

# Capstone Project Presentation



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Therapeutic Alliance

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# Agenda

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# Introduction

# What is Therapeutic Alliance (TA)?

- collaborative and affective bond between a therapist and a patient
- plays a pivotal role and predictor in the efficacy of psychological treatments



# Literature Review

01 Therapeutic alliance as a consistent predictor of successful treatment outcomes [1]

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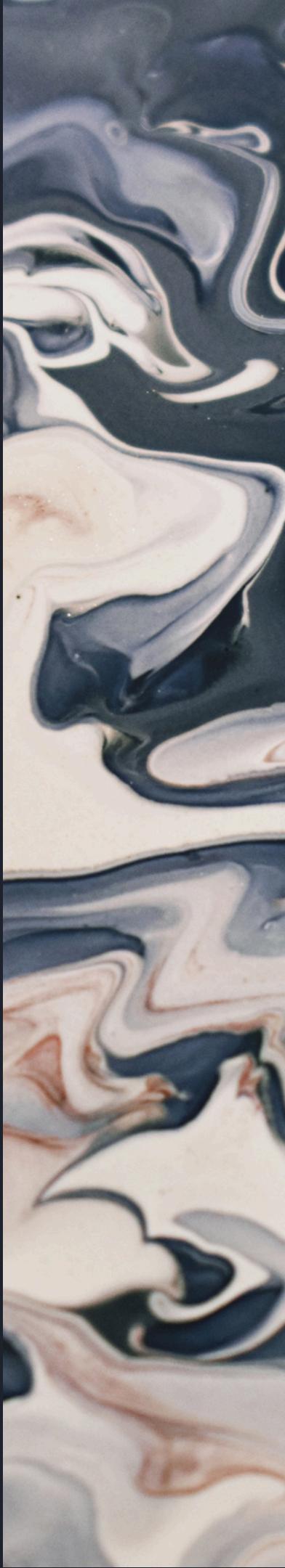
02 Personalized matching significantly improves psychotherapy outcomes compared to traditional assignment methods [2]

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03 Key factors : empathy, agreement on therapy goals, and mutual collaboration

## References:

1. Ardito, R.B., & Rabellino, D. (2011). Therapeutic alliance and outcome of psychotherapy: historical excursus, measurements, and prospects for research. *Frontiers in Psychology*, 2, 270.
2. Martin, D.J., Garske, J.P., & Davis, M.K. (2000). Relation of the therapeutic alliance with outcome and other variables: A meta-analytic review. *Journal of Consulting and Clinical Psychology*, 68(3), 438.



# Therapeutic Alliance Assessment (BR-WAI)

1 = Strongly Disagree

2 = Disagree

3 = Neutral

4 = Agree

5 = Strongly Agree



My therapist and I understand each other.



We have established a good understanding of the kind of changes that would be good for me.



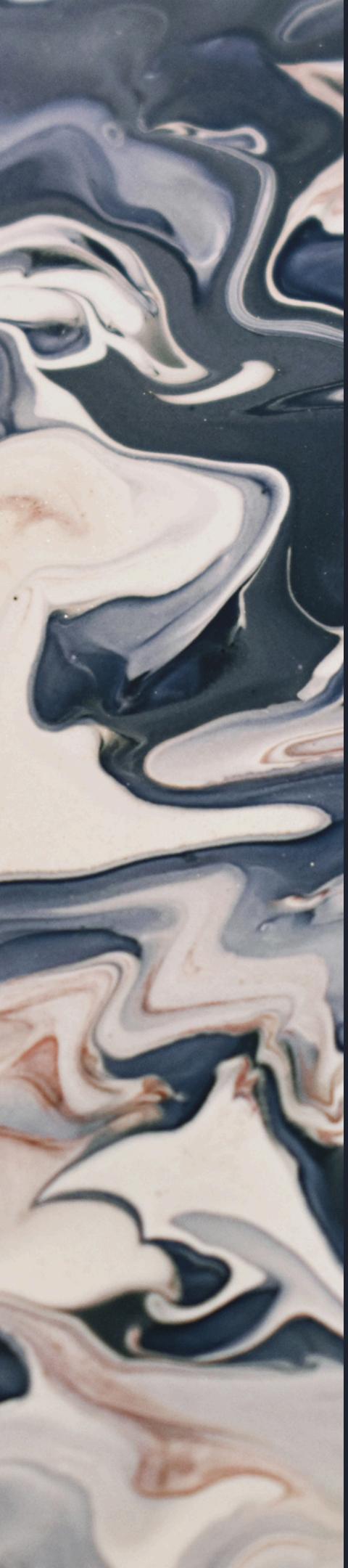
I feel that my therapist appreciates me.



I believe the time my therapist and I are spending together is not spent efficiently.



I believe my therapist likes me.



# GreenSpace Mental Health

- Comprehensive Measurement Based Care (MBC) platform tailored for mental health professionals and clients.
- Measurement-Based Care involves tracking client progress throughout treatment, using consistent Patient-Reported Outcome Measures (PROMS).

# Demo

Ravi Poole

Print Save

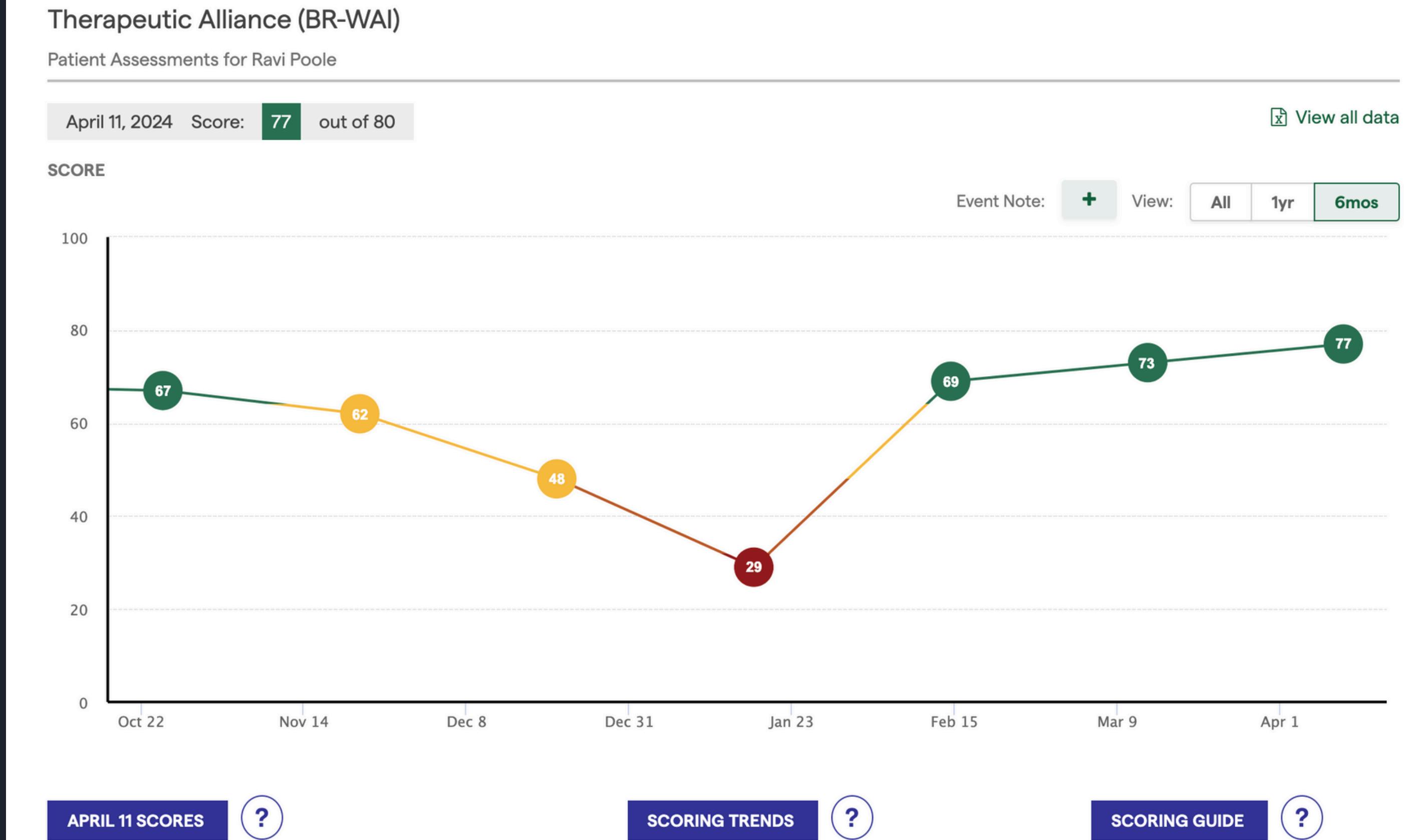
Results Notes Manage Profile Patient Access

### Assessments

+ Add Assessments

	FREQUENCY	LAST COMPLETION	OUTSTANDING	NEXT DELIVERY
Depression (PHQ 9) <span>edit</span> <span>x</span> Clinical Symptoms	Manual	April 11	-	-
Generalized Anxiety (GAD 7) <span>edit</span> <span>x</span> Clinical Symptoms	Manual	April 09	-	-
Work and Social Functioning (WSAS) <span>edit</span> <span>x</span> Functioning	Manual	March 26	-	-
Therapeutic Alliance (BR-WAI) <span>edit</span> <span>x</span> Therapeutic Alliance	Manual	April 11	-	-

# Demo



# Demo

Intro: Your thoughts or feelings may undergo changes over a period of time, but we would like to know your views or feelings as of right now.		Apr 11	Oct 26	Nov 23	Dec 21	Jan 18	Feb 15	Mar 14	Apr 11
<b>1</b>	Bonds: We understand each other	5	4	4	3	2	5	5	5
<b>2</b>	Goals: We have good understanding of goals	5	4	4	4	1	4	5	5
<b>3</b>	Bonds: I feel that my therapist appreciates me	5	4	4	3	2	4	5	5
<b>4</b>	Goals: Time in session is not spent efficiently *	5	5	3	1	0	2	3	5
<b>5</b>	Bonds: I believe my therapist likes me	4	4	4	3	3	3	3	4
<b>6</b>	Goals: Therapy gives me new perspectives on my	5	3	3	2	2	4	4	5
<b>7</b>	Bonds: My therapist cares about me (even when I	5	5	3	4	1	5	5	5
<b>8</b>	Goals: My therapist doesn't understand my goals	4	4	4	2	1	4	4	4
<b>9</b>	Bonds: Confident in my therapist's ability to help me	5	3	4	2	5	5	5	5
<b>10</b>	Goals: I believe therapy will help accomplish the c	5	3	4	4	2	5	5	5
<b>11</b>	Bonds: My therapist and I trust each other	4	4	2	4	2	4	4	4
<b>12</b>	Goals: I disagree with my therapist about goals of	5	5	5	4	1	5	5	5
<b>13</b>	Bonds: I believe my therapist is concerned for my	5	5	5	4	2	5	5	5
<b>14</b>	Goals: We agree on what is important to work on	5	5	4	3	1	4	5	5
<b>15</b>	Bonds: My therapist and I respect each other	5	4	4	3	1	5	5	5
<b>16</b>	Goals: The tasks given by my therapist don't make	5	5	5	2	3	5	5	5
Total Score		77	67	62	48	29	69	73	77
Subtotals			33	30	26	18	36	37	38
<b>Bonds</b>		38	34	32	22	11	33	36	39
<b>Tasks and Goals</b>		39							

\* The items with an asterisk are reverse scored?

Back
Forward

**Individual Responses**

1 - Strongly Disagree  
 2 - Disagree  
 3 - Neutral  
 4 - Agree  
 5 - Strongly Agree

**Questions 4, 8, 12, 16:**

1 - Strongly Agree  
 2 - Agree  
 3 - Neutral  
 4 - Disagree  
 5 - Strongly Disagree

**Symptom Severity**

Research does not provide any specific titles or guidance for scores on the BR-WAI. The higher the score on the BR-WAI, the stronger the therapeutic alliance. A score of 48 represents a neutral alliance, and can be considered a midpoint.

16-31	32-47	48-63	64-80
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# **Research Question & Motivation**

What needs to happen for the  
Therapeutic Alliance score  
between patient and therapist to  
be high?



# Connecting Patients with likely successful Therapists

## Manage Providers - Adam Chris

Search for therapists

Douglas Allen - demo+therapist6@greenospacehealth.com	80% Match
Hannah Bowman - demo+therapist9@greenospacehealth.com	80% Match
James Salter - demo+therapist4@greenospacehealth.com	80% Match
Joshua Clark - demo+therapist8@greenospacehealth.com	80% Match
Marc Williams - demo+therapist10@greenospacehealth.com	

Douglas Allen new    demo+therapist6@greenospacehealth.com    ABC Organization    ✖ Remove

Share progress notes with shared providers? ? \*

Yes     No

I acknowledge that I have received consent from the patient to share their account with the provider(s) listed above.\*

# **Data & Data Cleaning**

# Dataset Overview

15 tables, 260k ~ 20m rows

## ASSESSMENTS

- ASSESSMENT\_ID
- PARTICIPANT\_ID
- DISPLAY\_NAME
- CODE
- ...

## TAGS

- TAG\_ID
- PATIENT\_ID
- SLUG
- ...

## PATIENTS

- PATIENT\_ID
- PARTICIPANT\_ID
- THERAPEUTIC\_ALLIANCE\_SCORE
- PATIENT\_TYPE
- INOFFICE
- ...

## THERAPISTS

- THERAPISTS\_ID
- THERAPEUTIC\_ALLIANCE\_SCORE

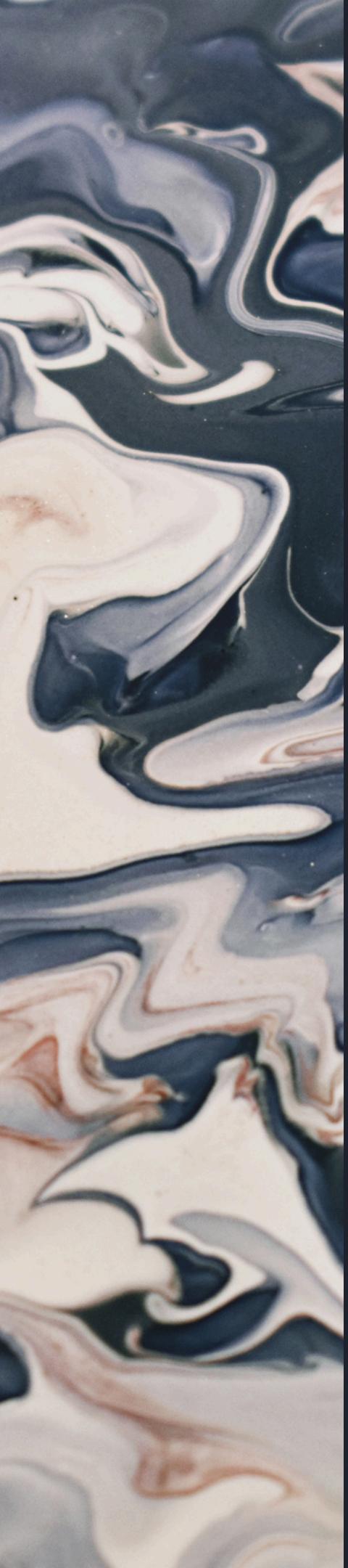
## QUESTIONS & RESPONSES

- QUESTION\_ID
- RESPONSE\_ID
- PATIENT\_ID
- QUESTION\_TITLE
- RESPONSES
- SCORE\_NORMALIZED
- SUICIDALITY\_FLAG
- ...



# Identify Predictors

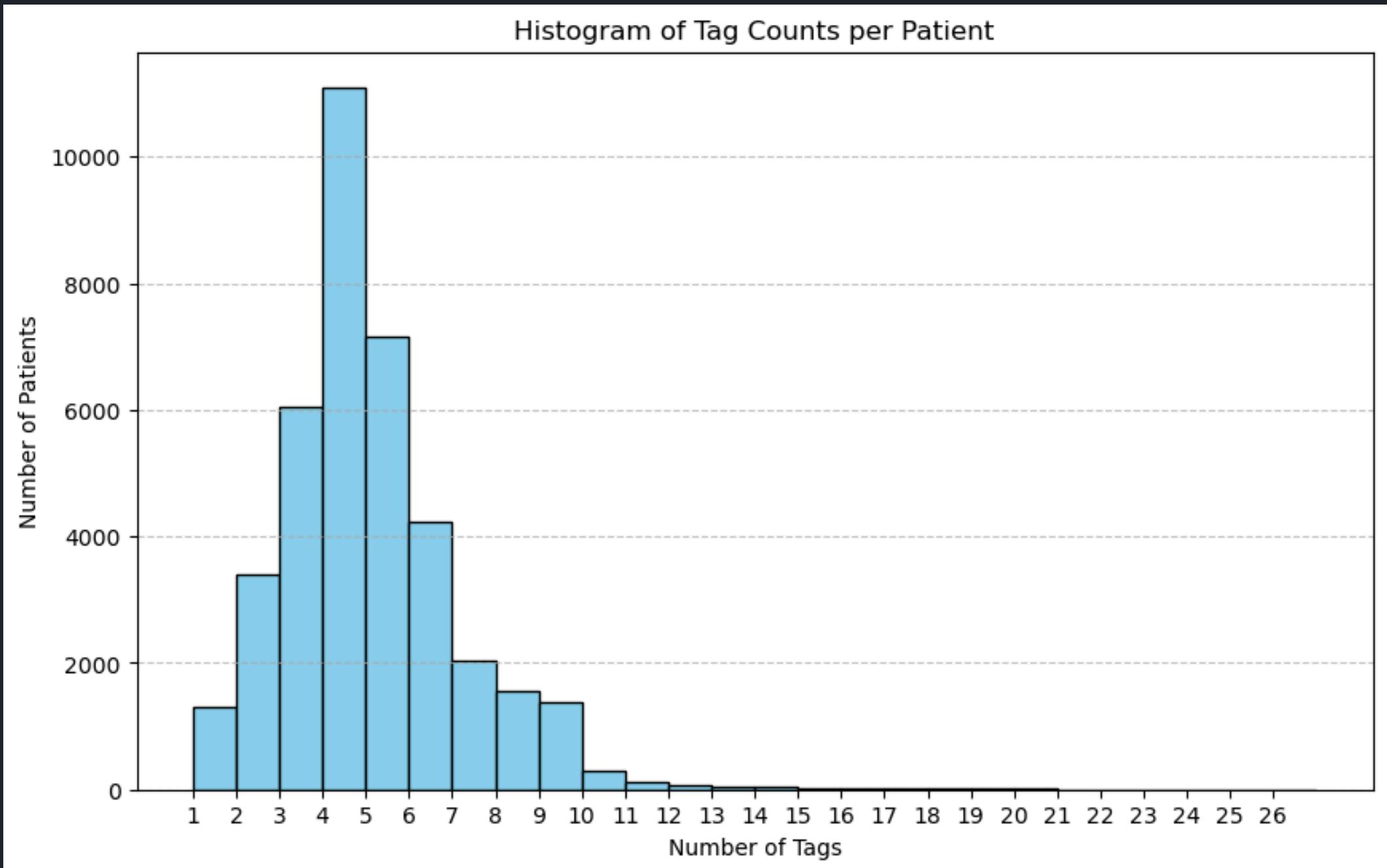
- Initial Assessment Scores
- Assessment Completed Rate
- Patient Demographic
  - via assessments assigned
  - via response table
  - via tags assigned
- Treatment Received
  - via tags assigned



# Assessments as Predictor

- Initial Assessment Scores
  - extract first assessment score by date
  - average the scores
- Assessment Completed Ratio
  - $\# \text{ completed assessments} / \# \text{ total assessments}$
- Main Diagnosis
  - most frequently assessment given for each patient
  - depression/anxiety/eating disorder/substance addiction/post-traumatic stress disorder etc
  - challenges

# Tags as Predictor



- Diagnosis (22 Conditions)  
Depression/Anxiety/Bipolar  
/ADHD/OCD/...
- Modality (11 Approaches)  
CBT/DBT/Mindfulness/...
- Other Demographics
  - 1. Identify various categories and keywords associated with them.
  - 2. Assign tags to these categories based on keyword matching.

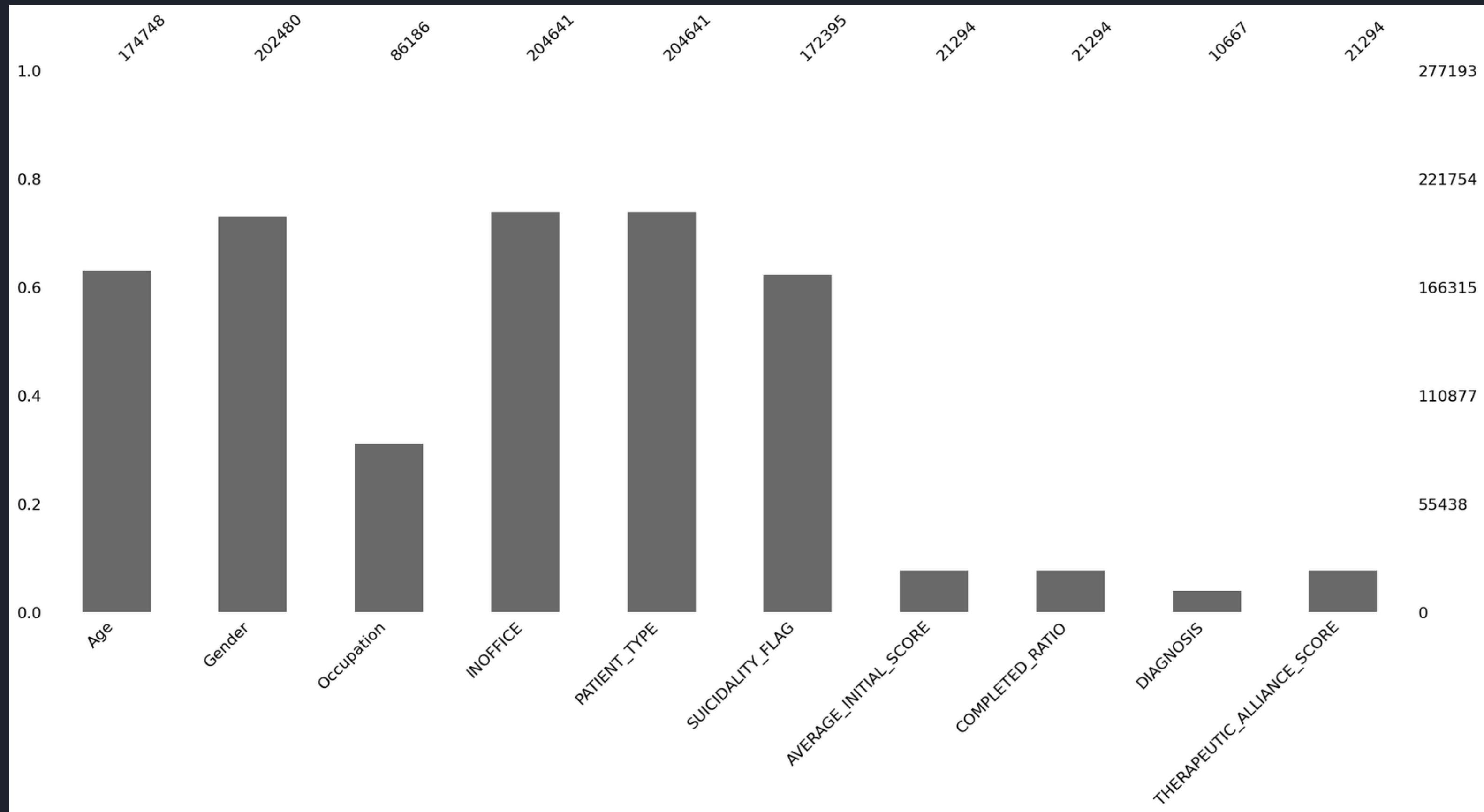
# Responses as Predictor

- General Demographic (Most Frequency Questions)
  - Age, Gender, Occupation, Mother Tongue, Ethnicity
- Significant Behaviors (Big Clinic Questions)
  - Suicide Attempt
  - Violent Behaviour
  - Deliberate Self-Harm
  - Homicidal Threats
  - Experiencing Violence



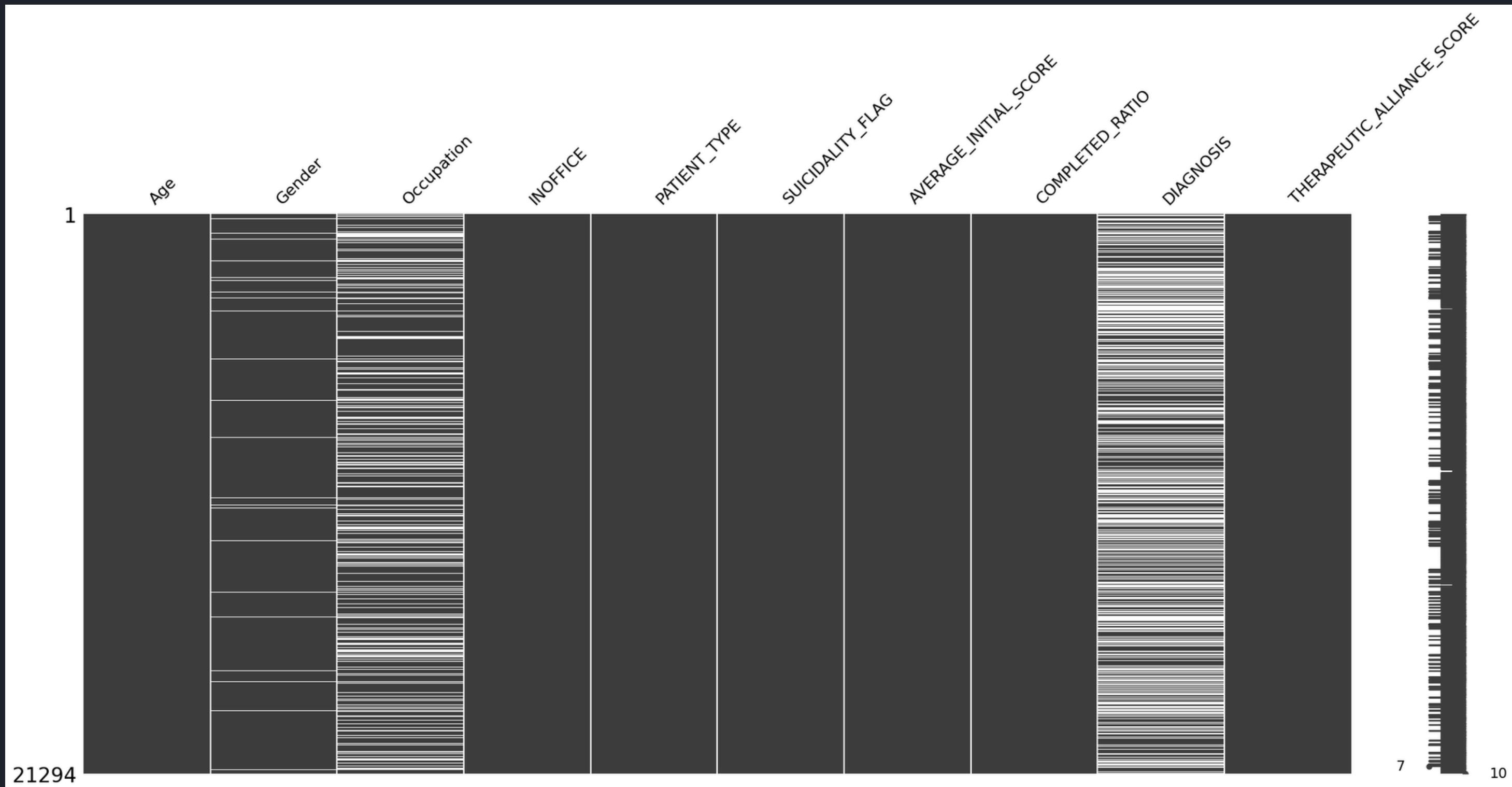
<b>THERAPEUTIC_ALLIANCE_SCORE</b>	<b>Numeric</b> score quantifies therapeutic relationship between a therapist and their patient <b>Response Variable</b>
<b>PATIENT_TYPE</b>	<b>Binary</b> variable indicates whether the patient is Adult or Child
<b>INOFFICE</b>	<b>Boolean</b> value indicates whether the patient's sessions are conducted in person
<b>SUICIDALITY_FLAG</b>	<b>Boolean</b> value indicates whether the patient has suicidal tendencies
<b>AVERAGE_INITIAL_SCORE</b>	<b>Numeric</b> value calculated average patient initial assinged assessment
<b>COMPLETED_RATIO</b>	<b>Numeric</b> value calculated assessment completed ratio
<b>DIAGNOSIS</b>	<b>Categorical</b> variable classified patients diagnosis into 12 groups
<b>Age</b>	<b>Integer</b> value calculated ages between 0-100
<b>Gender</b>	<b>Categorical</b> variable classified Female, Male or Other
<b>Occupation</b>	<b>Categorical</b> variable classified into 9 groups

# Count of rows



# Missing Data (NAs)

- Removed NAN THERAPEUTIC\_ALLIANCE\_SCORE
- Unrecorded Data



# **Models & Results**

# Different Feature Selections Model Result

Stage 1

Initial\_Assessment\_Score, Assessment code -> TA Score

Linear Regression

- MSE: 250.20
- R Squared: 0.160
- Adjusted R Squared: 0.159

Random Forest

- MSE: 262.08
- R Squared: 0.12
- Adjusted R Squared: 0.12

# Different Feature Selections Model Result

## Stage 2

Patient Age, Gender, Occupation, Mother Tongue, Ethnicity, Suicide Attempt, Violent Behaviour, Deliberate Self-Harm, Homicidal Threats, Experiencing Violence, Completed Assessment Ratio, Tag  
-> TA Score

### Random Forest

- MSE: 262.35
- R Squared: 0.098
- Adjusted R Squared: 0.097

### Ridge Regression

- MSE: 285.12
- R Squared: 0.019
- Adjusted R Squared: 0.019

### Lasso Regression

- MSE: 286.35
- R Squared: 0.015
- Adjusted R Squared: 0.014

### Decision Tree

- MSE: 279.49
- R Squared: 0.039
- Adjusted R Squared: 0.038

### Linear Regression

- MSE: 250.20
- R Squared: 0.160
- Adjusted R Squared: 0.159

# Different Feature Selections Model Result

Stage 3  
(Current Stage)

Patient Age, Gender, Occupation, Initial\_Assessment\_Score\_AVG,  
INOFFICE, PATIENT\_TYPE, SUICIDALITY\_FLAG, COMPLETED\_RATIO,  
DIAGNOSIS  
-> TA Score

Random Forest  
(NaN filled by most\_frequent value)

- MSE: 192.772
- R Squared: 0.32
- Adjusted R Squared: 0.31

Random Forest  
(Row dropped if NaN)

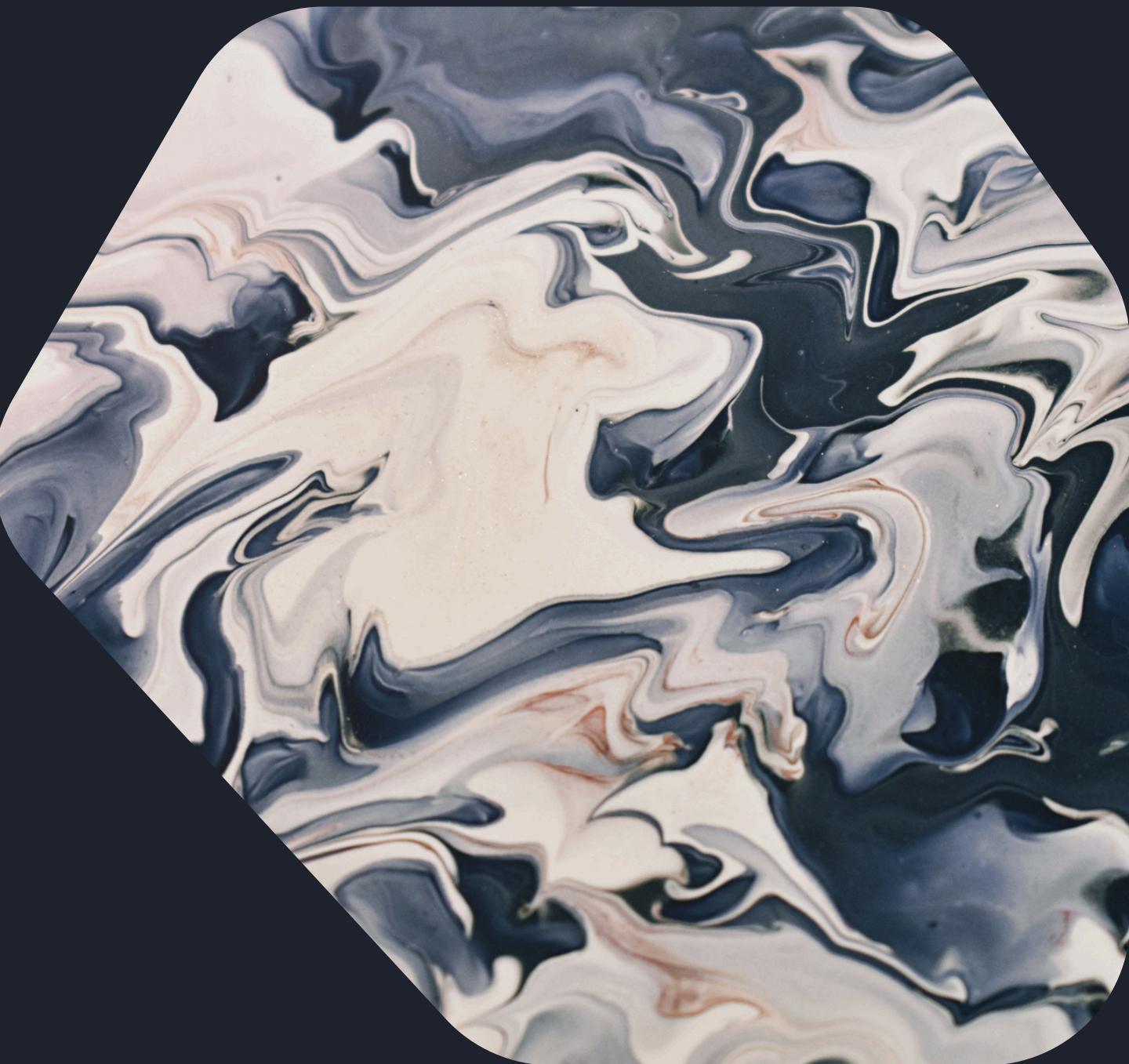
- MSE: 220.18
- R Squared: 0.20
- Adjusted R Squared: 0.19

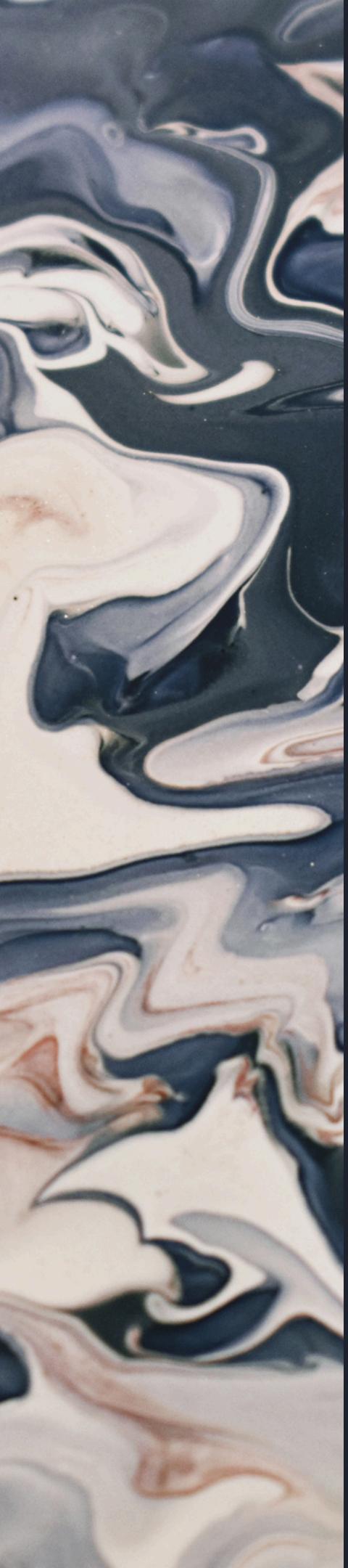
Lasso + Random Forest Regression

- MSE: 222.38
- R Squared: 0.198
- Adjusted R Squared: 0.191

# Summary

- Fail to identify useful predictors for TA
- Complicated nature of TA
  - therapist factors
  - treatment factors
  - relationship factors
- Weakness of this dataset
  - lots of open-ended questions
  - tailored tags and questions by every clinic
  - lots of missing data
  - lack of therapist demographic





# Next Steps

## Therapist Match

- which therapists is seeing improvement for patients of a specific assessment

## Other Match Logic

- high average TA (therapeutic alliance score)
- high average TA of clients with similar characteristics
- low caseload
- improvement within 6 sessions with patients of similar characteristics
- success with 5 similar patients based on their clinical outcomes

The background of the slide features a detailed marbled pattern. It consists of intricate, swirling veins of dark blue, light blue, white, and hints of orange and brown on a dark, textured base. The pattern is organic and fluid, resembling water or stone.

**Thank you!**