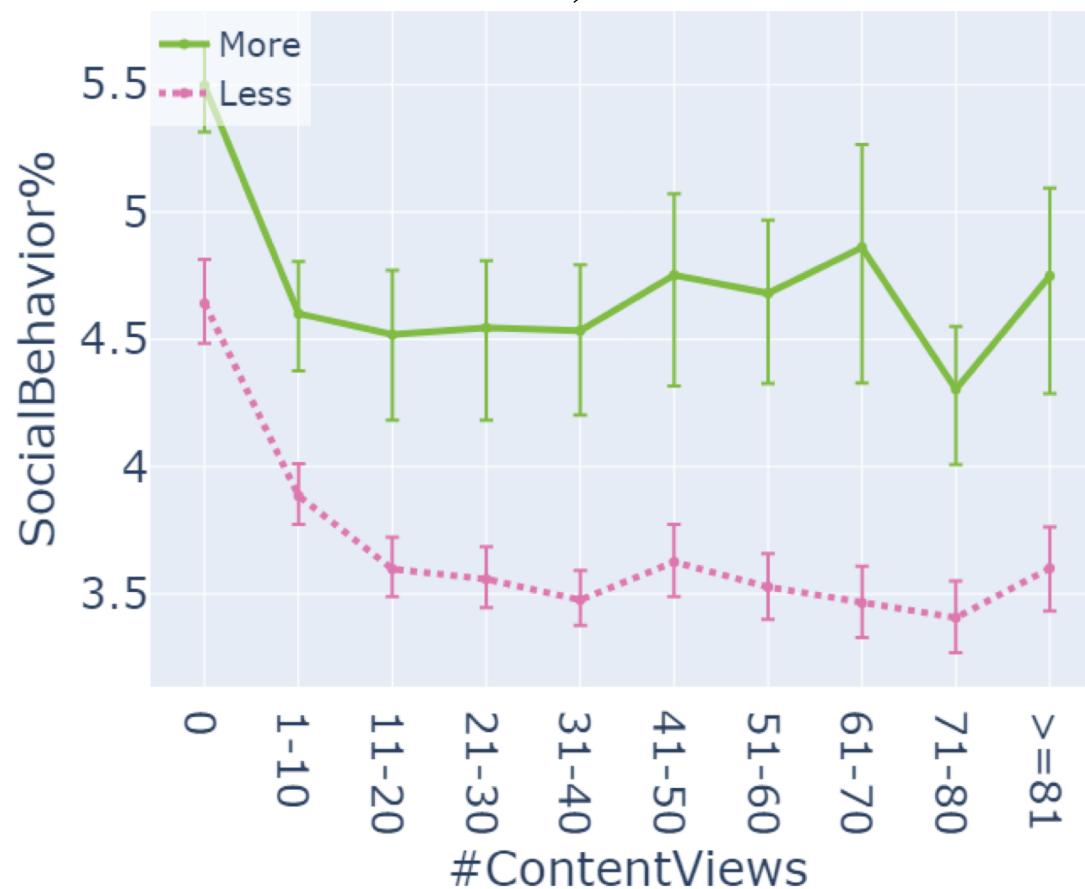


Successful Support Strategies – Results

- More successful messages had:
 - Used **more encouraging phrases** (e.g. well done, good job).

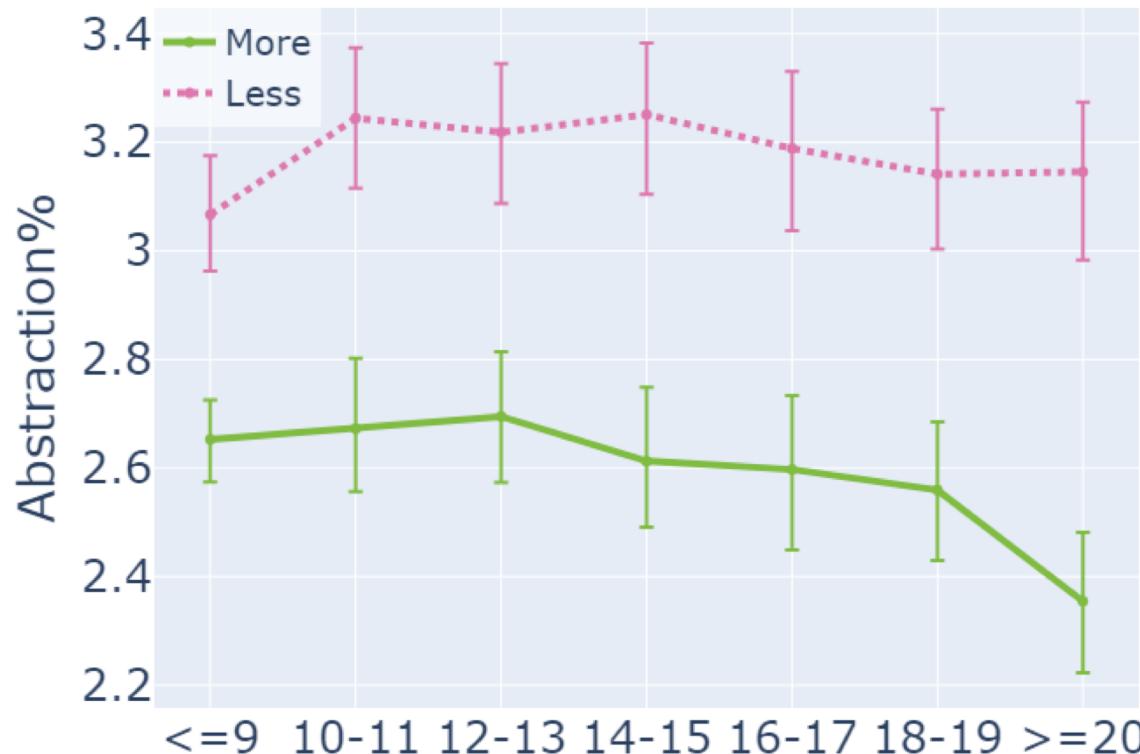
Successful Support Strategies – Results

- More successful messages had:
 - Used **more** words associated with **social behavior** (*E.g. help, call, discuss, and share.*)



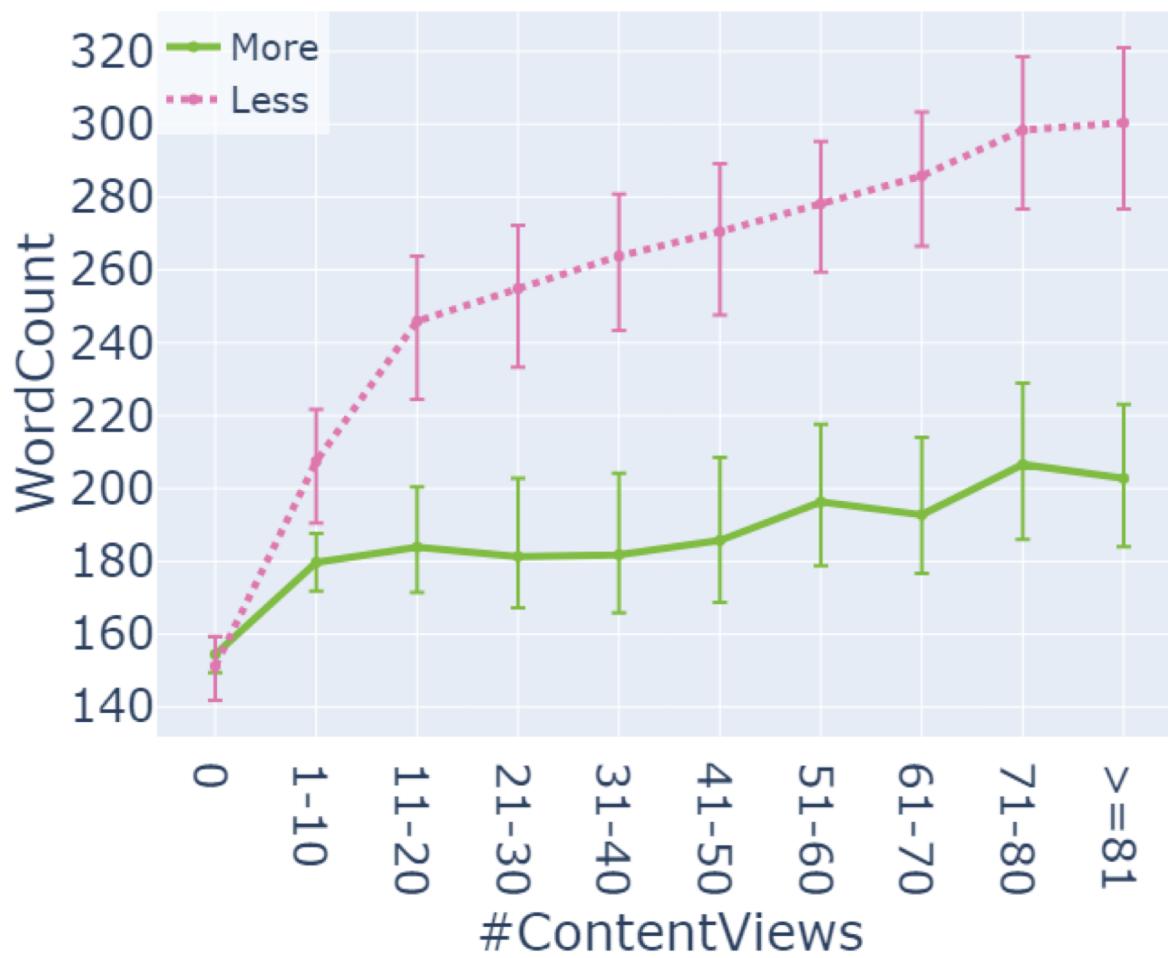
Successful Support Strategies – Results

- More successful messages had:
 - Used **less** words associated with **abstraction**.
(E.g. think/thought, know, understand, and learn)



Successful Support Strategies – Results

- More successful messages were shorter!





Outline

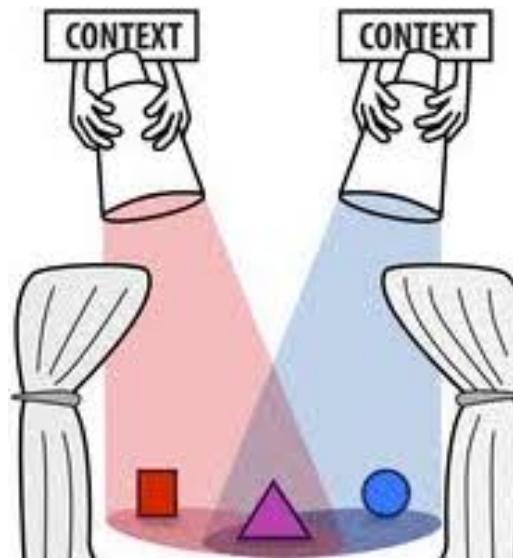
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Salient Context-Specific Support Strategies
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Salient Context-Specific Support Strategies

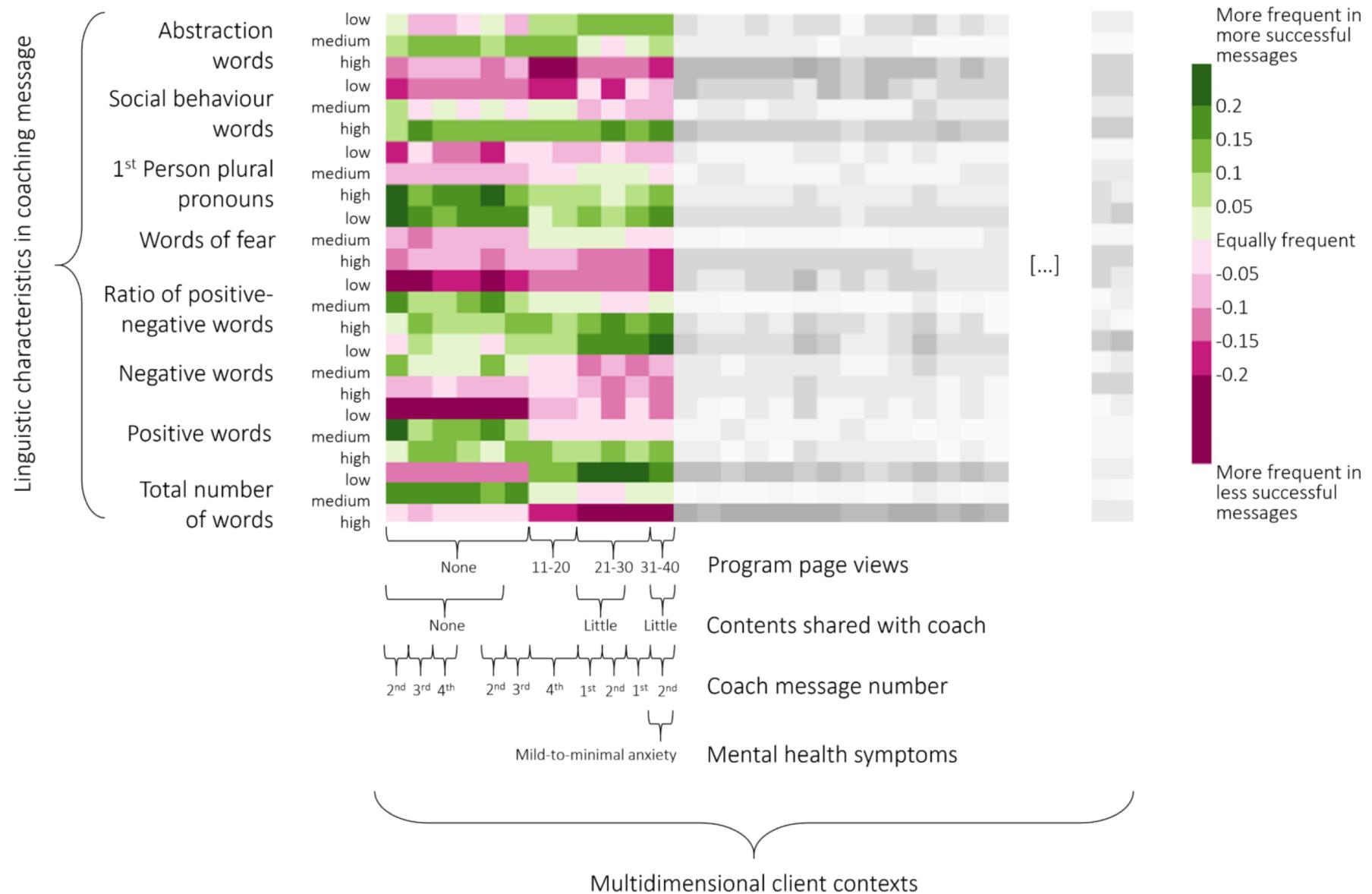
- Client Context, Supporter Behavior, and Client Outcomes → More complex relationship
 - E.g. Multidimensional Context.

Salient Context-Specific Support Strategies



- Multidimensional Context
 - How may considering the combination of multiple context variables shift how salient a specific support strategy is?
 - Interesting for personalization!

Salient Context-Spec. Supp. Strategies – Results



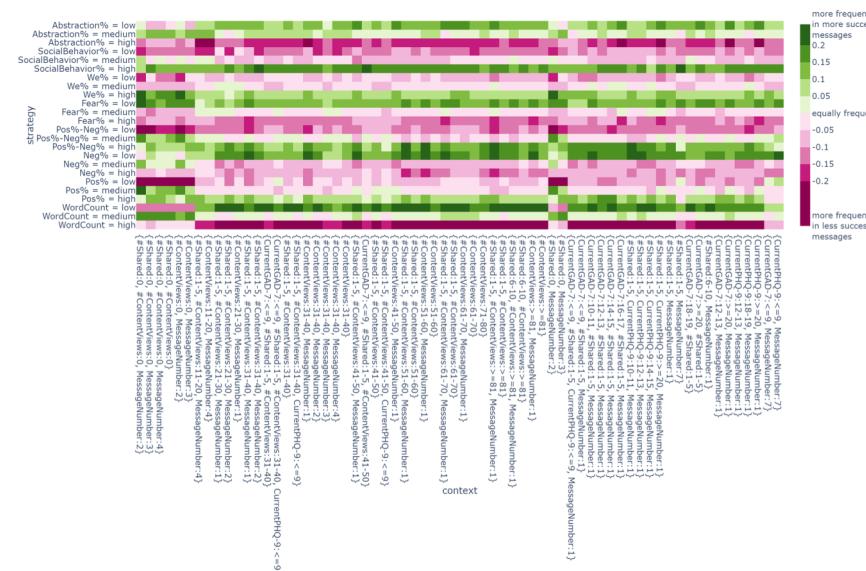
Salient Context-Spec. Supp. Strategies – Results





Salient Context-Spec. Supp. Strategies – Results

- For less engaged clients, writing longer, more positive and more supportive messages is linked with greater outcomes.
 - More engaged clients appear to benefit more from messages with less negative words, less abstraction, and more references to social behaviors.



See Paper! 



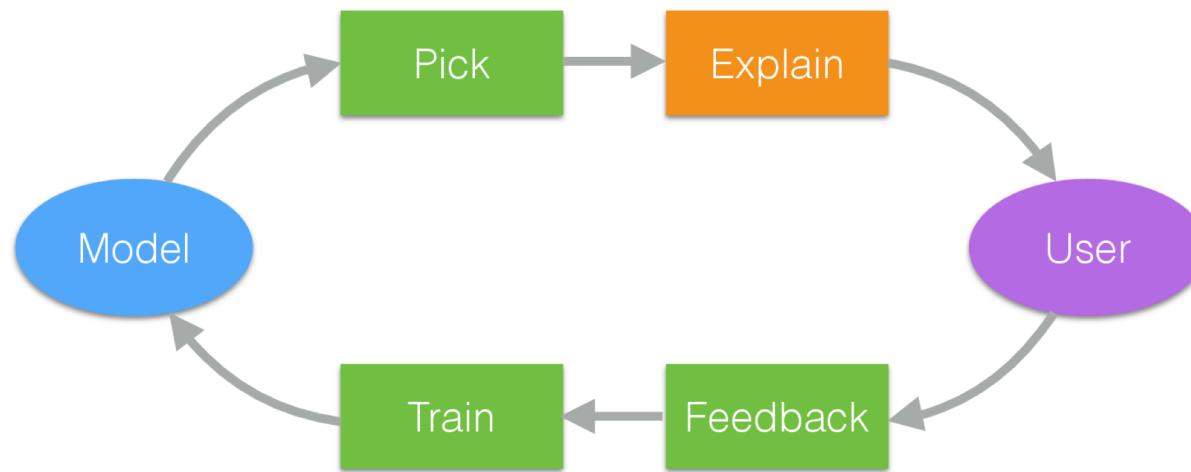
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Discussion – Conclusion

- Maintaining the Human Touch & Enhancing Supporter Agency
 - Genuine human connection important for working alliance.
 - Creates opportunities to empower supporters → better training or data-driven tools for supporters.



Boomerang
Respondable

Very unlikely
to receive a response

Subject Length ?
5

Word Count ?
280

Question Count ?
0

Reading Level ?
12+

ADVANCED FEATURES

Positivity ?
22

Politeness ?
73

Subjectivity ?
48



Thank you! 😊

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