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Manuscript 1062

PIC Math Report Youth In Need

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PIC Math Report Youth In Need

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1 Introduction

Youth in Need is a nonprofit that offers mental and physical health resources to kids under the age of 19 in the St. Charles area. They have been in operation for 50 years. Youth in Need is concerned that their services may have been negatively impacted by the pandemic. They have asked Lindenwood's PIC Math group to review their data over 2015-2023 and identify trends. This is an important matter since identifying these trends may help the client optimize their resources. This could lead to furthering Youth in needs mission of service for the community. So far, the group has identified trends when the intake of new clients occurs as well as trends between the counselors' client-scores and clients' self-scores at the beginning and end of treatment. The group has also identified improvements to the questionnaire used to determine the youth's risk score.

2 Youth In Need

Youth In Need is a local organization in St. Louis, Missouri that provides direct service and support programs to the youth. Their mission is, "To build on the strengths of children, youth and families so they find safety, hope and success in life." Their vision is, "Equitable opportunities so children, youth and families in our region can thrive." They pursue their vision and mission by providing counseling sessions where the client rates themselves on a 40-point ORS scale which includes four 10-point questions:

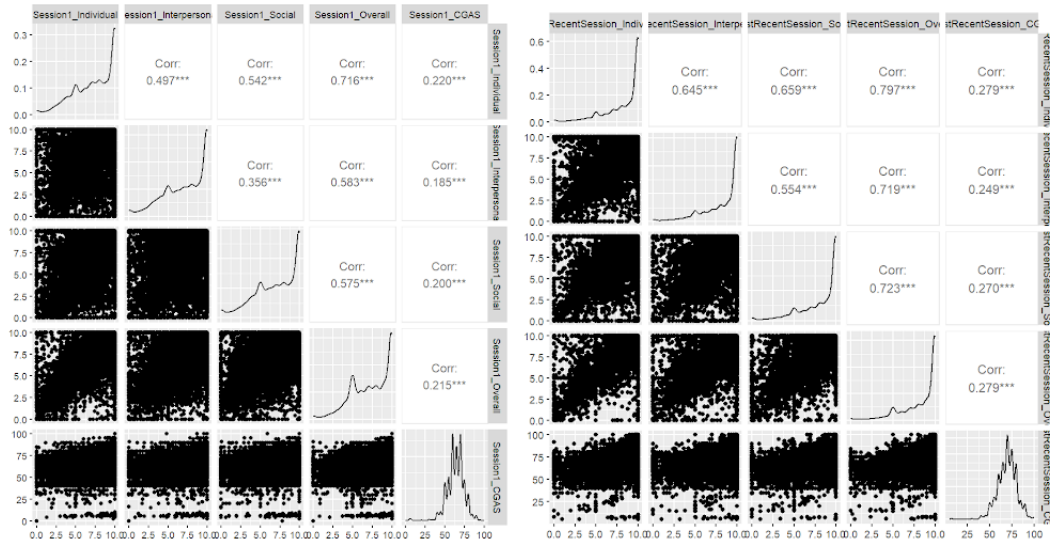
- Individual: Personal well-being
- Interpersonal: Family, close relationships
- Social: Work, school, friendships
- Overall: General sense of well-being

Additionally, the therapist rates the client on a risk rating/CGAS scale:

Risk Rating	CGAS Score
1 (High Risk)	1 – 14 Extremely Impaired
2 (High Risk)	15 – 24 Very Severely Impaired
3 (High Risk)	25 – 34 Severe Problems
4 (High – Moderate Risk)	35 – 44 Serious Problems
5 (Moderate Risk)	45 – 54 Obvious Problems
6 (Moderate Risk)	55 – 64 Some Noticeable Problems
7 (Moderate – Low Risk)	65 – 74 Some Problems
8 (Low Risk)	75 – 84 Doing Alright
9 (Low Risk)	85 – 94 Doing Well
10 (Low Risk)	95 – 100 Doing Very Well

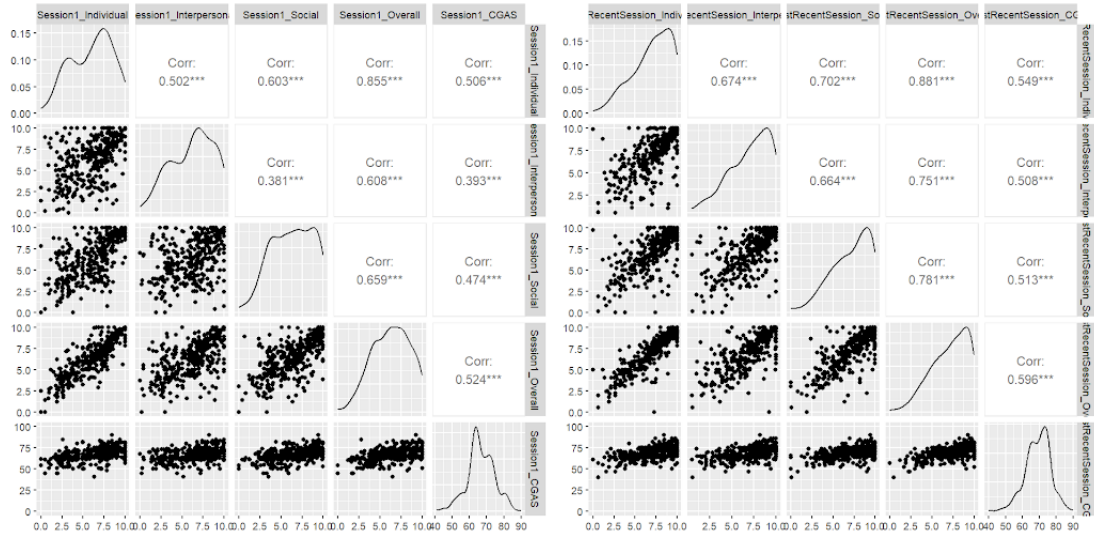
The industry liaison from Lindenwood University is Wendi Price, the Manager for Service Learning and Responsible Citizenship in Engaged Learning, Academic Affairs. The industry liaisons from Youth In Need are Stephanie Blakley, Continuous Quality Improvement Manager; Cara Merritt, Senior Director of Counseling Services; and Erin Strohbahn, Senior Director of Youth Programs.

3 Graphs



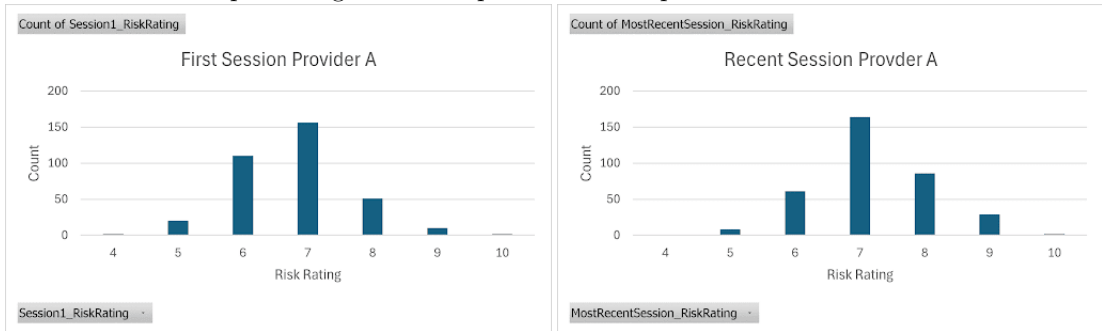
(1) Correlation plots for Session 1 and Most Recent Session

Correlation plots were created using all of the data points provided for the client counseling sessions, roughly 19,000, but we removed around 4,300 data points due to data entry errors. The graph yields frequency plots horizontally, correlation coefficients in the upper right diagonal, and plots in the lower left diagonal. There was a high correlation coefficient between Overall and Individual in both Session 1 and Most Recent Session. Similarly, in the Most Recent Session, every correlation coefficient increased. Also, in the frequency plots, the distribution shifted to the right in the Most Recent Session. Lastly, in the bottom row, which plots each individual ORS score against the CGAS, there is a clear line at the 40 mark, and also one above 0.



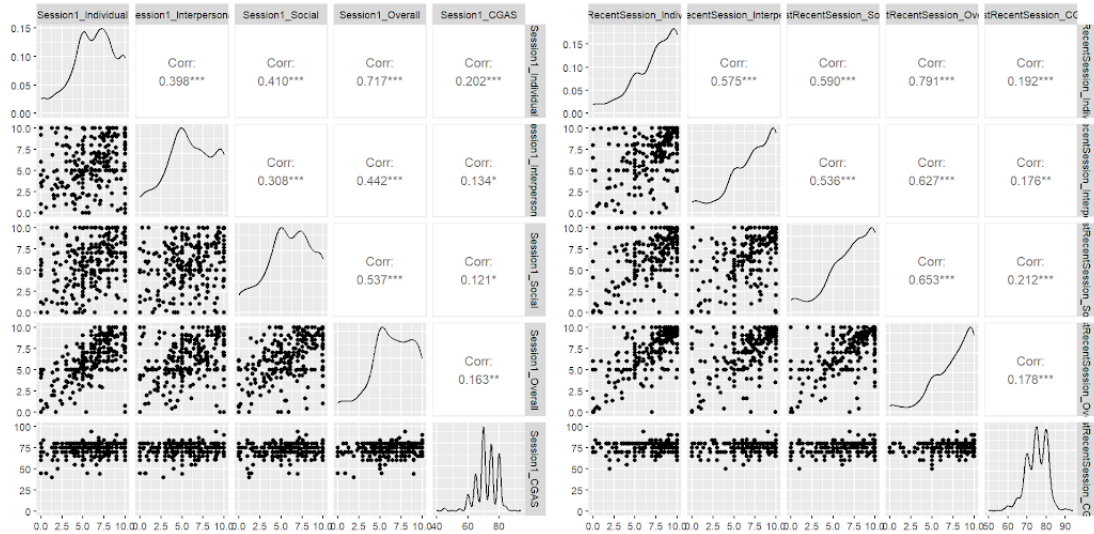
(2) Correlation plots for Therapist A

Similar correlation plot using data from particular therapist.



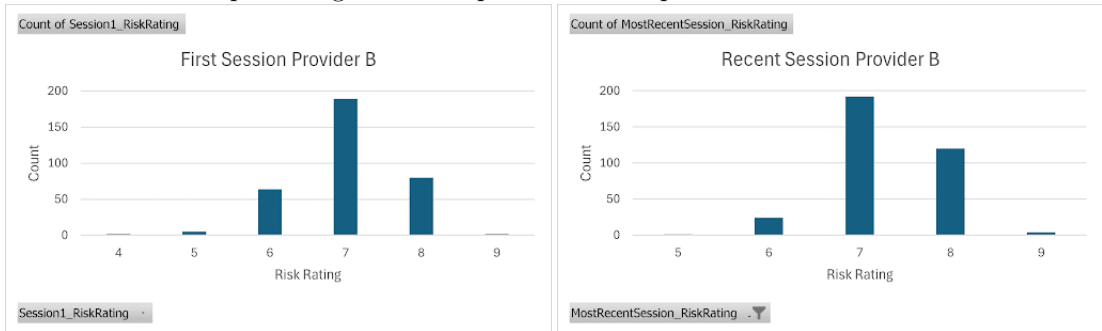
(3) Risk Ratings for Therapist A

Risk ratings associated with the same data.



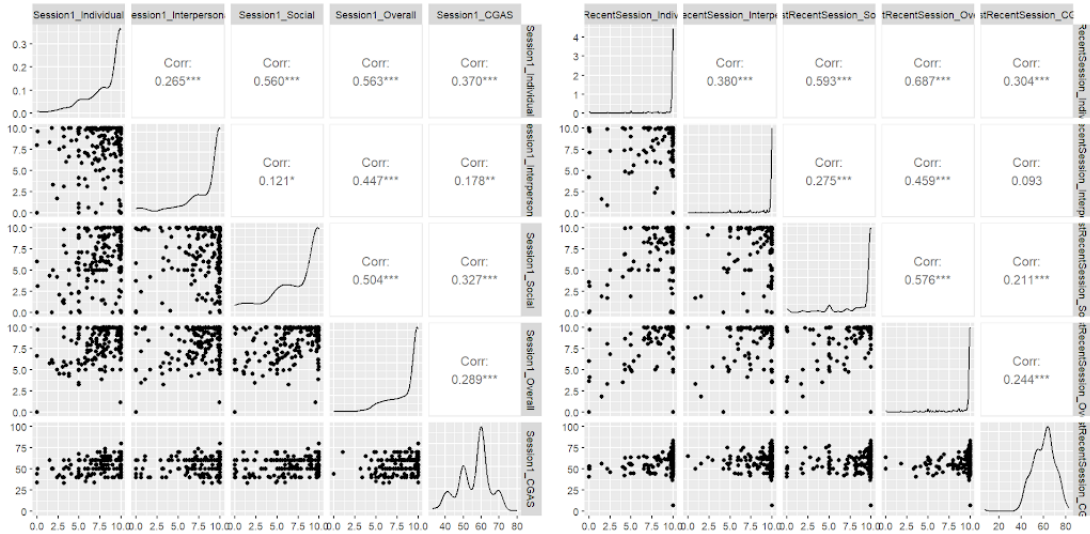
(4) Correlation plots for Therapist B

Similar correlation plot using data from particular therapist.

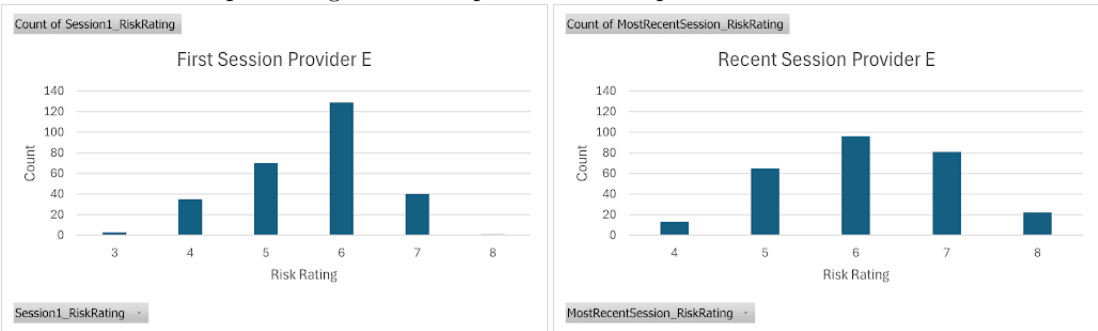


(5) Risk Ratings for Therapist B

Risk ratings associated with the same data.



(6) Correlation plots for Therapist E
Similar correlation plot using data from particular therapist.



(7) Risk Ratings for Therapist E
Risk ratings associated with the same data.

S1 Median	CSF						
20XX	17	18	19	20	21	22	23
Ind.	7.2	7.7	8.1	7.8	8.0	8.0	7.6
Ovr.	7.1	7.4	7.9	7.8	8.0	8.0	7.7
Soc.	7.1	7.2	7.7	7.5	7.9	7.9	7.5
Int.	7.1	7.4	7.9	7.9	8.0	8.0	7.9
Total	28.0	28.8	30.0	29.5	30.2	30.5	29.0
Risk Rating	6	6	6	7	7	6	6
CGAS	63.0	63.0	65.0	69.0	65.0	61.5	60.0

MRS Median	CSF						
20XX	17	18	19	20	21	22	23
Ind.	9.2	9.4	9.2	9.0	9.0	9.5	8.9
Ovr.	9.1	9.3	9.2	9.0	9.2	9.6	9.0
Soc.	9.0	9.2	9.0	9.0	9.0	9.3	8.5
Int.	9.1	9.4	9.3	9.0	9.0	9.5	8.9
Total	34.8	35.5	35.3	34.9	35.1	36.7	34.0
Risk Rating	7	7	7	7	7	7	6
CGAS	70.0	70.0	71.0	72.0	70.0	69.0	63.0

(8) Graph for CSF Session 1 and Most Recent Session
Table of various medians over the years for CSF.

S1 Median	CCRB						
20XX	17	18	19	20	21	22	23
Ind.	7.4	7.5	7.1	7.6	7.0	7.2	7.2
Ovr.	7.0	7.6	7.0	7.3	7.0	7.2	7.4
Soc.	7.3	7.0	7.1	7.7	7.0	7.4	7.3
Int.	6.9	7.1	7.0	7.7	6.6	7.3	7.5
Total	28.2	28.5	27.3	29.0	26.3	28.8	28.6
Risk Rating	7	7	7	7	6	6	6
CGAS	67.5	65.0	66.0	66.0	65.0	60.0	60.0

MRS Median	CCRB						
20XX	17	18	19	20	21	22	23
Ind.	8.5	8.4	8.6	8.4	8.0	8.8	9.0
Ovr.	8.5	8.5	8.8	8.4	8.0	8.8	8.9
Soc.	8.4	8.5	8.9	8.5	8.0	8.7	8.7
Int.	8.5	8.1	8.4	8.0	8.0	8.8	8.8
Total	33.5	32.8	33.0	33.0	31.8	33.7	34.1
Risk Rating	7	8	7	7	7	7	7
CGAS	80.0	70.0	75.0	70.0	70.0	70.0	70.0

(9) Graph for CCRB Session 1 and Most Recent Session

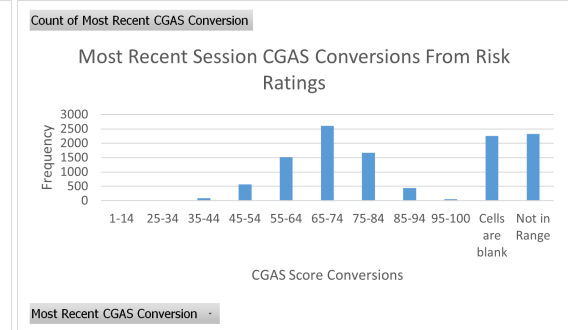
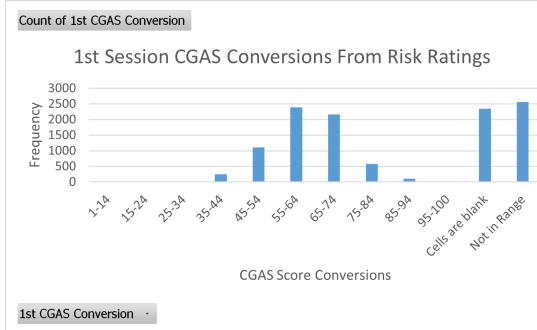
Table of various medians over the years for CCRB.

S1 Median	LCRB						
20XX	17	18	19	20	21	22	23
Ind.	N/A	7.8	9.4	8.6	9.0	8.1	7.4
Ovr.	N/A	8.2	9.3	8.4	9.0	8.2	7.2
Soc.	N/A	7.9	9.5	8.4	9.0	8.0	7.0
Int.	N/A	7.8	9.2	8.0	9.0	8.7	7.1
Total	N/A	30.7	34.6	31.2	34.0	32.0	28.6
Risk Rating	N/A	7.0	6.5	7.0	7.0	7.0	6.0
CGAS	N/A	65.0	70.0	70.0	70.0	70.0	60.0

MRS Median	LCRB						
20XX	17	18	19	20	21	22	23
Ind.	N/A	9.8	9.9	9.7	10.0	9.5	9.3
Ovr.	N/A	9.9	9.9	9.1	10.0	9.7	9.5
Soc.	N/A	9.6	9.9	9.2	10.0	9.5	9.0
Int.	N/A	9.8	9.9	9.1	10.0	9.7	9.4
Total	N/A	38.5	38.9	36.1	38.0	37.5	36.0
Risk Rating	N/A	7.5	7.0	7.5	8.0	8.0	6.0
CGAS	N/A	72.0	72.0	75.0	75.0	76.5	64.0

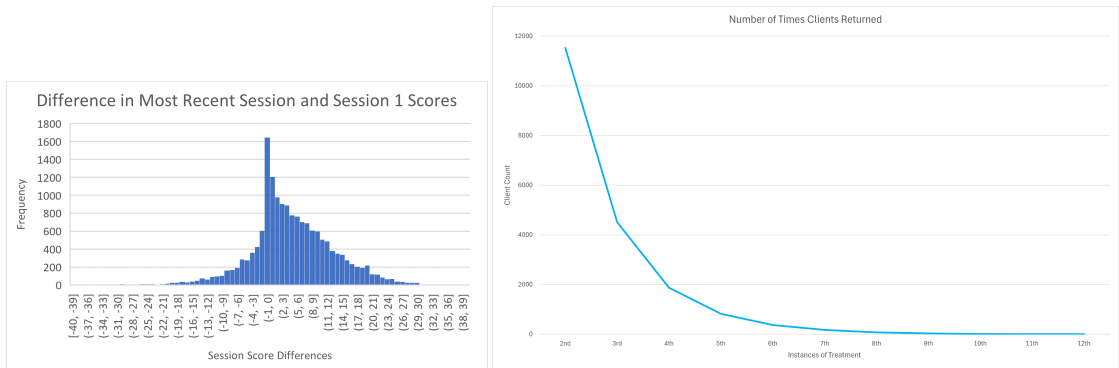
(10) Graph for LCRB Session 1 and Most Recent Session

Table of various medians over the years for LCRB.



(11) Graphs for Session 1 and Most Recent Session CGAS conversions

This graph looks at the risk rating and CGAS from each session, which are correlated. The CGAS was converted to the correct risk rating range, and the results were plotted. There is a large frequency where the cells are blank, this is because certain programs do not use a CGAS. But, there is an alarming amount of times where the corresponding CGAS wasn't in the correct risk rating range.

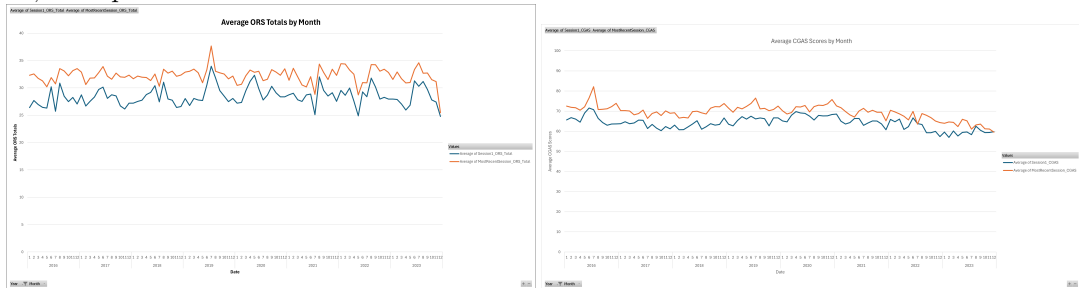


(12) Difference between Most Recent Session and Session 1

The graph took the ORS total from the Most Recent Session and subtracted the Session 1 ORS total from it. Thus, the graph showcases how much a client improved between their first and last session.

(13) Graph of Repeated IDs

The data we received had over 19,000 data points that each included an ID, and we analyzed how many of the IDs were repeats, which ended up being close to 12,000 repeats.

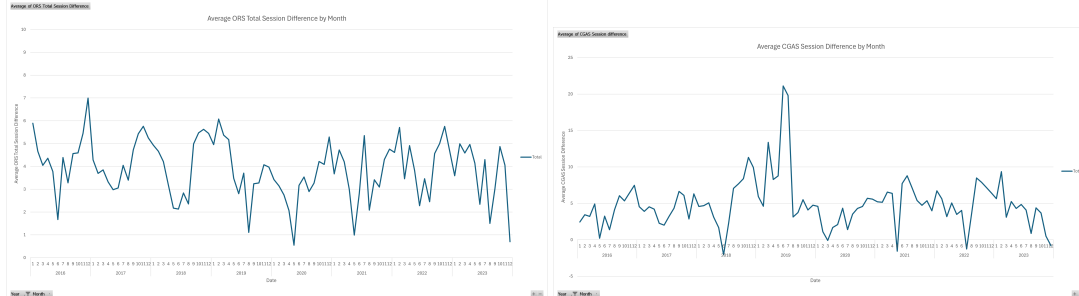


(14) Graph of the Average ORS Total Change by Month

The graph analyzed the average Session 1 and Most Recent Session ORS total for each month from 2016-2023.

(15) Graph of the Average CGAS Change by Month

The graph analyzed the average Session 1 and Most Recent Session CGAS for each month from 2016-2023.



(16) Graph of ORS Total Session Differences

The graph analyzes the difference between the ORS total of the Most Recent Session and Session 1.

(17) Graph of CGAS Session Differences

The graph analyzes the difference between the CGAS of the Most Recent Session and Session 1.

4 Approach

The approach of our project started with meeting with Youth In Need where they discussed where all of the data they gave us comes from, and what they were interested in seeing. So, our approach was to analyze any data that the staff asked us to look into. We started looking at small subsets of the data in order to get acclimated with Excel and R Studio. After that, we figured out how we would clean the data. Then, we analyzed the data Youth In Need gave us. We met up with them once more in the middle of the semester and presented what we had found thus far, and got their feedback about where to go next. Ultimately, we ended up looking into the different funding sources, analyzing the differences between Session 1 and Most Recent Session, observing the ORS and CGAS improvements, and analyzing the risk rating.

Our assumptions included that all counselors follow the same guidelines (scores in same ranges). Also, that every client had at least two sessions (didn't analyze dropouts or clients with missing entries). Finally, we only analyzed data in the range from 2015-2023.

5 Graph Interpretations

(1) Correlation plots for Season 1 and Most Recent Session - The correlation coefficients between Overall and Individual were highly correlated, this is because the questions for Overall and Individual are similar. Overall is stated as a general sense of well-being, and Individual is a person sense of well-being. The high coefficient tells us that the clients see the two questions as the same question. Also, the graphs shifted to the right, meaning that the clients improved in the Most Recent Session. Lastly, the line at 40 is because clients below that line are hospitalized.

(2) Correlation plots for Therapist A - This is the data of a particular therapist, there are a total of 352 data entries. This data spans from 2015-2022. We can see a trend line for the CGAS at 60, and the clumps on these graphs move slightly right (improving ORS scores).

(3) Risk Ratings for Therapist A - Risk rating scores generally increase with

more scores lying to the right of 7 in the most recent session.

(4) Correlation plots for Therapist B -This therapist had a total of 342 data entries. This data spans from 2018-2023. What's interesting about this graph is the CGAS scores are very stratified for both sessions. We might be seeing a tendency for "go to scores".

(5) Risk Ratings for Therapist B -Risk rating scores generally increase with more scores lying to the right of 7 in the most recent session. All scores rise above 4.

(6) Correlation plots for Therapist E -This therapist had a total of 274 data entries after cleaning (278 prior). This data spans from 2016-2023. The data for CGAS is very stratified again with noticeable shifts right in the most recent session(stratified to stratified clump).

(7) Risk Ratings for Therapist E -Risk rating scores generally increase with more scores lying to the right of 6 in the most recent session. All scores rise above 3.

(8) Graph for CSF Session 1 and Most Recent Session - Various medians for ORS scores, CGAS scores, and Risk rating over the years for CSF funding.

(9) Graph for CCRB Session 1 and Most Recent Session Various medians for ORS scores, CGAS scores, and Risk rating over the years for CCRB funding.

(10) Graph for LCRB Session 1 and Most Recent Session -Various medians for ORS scores, CGAS scores, and Risk rating over the years for LCRB funding.

(11) Graphs for Session 1 and Most Recent Session CGAS Conversions - Around 20% of the data was incorrectly entered, as seen in the "Not in Range" bar. This is deemed to be a training error.

(12) Difference between Most Recent Session and Session 1 - A large amount of clients leave their Most Recent Session at the same score as their Session 1, but a large portion also leaves Youth In Need better than when they first came. Additionally, one of Youth In Need's goals is for a client to improve six points before they leave, and the graph showcases that this happens a decent amount of the time

(13) Repeat ID's - Over half of the client data we received included the same client having at least two sessions. This is most likely because of the clients who go to counseling in schools, where every school year a new row for the client will be created.

(14) Average ORS Total by Month - The ORS namely has three low peaks post-covid. Also, there is a common trend of the ORS decreasing during the summer and increasing when school starts back up. This is because during the summer their clientele shortens to those who are most in need.

(15) Average CGAS by Month - In 2022 the Most Recent Session CGAS intersects with the Session 1 CGAS, indicating no change, which is abnormal compared to the rest of the graph. Also, there is a steady trend of the CGAS decreasing throughout the seven years.

(16) Graph of ORS Total Session Differences

There is a similar trend of the difference being lower during summer months and increasing when school starts. The lowest point was in May 2020, when covid was making an abrupt impact.

(17) Graph of CGAS Session Differences

There are four times in the graph when the difference is negative, three of which are post-covid. The graph follows similar trends of the ORS session difference graph.

6 Limitations

One limitation of our results is that we only had data available for a clients first and most recent session. This left a lot of questions open about clients experiences might have changed relative to there total number of sessions. Additionally, we weren't given the reason for why clients were discharged, this would have allowed us to draw conclusions about how effective counseling sessions were. Additionally, we weren't given information about why clients were at the counseling sessions. Teachers and families can recommend students for counseling, which would have been beneficial for data interpretation.

7 Conclusion

The Youth In Need Data Analysis was greatly received by the employees at Youth In Need. Some of their notions were confirmed to be true, and there were some unexpected findings as well. One of the main takeaways by the staff was errors in training, yielding a high amount of incorrect data entries. Additionally, they appreciated seeing how their clients on average leave Youth In Need better than when they started. Furthermore, they were intrigued by the different types of analyses each therapist has with their clients.

Future work for this project includes:

- Analyzing the likeliness of people who had a low CGAS to return
- Analyze other funding sources (not CSF, CCRB, LCRB)
- Analyze ORS scores of 40 and 0 and their change in the CGAS or average CGAS
- Age/race/etc. demographic analysis with average ORS and CGAS scores
- Rates of improvement for CGAS and ORS by length of treatment (days between Session 1 and Most Recent Session)
- For the Repeated Ids, analyze all of the session differences
- Analyze Repeated Ids pre/post/during covid

8 Acknowledgements

Special thanks to our advisors Dr. Golik and Dr. Wintz, and to the staff at Youth in Need for making these results possible.

PIC Math is a program of the Mathematical Association of America (MAA) and the Society for Industrial and Applied Mathematics (SIAM). Support is provided by the National Science Foundation (NSF grant DMS-1722275).