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positive BRAIN HEALTH NOW

Using Text Mining to Evaluate Quality of Free-Text Health Goals in People with HIV: Proof-of-Concept

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neuro CIHR IRSC Canadian Institutes of Health Research / Instituts de recherche en santé du Canada McGill the CTN CIHR Canadian HIV Trials Network le Réseau Réseau canadien pour les essais VIH des IRSC

HIV is now within the list of chronic diseases

A chronic condition requires day-to-day management by

the person affected

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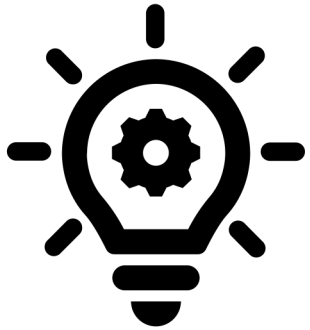
GOAL SETTING

- Plays a critical role in day-to-day management of people living with chronic conditions
- Ideal goals are *SMART (Specific, Measurable, Actionable, Realistic, & Time-bound)*
- *SMART* goals achieve desired effects on health outcomes and are often set collaboratively = Clinician + Client



Unsupervised goals lack the structure and format
Measuring goal quality is important
Text mining to the rescue

Objective: To identify whether text mining techniques can be used to discriminate good quality goals

Methods: Two sources of data were tapped. The first was a set of goals set collaboratively (supervised) during a project on health outcomes post-hospitalization. The second source arose from cognitive interviews conducted with people with HIV piloting a goal-setting exercise for a future trial. Half of the goals were uninformed and half informed (i.e., feedback via providing a health profile).

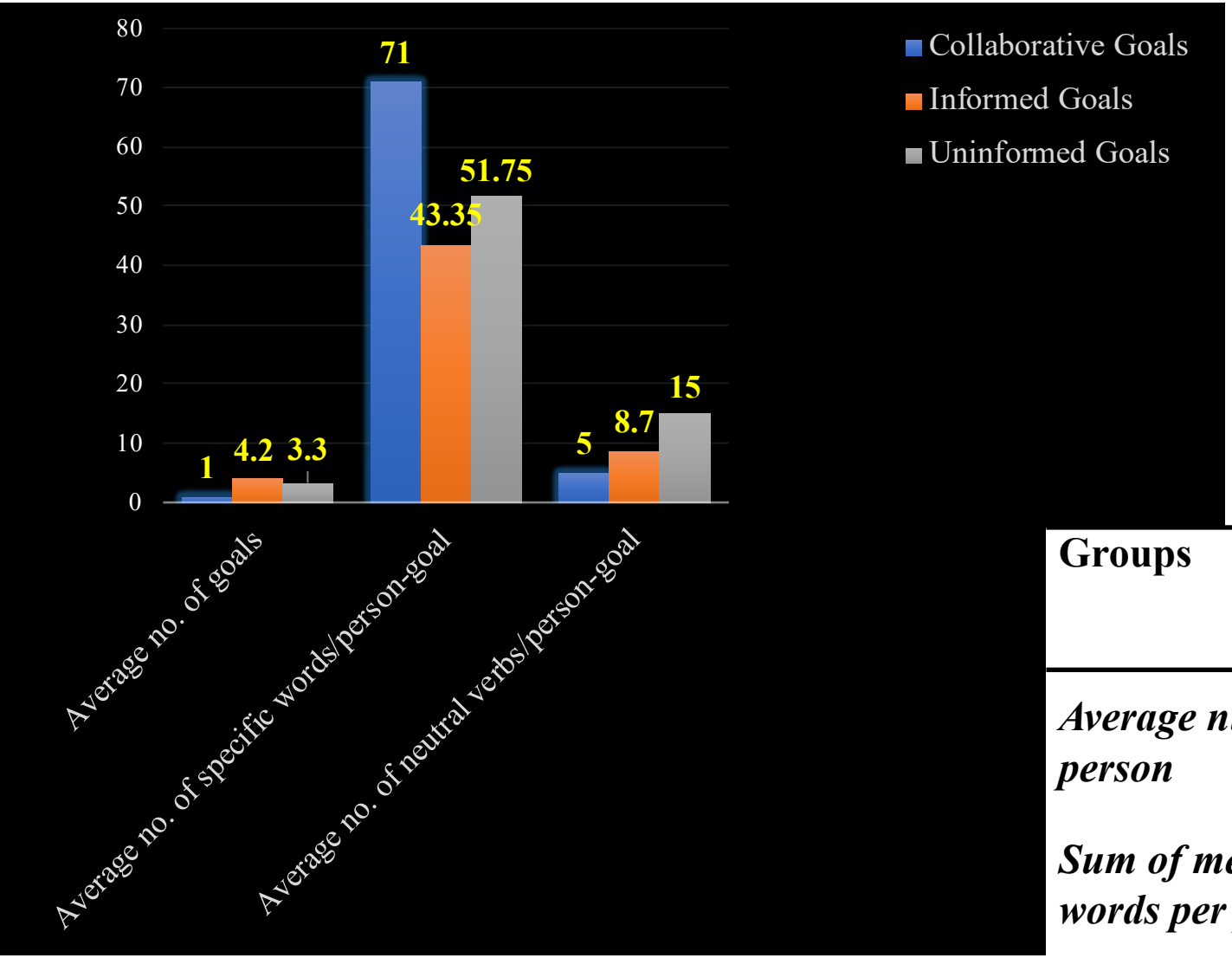
- The main outcome was the extent to which goals were *SMART* by using **specific words and actionable verbs.**
- A measurement framework and an initial lexical (i.e., collection of vocabularies) were developed for the goal evaluation.
- Using text mining techniques, the specific components of each goal (i.e., tokenizing and *pos*-tagging) were extracted and compared to the lexical using regular expression algorithms.
- Text mining offers solution to organize **free text into pre-defined groupings** that can be analyzed to identify patterns in goal-setting quality.
- ***Limitation:** Usability & readability of the profile was being tested via cognitive interviews. Participants did not receive their own health profile. The profile kept changing as comments were received. Despite all, the results are encouraging.

positive BRAIN HEALTH NOW : **Your Personal Brain Health Profile**

Participant Number:10-002			
Important Brain Health Areas	**Your first visit**	**Your most recent visit**	**Optimal**
Visit date	October 29, 2013	January 13, 2016	
Cognitive test score	Excellent	Good	**Excellent**
Your evaluation of your memory	Good	.	**Excellent**
Able to concentrate	A moderate amount	A moderate amount	**Very much to extreme**
Negative feelings (blue mood, despair, anxiety, depression)	Quite often	Seldom	**Never or seldom**
Feeling lonely	Sometimes	Sometimes	**Almost never**
Time feeling worn out	A little	Some	**None to a little**
Feeling rested after waking up	Never	Never	**Often or always**
Your pain rating	None	None	**None to mild**
Climbing several stairs	Limited a little	Not limited	**Not limited**
Walking more than a kilometer	Limited a little	Limited a little	**Not limited**
Vigorous activities	Limited a little	Limited a little	**Not limited**
Weight to height ratio (BMI)	27	25	**Between 19 and 25**
Smoking	Smoking	Smoking	**Not smoking**
Health rating	Very good	Very good	**Excellent, very good**
Quality of life	Good	Good	**Good, very good**

The green boxes indicate areas where you are in the optimal state
The neutral boxes indicate areas where you are below the optimal state but not too far away
The orange boxes indicate areas where you are further away from the optimal state

Number of optimal areas at my first visit = 5
Number of optimal areas at my most recent visit = 6



Results: Collaborative goals had more actionable verbs (n/person-goal) than informed goals (n/person-goal), and uninformed goals mainly had neutral verbs.

Rates and rate ratio of goal specificity

Groups	Collaborative (n = 10)	Uninformed (n = 10)
Average number of goals per person	1	3.3
Sum of mean number of specific words per person goal	71	51.75
Rate of specific goals	7.1	1.6
Rate Ratio	4.4 (CI 2.0 – 9.9)	

Comparison of 3 groups

- Specific words and actionable verbs = good quality goal
- Neutral verbs = poor quality goal

Word visualization for "Uninformed Goals"

Word visualization for "Informed Goals"

More words have been taken from the health profile (i.e., use of the health profile to set goals)

Word visualization for "Collaboratively Set Goals"

SMART elements are all present

Conclusion: The process of text mining is ideal for extracting and quantifying specific goal content. With more data, clustering techniques can be applied to shed light on the preoccupations of people with HIV with respect to health outcomes.

* Size of the words represents frequency of their use within the goals.