

# NAVIGATING MENTAL HEALTH NARRATIVES: ESTABLISHING A PRIORITY FRAMEWORK IN MEDICAL EDUCATION THROUGH NATURAL LANGUAGE PROCESSING



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## BACKGROUND

From institutional-based policies to community-based policies, the US mental health system has dramatically evolved since the mid-nineteenth century. Following a major economic depression and facing postwar political challenges, many advocates lobbied to deinstitutionalize. The results, however, left many states unprepared to handle the challenges of providing for those with mental disabilities. Currently, people with mental illnesses and their family members face innumerable burdens to accessing mental health care. There is a need to investigate unmet needs of family members of mentally ill patients, and their insight on how the mental health system, and medical education, can be improved upon (1).

Natural Language Processing (NLP) is a tool that has become more popular in recent years. It has found its utility in the healthcare world, helping us for example understand patients' stories in order to incorporate them into their care (2). Furthermore, data has shown that using a combined approach of qualitative analysis with NLP is the most efficient in terms of time and extracting data (3).

**Objective:** We combined qualitative analysis with Natural Language Processing to analyze the public testimonies of members from the mental health community in the Denver Metro Area and gain a better understanding of the gaps and barriers in care that this community faces in the hopes of incorporating this into medical school education.

## SPECIFIC AIMS

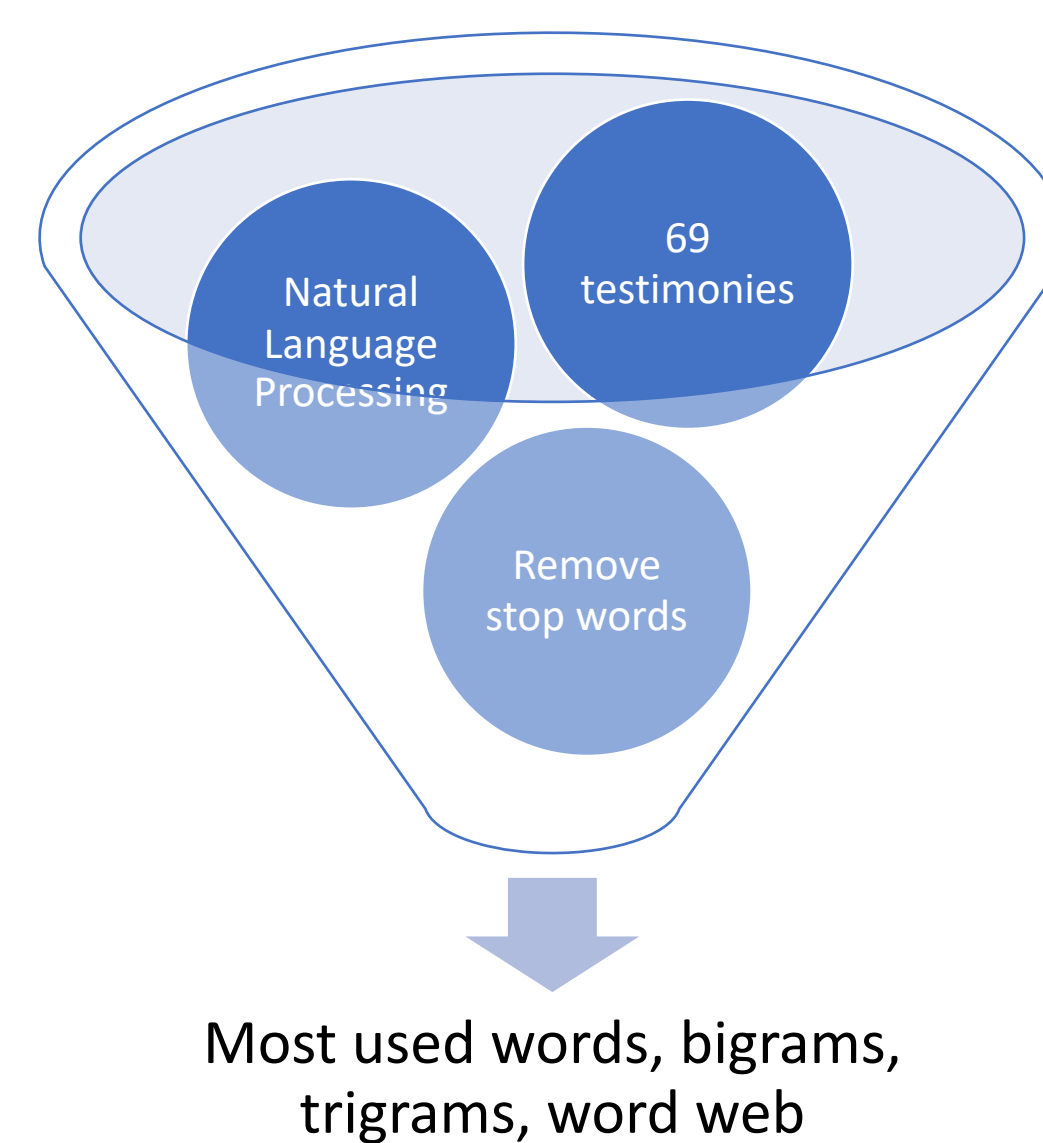
Understand the relationship between previously identified barriers to mental health care.

Leverage Natural Language Processing to analyze and visualize the role of different factors contributing to mental health care.

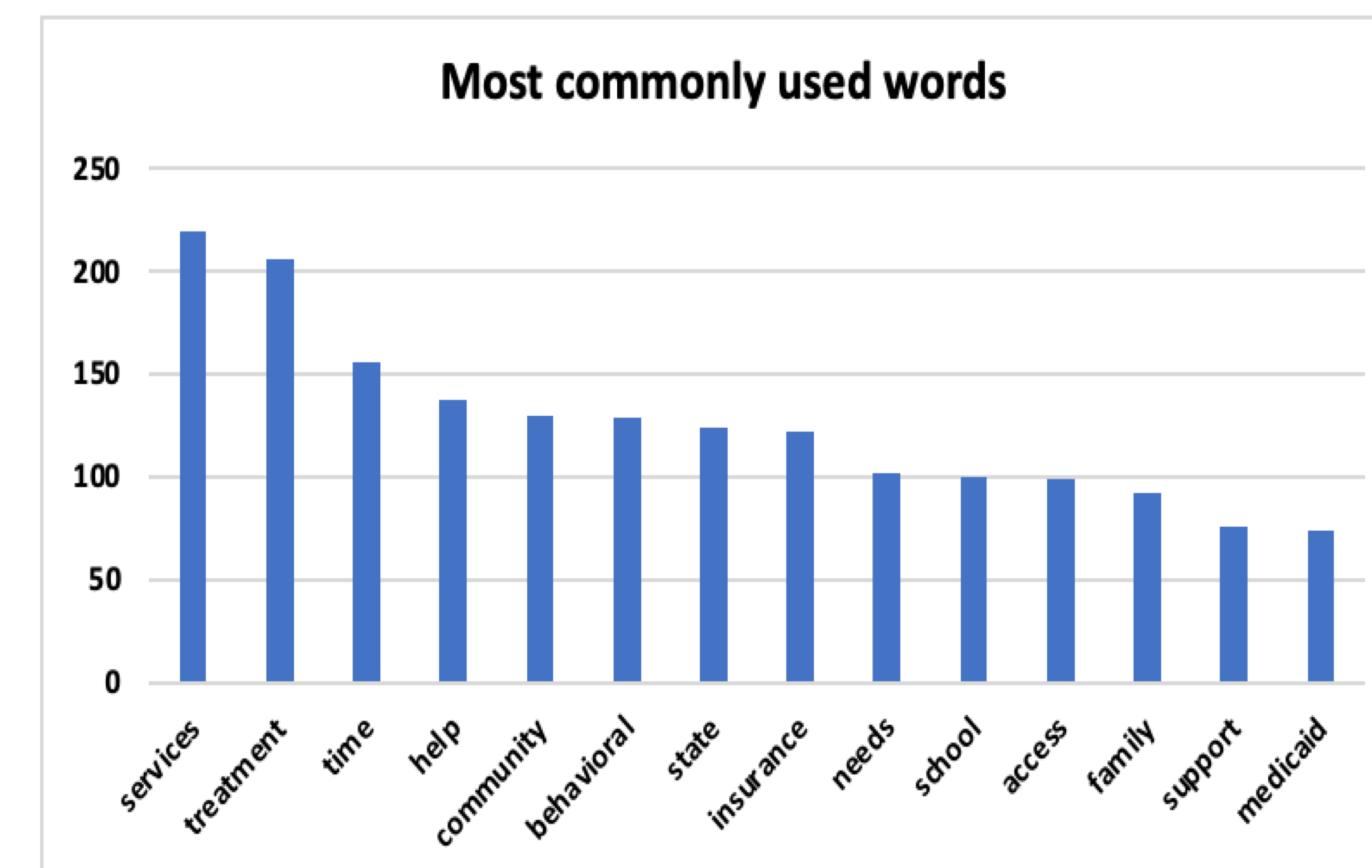
Establish a priority framework for mental health care to effectively guide and develop future solutions executed by our organization.

## METHODS

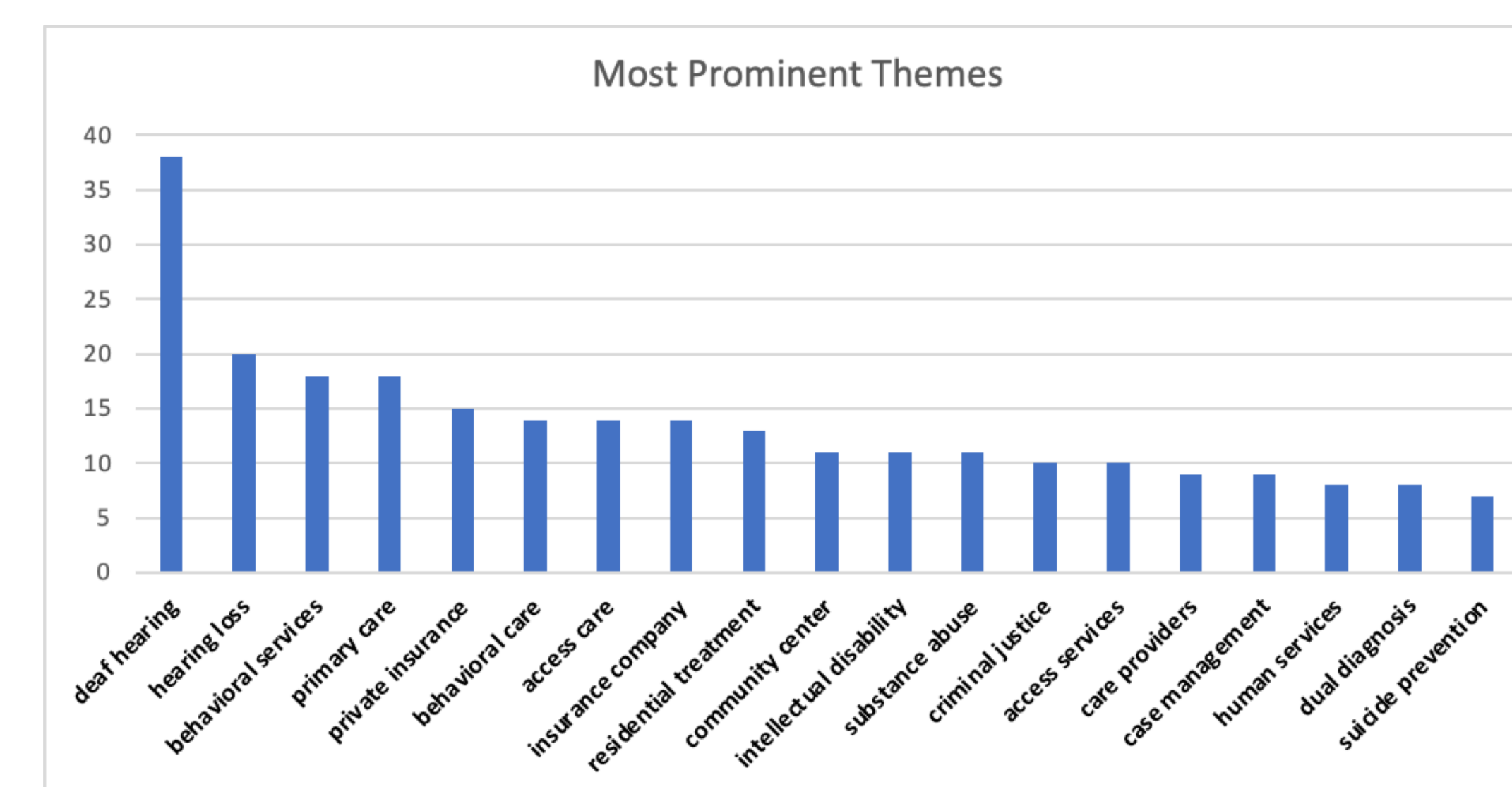
From September 2019 through March 2020, 69 out of 149 online public testimonies were selected from the Colorado Department of Human Services (CDHS) Behavioral Health Task Force (BHTF), all from the Denver Metro Area. From the available data, this included Denver, Adams, Douglas, and Jefferson County. The remaining testimonies were excluded as those were from outside the Denver Metro Area, and thus outside our scope of study.



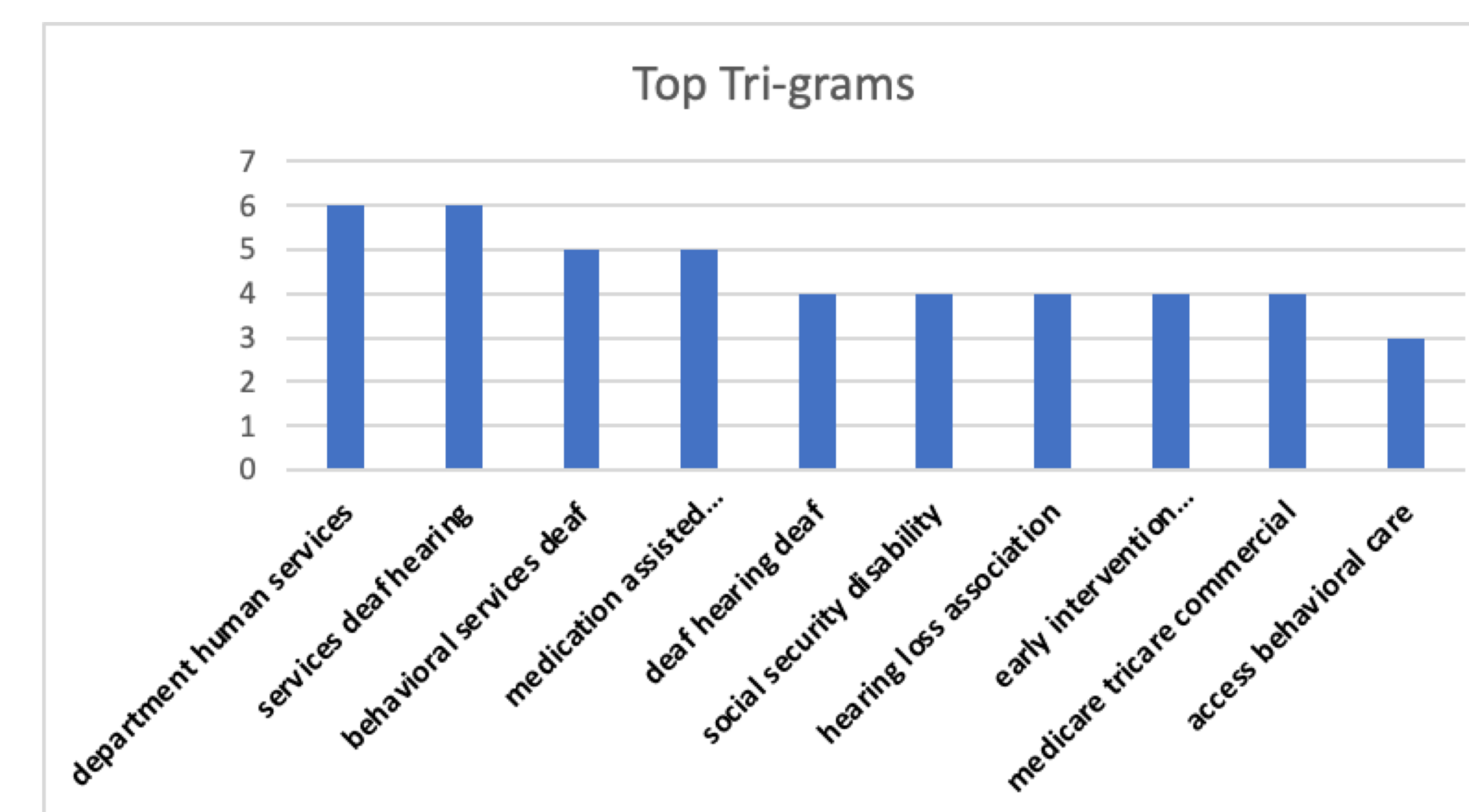
## RESULTS



**Figure 1: Most Commonly Used Words:** Most commonly used words in the public health testimony transcriptions, excluding "mental health" since this was the area of focus for the testimonies themselves. Words were mentioned greater than 50 times and as frequent as 220 and this data was auto-generated by the natural language processing analysis.



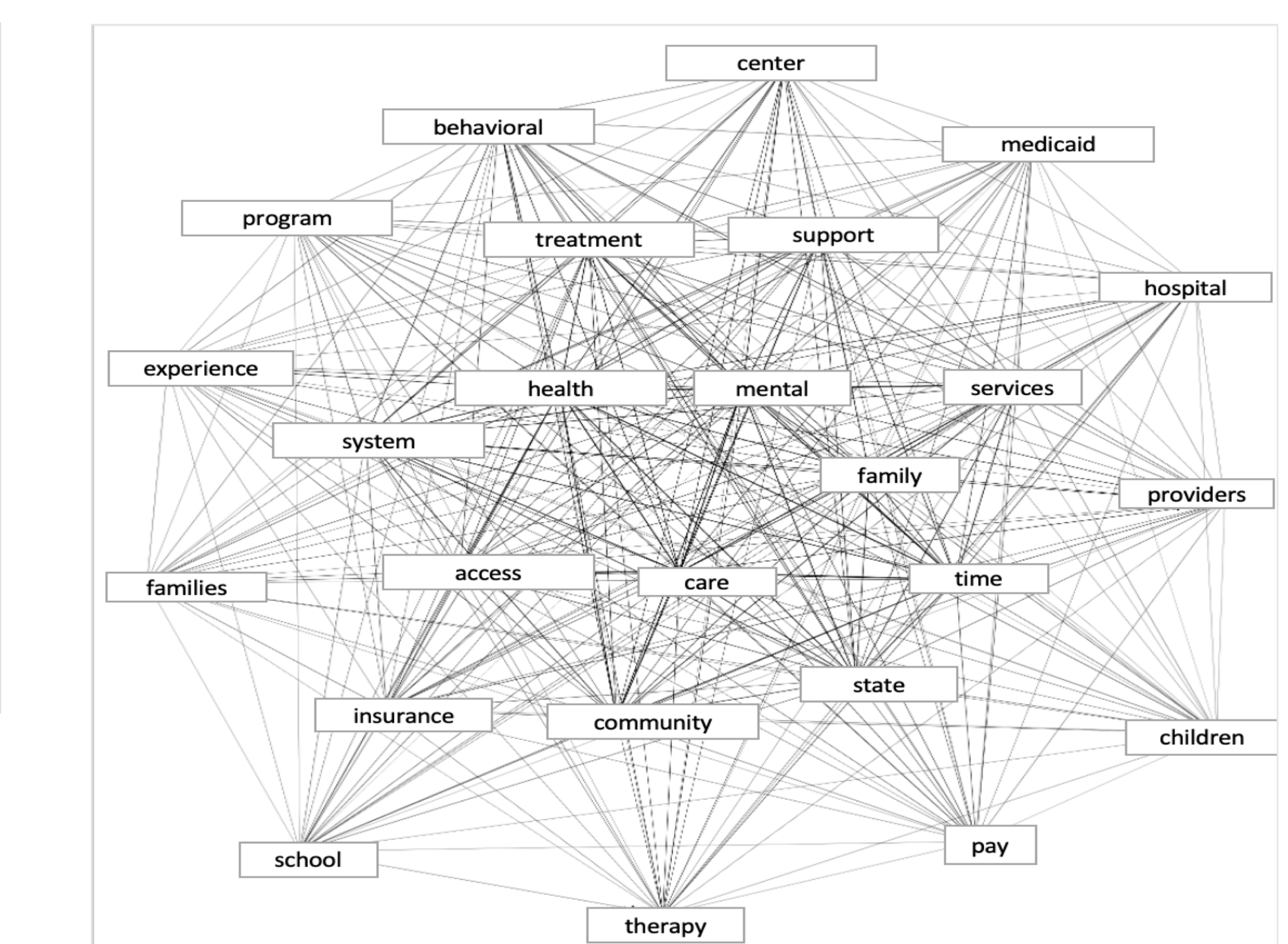
**Figure 2. Most prominent bi-grams mentioned in the transcribed public testimonies:** Used to delineate themes mentioned greater than five times in the transcription and as frequent as thirty-eight times. Auto-generated by natural language processing analysis.



**Figure 3. Most commonly used tri-grams in public testimony transcriptions:** Auto-generated by the natural language processing analysis. Tri-grams were mentioned anywhere between 6 to 3 times.



**Figure 4. Word web:** showing commonly used words at the center of clusters and other commonly associated words to highlight relationships frequently made in the public testimony transcriptions. These relationships were auto-generated by the natural language processing analysis. The most commonly associated word was "health" in conjunction with other modifiers.



**Figure 5: Natural Language Processing Word Web:** Highlight relationships and strength of association between words in the public testimony transcriptions. Words in the center of the web were mentioned the most frequently. Line thickness is used to visually depict the level of relation between words. Thicker lines indicate stronger relation.

Based on our results, we created a priority framework to emphasize which areas should be focused on in medical education. While all gaps and barriers in care identified through Natural Language Processing are relevant, it is important to prioritize the ones that can have the highest impact on improving the experiences of members of the mental health community.

High Priority: community, family, accessing care  
 Medium Priority: treatment, primary care, substance use  
 Low Priority: insurance, Medicaid, schools, financial

## CONCLUSIONS

Through Natural Language Processing, we established a priority framework that should be addressed during medical education. This tool allowed us to expand on the results from our qualitative analysis that identified the four following themes: (1) structural barriers, (2) equity of access, (3) population-specific needs, and (4) training and education gaps. The connections and relationships between these themes and barriers were extracted through Natural Language Processing. A priority framework was created as follows:

High Priority: community, family, accessing care  
 Medium Priority: treatment, primary care, substance use  
 Low Priority: insurance, Medicaid, schools, financial

While all these gaps and barriers in care should be addressed, this priority framework helps guide our program in the right direction.

## NEXT STEPS

- 1) Send out surveys to University of Colorado medical students and University of Colorado residents in primary care and psychiatry to assess medical education.
- 2) Incorporate findings from our qualitative data and NLP with survey results.
- 3) Develop a service-learning course with an ally training to bridge the gap in mental health care.

## REFERENCES

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## ACKNOWLEDGEMENTS

