

## Research Article

# Talking to Patients: Part 2 - Mind Genomics Cartography of Reactions to Messages Pertaining to Patient Experience with COVID-19

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## Abstract

In a Mind Genomics experiment, 101 respondents each evaluated unique sets of 24 vignettes pertaining to interactions with a medical professional concerning the personal experience with COVID-19. The focus was to determine which messages made the respondents feel “comfortable” communicating. The results suggest two clearly different mind-sets, those responsive and comfortable with communication about the “facts” of COVID-19, versus those comfortable with communication about emotional support of the patient. These two mind-sets transcend gender, age, and previous experience with COVID-19. A simulation of the same topic by AI revealed that AI picked up these two mind-sets but suggested even deeper subgroups within each mind-set. The paper shows the value of incorporating Mind Genomics and AI into the education of medical professionals to provide deeper knowledge of how to communicate with patients.

**Keywords:** Artificial Intelligence, COVID-19, Empathy in healthcare, Medical education, Mind Genomics, Patient communication

## Introduction

Healthcare professionals can improve their communication skills with patients by actively listening, demonstrating empathy, using clear language, and adopting a patient-centered approach. By involving patients in decision-making processes, providing comprehensive information, and collaborating on treatment decisions, healthcare providers can build trust and rapport. Measurement of communication strategies can be done through patient surveys, feedback forms, focus groups, and patient outcomes data. Common barriers to effective communication include time constraints, language barriers, cultural differences, health literacy limitations, and emotional or psychological challenges. Addressing these barriers can lead to more effective patient-provider interactions and improved health outcomes.

Mind Genomics is an emerging science that studies how people behave and respond to different messages on important topics, such as COVID. This method helps experts understand what people like or dislike about certain messages and how they react in various situations. By using AI, healthcare workers can create personalized texts about COVID in the Mind Genomics app to see how comfortable patients are with them. This approach is based on facts and aims to help healthcare workers establish deeper connections and have more effective conversations with their patients.

Mind Genomics differentiates itself from standard consumer

research techniques by taking a unique approach to gathering insights on consumer preferences. Instead of asking respondents to directly rate the importance of various aspects, Mind Genomics presents them with combinations of messages and analyzes their responses to determine the impact of each message. This method avoids forcing people to intellectualize and allows for a more natural, intuitive understanding of consumer preferences. Using statistical techniques such as regression modeling, Mind Genomics identifies which messages most strongly communicate the desired messages. The pattern of strong performing messages provides insights on consumer behavior and preferences, doing so in a fashion which is robust, rapid, and designed for exploration in areas that may be as yet “terra incognita,” viz., unknown lands. This approach not only improves patient satisfaction but also makes training medical professionals more effective by giving them real-world feedback on their messaging strategies.

Mind Genomics has been used in topic areas ranging from medicine (focus of the current paper), to food, law, social issues, and matters of the everyday). The methods have been explicated in a variety of papers [1-6]. This paper adds to the corpus of knowledge created by Mind Genomics, doing so with the focus on COVID, and specifically on the communication between patient and medical professional, e.g., doctor or nurse practitioner.

### Step 1: Create the Raw Materials

The Mind Genomics technique asks the user to provide four questions, each with four answers. The four questions and four answers to each question were developed using AI, as discussed in the accompanying paper. Table 1 shows the four questions and four answers to each question (elements), generated by AI, but edited by the researchers to make the answers succinct and easy to understand. For each question and each answer, the AI was instructed to make the text 15 words or less, to write in the way people talk, and to make the text understandable to a 12-year-old.

### Step 2: Create the Test Stimuli

The test stimuli consist of message combinations from an experimental design. The experimental design specifies the combinations as follows:

1. Each element appears five times in 24 vignettes and is absent from 19 vignettes.
2. A vignette must contain at most one answer to a question.
3. A vignette must have a minimum of two elements and a maximum of four elements. This requirement means that in some cases a vignette does not have an element (answer) from one of the four questions, and in some other cases a vignette does not have an element from two or the four questions. This approach ensures that vignettes do not contain contradictory information from the same question.
4. The 16 elements appear independently, enabling OLS regression to assess the strength of each element in driving the response.
5. Each respondent assesses a distinct set of 24 vignettes. A permutation scheme ensures uniqueness while preserving

the mathematical properties of the experimental design, altering only the combinations. This leads to greater coverage of potential combinations. The permutation scheme allows research to explore various ideas and combinations, rather than relying on prior knowledge of what will work best. This shift from experimental confirmation to exploration is central to the Mind Genomics perspective [7].

### Step 3: Execute the Study

Mind Genomics studies are conducted online through the BimiLeap.com platform. Luc.id, now Cint, supplies respondents based on user specifications. Participants were adults aged 25-54 living in the United States. Email invitations were sent to the respondents. Participants were directed to an orientation page about the study. The study was not labeled that way. The respondents were informed they would read a set of phrases and rate them as a single idea.

The orientation began with a self-profiling questionnaire that collected the respondent's age and gender, followed by their answers to seven profile questions in Table 2. BimiLeap.com uses this information to form subgroups of respondents based on their self-identification.

The respondents did not receive extensive orientation. The goal was to show them the vignettes and capture their immediate reactions, without creating any expectations. This brief introduction is typical for most Mind Genomics studies, except those related to the law, where case background is pertinent. A brief introduction will suffice for most issues.

### Step 4: Create the Database and Estimate the Regression Equation for the Total Panel

Each respondent assessed a unique set of 24 vignettes in random order. The respondent initially assessed vignette #1 as a training vignette. The rating for the first vignette was discarded. The respondent assessed

Table 1: The four questions and the four answers to each question.

<p><b>Question A: Explain in detail how you would ask the patient, "What is your understanding of COVID-19?"</b></p> <p>A1 What do you know about COVID-19? It is a type of germ that can cause coughing and fever.</p> <p>A2 Can you tell me what you've heard about COVID-19? It is a contagious disease that can cause cough, fever, and trouble breathing.</p> <p>A3 "What do you think COVID-19 is all about? Can you give me a quick summary?"</p> <p>A4 So, can you break it down for me? What's your understanding of COVID-19?</p> <p><b>Question B: "Explain in detail how you would ask the patient, "Do you have a few minutes to discuss your concerns and provide you with information about COVID-19?"</b></p> <p>B1 I'd like to talk about your concerns and COVID-19.</p> <p>B2 Let's discuss your worries and share info about COVID-19.</p> <p>B3 Can we talk for a bit about what worries you regarding COVID-19?</p> <p>B4 Can we take a quick chat about your worries and COVID-19?</p> <p><b>Question C: "Explain in detail, how you would say the "Hello, nice to meet you. Today, I would like to discuss COVID-19 and your health. Are you familiar with the coronavirus and its potential symptoms?"</b></p> <p>C1 I want to talk about COVID-19 and how it could affect you. Do you know what it is?</p> <p>C2 Have you heard about COVID-19 and the signs it can cause in your body?</p> <p>C3 Wanna chat about COVID-19 and what kind of problems it can give you?</p> <p>C4 Do you know about COVID-19 and the symptoms it might make you feel?</p> <p><b>Question D: Explain in detail, how you would ask the patient "What information would you like to know about COVID-19 and how it may affect you?"</b></p> <p>D1 "Wondering about COVID-19 and how it can affect you? Anything specific you want to know?"</p> <p>D2 Anything you're curious about when it comes to COVID-19 and its impact on your health?"</p> <p>D3 Feel free to ask me anything about COVID-19 and how it might affect you personally."</p> <p>D4 "Looking to learn more about COVID-19 and its impact on your health? Let me know what you'd like to know!"</p>
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**Table 2:** Self-profiling questions for classification questionnaire (top) and rating scale for the 24 vignettes (bottom).

<p><b>SELF-PROFILING, COVID-RELEVANT CLASSIFICATION QUESTIONS</b></p> <p><b>Question 1: Have you ever had COVID?</b>  1=No, I don't know much about it.  2=No, but I know a lot about it.  3=Yes, I have had COVID, but it was cured.  4=Yes, it was long COVID.</p> <p><b>Question 2: How many years ago did you have COVID?</b>  1=Less than 1 year ago  2=1 to 5 years ago  3=More than 5 years ago  4=Not applicable</p> <p><b>Question 3: Have you suffered from COVID more than one time?</b>  1=No  2=Yes, once.  3=Yes, twice.  4=Yes, three times.  5=Yes, more than 3 times.</p> <p><b>Question 4: How many members of your family were affected by COVID?</b>  1=1  2=2  3=3  4=&gt;3</p> <p><b>Question 5: Has COVID caused any death in your family?</b>  1=No  2=Yes</p> <p><b>Question 6: Have you experienced any long-term complication of COVID?</b>  1=No  2=Yes</p> <p><b>Question 7: Have you experienced any psychological distress after COVID?</b>  1=No  2=Yes</p> <p><b>INSTRUCTIONS AND RATING SCALE USED WHEN THE RESPONDENT RATED THE 24 VIGNETTES</b></p> <p>Please read the sentences below describing how a doctor talks to the patient when patient is being told about COVID. It comes from a doctor talking to a patient.</p> <p><b>Rating question for the vignette:</b> How do you feel when you read the paragraph below?  1=This makes me uncomfortable AND the doctor will not get good information from me.  2=This makes me uncomfortable BUT the doctor will get good information from me.  3=I can't answer this question.  4=This makes me comfortable BUT the doctor will not get good information from me.  5=This makes me comfortable AND the doctor will get good information from me.</p> <p><b>R54x = Newly transformed binary variable used for analysis (This makes me comfortable)</b></p>
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all 24 vignettes. The 24th vignette was a repeat of the training vignette.

The respondent scored the vignette on a 5-point scale. The analysis focused on ratings 4 and 5, which indicate “patient feels comfortable with what the patient has heard.” They were transformed into a new binary variable, R54x. When the respondent rates a vignette a 4 or 5, R54x become 100. When the respondent rates a vignette 3, 2, or 1, R54x become 0. As a prophylactic measure to ensure some variation in the binary variable R54x (necessary for regression analysis) a tiny random number ( $<10^{-5}$ ) was added to the new binary variable.

The Mind Genomics platform recorded both the rating that the respondent assigned, then the transformed value (R54x), as well as the response time. The response time was the number of seconds (to the nearest 100th second) elapsing between the time the vignette appeared on the screen to the time that the respondent assigned a rating. Response times of 8 seconds or longer were automatically transformed to 8 seconds under the assumption that the respondent was multi-tasking.

The platform's database included 2424 records, one for each vignette per respondent among 101 participants. Each record included a respondent ID, self-profiling data, vignette order in the 24-set, 16 columns for coding element absence, and the rating, response time, and transformed binary rating R54x.

For the OLS regression, the 16 columns for the elements were coded “1” if present in the vignette and “0” if absent. This is known as dummy coding. The coding indicates the predictor's state: absent (0) or present (1).

The analysis occurs twice: first for groups, then for individuals. Groups are defined by the self-profiling questionnaire. All 24 vignettes from each respondent were compiled for analysis. The analysis involved the OLS regression without an additive constant, represented as:  $R54x = k1A1 + k2A2 \dots k16D4$

The regression equation shows the impact of each factor. Parallel analyses showed a t statistic of about 2.0 corresponding to a coefficient

close to 11 in the regression model with an additive constant. The coefficient of 11 in a model or equation is equivalent to a coefficient of about 20 for a model without an additive constant, estimated on the same data. Given the foregoing argument, it appears that one could make an argument for coefficients of 21 or above as show strong performance when the model or equation is estimated without an additive constant

Table 3 presents the model parameters estimated for 101 respondents. Five elements are statistically significant (coefficient > 20), indicating that AI effectively generated strong, inspiring elements. These elements use informal language.

### Step 5: Estimate Regression Equations for the Self-defined Subgroups

Recall that at the start of the Mind Genomics session the respondent completed a self-defining questionnaire, shown in Table 2. The regression analysis for each group comprising 10 or more respondents generates a great deal of data. In order to make the analysis easier, Table 4 (age, gender) and Table 5 (self-defined attitudes and behavior) show only those coefficients of 25 or higher.

Table 4 shows only four strong performing elements, suggesting that if there are group differences, the groups are probably not defined by gender nor by age. Table 5 shows that the elements “resonate” for

the 11 respondents who have defined themselves as having had Long COVID, but otherwise the pattern is once again elusive

### Step 6: Create Mind-Sets by K-means Clustering

Variability among individuals derives from the “human condition,” which is the inescapable reality that people differ from each other on issues, even on the same issues of the world of everyday. Perhaps this variation is an intractable inconvenience? That would be acceptable, of course, and dealt with by oversampling people until the real average emerges out of the intractable variation. But what if this variation represents various ways of thinking about things, rather than random differences? What if there are basic distinctions in cognitive patterns that are not always related to a person’s identity or previous experiences?

A recurrent theme in Mind Genomics is that individuals vary in their daily lives but that this variation at the level of the everyday experience can be traced to mind-sets, patterns of thinking. The mind-sets emerge from the world of the granular and are descriptive rather than normative. The mind-sets “make sense” of the variation by showing that the variation can be generated by parsimonious set of groups. Furthermore, these groups are discoverable by simple studies such as the study presented here. Furthermore, one cannot always anticipate how a person would think based on their demographics, or

Table 3: Coefficients for the total panel for the equation relating R54x (comfortable) to the elements.

Binary dependent variable = R54x = patients feel comfortable		Total
	<b>Base Size</b>	101
	Average coefficient across all 16 elements	19
C2	Have you heard about COVID-19 and the signs it can cause in your body?	25
C3	Wanna chat about COVID-19 and what kind of problems it can give you?	24
C1	I want to talk about COVID-19 and how it could affect you. Do you know what it is?	23
B1	I'd like to talk about your concerns and COVID-19.	22
B3	Can we talk for a bit about what worries you regarding COVID-19?	21
C4	Do you know about COVID-19 and the symptoms it might make you feel?	20
A1	What do you know about COVID-19? It is a type of germ that can cause coughing and fever.	19
B2	Let's discuss your worries and share info about COVID-19.	19
B4	Can we take a quick chat about your worries and COVID-19?	19
D3	"Feel free to ask me anything about COVID-19 and how it might affect you personally."	18
A4	So, can you break it down for me? What's your understanding of COVID-19?	18
D1	"Wondering about COVID-19 and how it can affect you? Anything specific you want to know?"	17
A3	"What do you think COVID-19 is all about? Can you give me a quick summary?"	17
A2	Can you tell me what you've heard about COVID-19? It is a contagious disease that can cause cough, fever, and trouble breathing.	16
D4	"Looking to learn more about COVID-19 and its impact on your health? Let me know what you'd like to know!"	15
D2	Anything you're curious about when it comes to COVID-19 and its impact on your health?"	14

Table 4: Coefficients for gender and for age for the equations relating R54x (comfortable) to the elements.

	Binary dependent variable = R54x = patients feel comfortable	Total	Gender		Age		
			Male	Female	25 - 34	35 - 44	45 - 54
	<b>Base Size</b>	101	47	54	21	45	20
B1	I'd like to talk about your concerns and COVID-19.			26			28
C1	I want to talk about COVID-19 and how it could affect you. Do you know what it is?						26
C2	Have you heard about COVID-19 and the signs it can cause in your body?	25	27		26		27
C3	Wanna chat about COVID-19 and what kind of problems it can give you?		27		27		26

**Table 5:** Coefficients for the four subsets of respondents based on COVID experience for the equation relating R54x (comfortable) to the elements.

	Group (Binary Ratings)	Have you ever had COVID?			
		No, I don't know much	No, but I know a lot	Yes, I have had COVID	Yes, it was long COVID
	<b>Base Size</b>	16	37	37	11
A1	What do you know about COVID-19? It's a type of germ that can cause coughing and fever.		25		25
B1	I'd like to talk about your concerns and COVID-19.				26
B3	Can we talk for a bit about what worries you regarding COVID-19?				29
B4	Can we take a quick chat about your worries and COVID-19?				29
C1	I want to talk about COVID-19 and how it could affect you. Do you know what it is?			28	25
C2	Have you heard about COVID-19 and the signs it can cause in your body?	27		26	
C3	Wanna chat about COVID-19 and what kind of problems it can give you?		27	27	
D4	"Looking to learn more about COVID-19 and its impact on your health? Let me know what you'd like to know!"				27

even their actions. As of this writing (Winter 2024-2025), the mind-sets must be retrieved via an examination of reaction patterns to the vignettes. The method is simple: use the individual coefficients from a research, such as ours, to determine what individuals react to in terms of inspiration.

Reducing this tumultuous inter-person variety to well-behaved, explainable, parsimonious number of mind-sets is one way of using clustering—a well-accepted statistical procedure. Clustering reduces a seeming random cloud of different objects into a few interpretable groups, clusters, or mind-sets in the language of Mind Genomics. The processes are strictly mathematical, Mind Genomics uses k-means clustering [8]. People in a cluster think and respond similarly to the elements (viz., feel comfortable with the message as conveyed by the medical professional).

The particular strategy used by k-means clustering follows these simple steps:

1. Using the data from the 24 vignettes evaluated by one respondent, compute the 16 coefficients which emerge from relating the binary dependent variable, inspire (R54x) to the 16 elements. The equation is the same as that above, viz.,  $R54x = k1A1 + k2A2... k16D4$
2. Although each respondent evaluated a different set of 24 vignettes, the original set-up ensured that each of the 101 respondents would evaluate a proper set of vignettes, permitting regression modeling at the level of the individual respondent.
3. The result of the analysis is a matrix of 101 rows, one row per respondent, and 16 columns one column for each of the 16 elements. The number in the cell is the coefficient for that respondent for the specific element.
4. The k-means process computes the "distance," D, between every pair of respondents, by the expression  $(1-R)$ . The "R" is the Pearson linear correlation between two sets of numbers. When R is 1, the two sets of numbers are perfectly related to each other. In our case, this means that the two respondents

react identically to the elements. The distance is 1-1 or 0. In contrast, when the two respondents are opposites,  $R = -1$ . The distance is  $(1 - -1)$  or 2.

5. The k-means algorithm puts the 101 respondents first into two groups, so that the distances of people in each group are small, but the distances of the two group centroids are large. Then the k-means algorithm does the same thing for three groups, and so forth.
6. The process is entirely objective.
7. Once the k means algorithm finishes, we end up with two and then with three groups. We can create the equations for the two groups and then create the equations for the three groups. In each case, we look at the strong performing elements.
8. The remaining effort moves from objective mathematics to subjective decision. We want to make sure that we have easy-to-interpret clusters (interpretability) and as few clusters as possibility (parsimony)
9. For this study, two clusters ended up providing the better solution. Three clusters ended up having many of the same elements in common.

Table 6 compares the two mind-sets emerging from the k-means clustering. To make the patterns easier to distinguish, the tables show the very strong performing coefficients (25 and higher) in shade. The choice of a cut-off of 25 was made subjectively, to provide a way to distinguish between these two mind-sets. When we use this cut-off, we end up with Mind-Set 1 feeling comfortable by "information-rich messages," and Mind-Set 2 feeling comfortable with "emotion-rich messages."

It is important to keep in mind that it would be impossible for the respondents to "game" the system. Each respondent saw 24 vignettes in rapid order, and essentially ended up judging each vignette intuitively. Yet, it is striking how clear the mind-sets are. The results of this study support the "insight productivity" emerging from the seemingly "impossible" Mind Genomics task of judging so many vignettes so rapidly.

**Table 6:** Coefficients of two mind-sets (MS1 of 2, MS 2 of 2) emerging from k-means clustering.

		MS 1 of 2	MS 2 of 2
	<b>Binary dependent variable = R54x = patients feel comfortable</b>		
	<b>Base Size</b>	60	41
	<b>Strong for Mind-set 1 – Information-rich Messages</b>		
C1	I want to talk about COVID-19 and how it could affect you. Do you know what it is?	34	8
C2	Have you heard about COVID-19 and the signs it can cause in your body?	34	12
C3	Wanna chat about COVID-19 and what kind of problems it can give you?	33	11
C4	Do you know about COVID-19 and the symptoms it might make you feel?	26	12
	<b>Strong for Mind-set 2 – Emotion-rich Messages</b>		
B4	Can we take a quick chat about your worries and COVID-19?	12	29
B1	I'd like to talk about your concerns and COVID-19.	18	28
B3	Can we talk for a bit about what worries you regarding COVID-19?	16	28
A1	What do you know about COVID-19? It is a type of germ that can cause coughing and fever.	14	27
B2	Let's discuss your worries and share info about COVID-19.	14	26
	<b>Not strong for either mind-set</b>		
A2	Can you tell me what you've heard about COVID-19? It is a contagious disease that can cause cough, fever, and trouble breathing.	13	22
A3	"What do you think COVID-19 is all about? Can you give me a quick summary?"	15	20
A4	So, can you break it down for me? What's your understanding of COVID-19?	14	23
D1	"Wondering about COVID-19 and how it can affect you? Anything specific you want to know?"	18	14
D2	Anything you're curious about when it comes to COVID-19 and its impact on your health?"	16	10
D3	Feel free to ask me anything about COVID-19 and how it might affect you personally?"	17	19
D4	"Looking to learn more about COVID-19 and its impact on your health? Let me know what you'd like to know!"	17	11

**Table 7:** Response times attributable to individual elements for the Total Panel and for the two mind-sets.

		Total	MS 1 of 2	MS 2 of 2
	<b>Binary dependent variable = Response time (in seconds)</b>			
	<b>Base Size</b>	101	60	41
A1	What do you know about COVID-19? It's a type of germ that can cause coughing and fever.	0.9	0.9	1.0
A3	"What do you think COVID-19 is all about? Can you give me a quick summary?"	0.9	0.7	1.1
B2	Let's discuss your worries and share info about COVID-19.	0.9	1.0	0.8
B3	Can we talk for a bit about what worries you regarding COVID-19?	0.9	1.0	0.7
A2	Can you tell me what you've heard about COVID-19? It's a contagious disease that can cause cough, fever, and trouble breathing.	0.8	0.8	0.7
A4	So, can you break it down for me? What's your understanding of COVID-19?	0.8	0.6	1.0
D3	Feel free to ask me anything about COVID-19 and how it might affect you personally?"	0.8	0.7	0.8
B1	I'd like to talk about your concerns and COVID-19.	0.7	0.7	0.6
B4	Can we take a quick chat about your worries and COVID-19?	0.7	0.6	0.7
C1	I want to talk about COVID-19 and how it could affect you. Do you know what it is?	0.7	0.6	0.8
C2	Have you heard about COVID-19 and the signs it can cause in your body?	0.7	0.7	0.8
C4	Do you know about COVID-19 and the symptoms it might make you feel?	0.7	0.8	0.5
D1	"Wondering about COVID-19 and how it can affect you? Anything specific you want to know?"	0.7	0.8	0.6
D2	Anything you're curious about when it comes to COVID-19 and its impact on your health?"	0.7	0.7	0.6
D4	"Looking to learn more about COVID-19 and its impact on your health? Let me know what you'd like to know!"	0.7	0.8	0.6
C3	Wanna chat about COVID-19 and what kind of problems it can give you?	0.6	0.6	0.5

### Step 7: Estimate the Regression Models Using Response Time as the Dependent Variable

Table 7 shows the estimated number of seconds in the response time attributed to each element. The table shows three columns, one column for Total Panel, and then the two remaining columns for the two mind-sets. Long response times are operationally defined as 1.3 seconds or

longer. Short response times are operationally defined as 0.3 seconds or shorter. The data suggests no response times meeting the criteria for "long response times." The absence of long or short response times suggests a lack of deep interest in the topic of COVID-19 [9,10].

### How AI Summarizes the Two Mind-Sets

After the analysis is completed by the Mind Genomics platform,

BimiLeap.com, the program is instructed to review the coefficients for each subgroup and answer a variety of prompts. Those prompts are based on the elements 21 or higher for the subgroup. Table 8 shows how the AI “summarizes” these subgroups.

### What Would AI Have Uncovered Had It Been Prompted to Look for Mind-Sets?

Our final analysis returns to AI, to determine whether or not AI would have uncovered these mind-sets [11-13]. Table 9 (top) shows the instructions given to the AI. Table 9 (bottom) shows the five different mind-sets emerging from the AI, AI-generated Mind-Sets A and B are similar to the empirical Mind-Set 1, AI-generated Mind-Sets D and E are similar to the empirical Mind-Set 2, and AI-generated Mind-Set C is similar to both empirical mind-sets.

Table 8: AI summarization of the two mind-sets.

<p><b>MIND-SET 1 OF 2 - TOP</b></p> <p><b>Interested in:</b> I want to talk about COVID-19 and how it could affect you. Do you know what it is?; Have you heard about COVID-19 and the signs it can cause in your body?; Wanna chat about COVID-19 and what kind of problems it can give you?; Do you know about COVID-19 and the symptoms it might make you feel?;</p> <p><b>Create a label for this segment:</b> COVID-19 Awareness and Knowledge</p> <p><b>Describe this segment:</b> This segment appears to be focused on assessing the participants’ knowledge and awareness of COVID-19, as well as their willingness to talk about the virus and its potential impact on their health. The statements suggest that the segment is interested in understanding whether the participants are familiar with COVID-19, its signs and symptoms, and their receptiveness to discussing the topic.</p> <p><b>Describe the attractiveness of this segment as a target audience:</b> The attractiveness of this segment as a target audience can vary depending on the context and goals of the research study. However, considering the provided description, this segment can be seen as highly attractive for certain purposes.</p> <p>First, the fact that the segment is interested in talking about COVID-19 and how it could affect them shows a proactive and engaged attitude towards understanding and addressing the pandemic. This level of interest suggests that they may be more receptive to information and interventions related to COVID-19.</p> <p>Second, the segment includes individuals who have heard about COVID-19 and its signs or symptoms. This indicates that they have some level of knowledge or awareness about the virus, which could make it easier to communicate information and engage them in discussions related to the topic.</p> <p>Third, the segment expresses a willingness to chat about the problems that COVID-19 can give and the symptoms it may cause. This suggests a potential openness to exploring the impacts of the virus and the consequences it can have on their health and well-being. Such a receptive mind-set can be valuable for researchers seeking to gather insights or conduct studies related to the experiences and effects of COVID-19.</p> <p>Overall, this segment appears to have a genuine interest and willingness to engage with the topic of COVID-19, making them potentially attractive as a target audience for research studies, educational initiatives, public health campaigns, or related interventions.</p> <p><b>Explain why this segment might not be attractive as a target audience:</b> This segment might not be attractive as a target audience because the description suggests that the individuals in this segment lack awareness or knowledge about COVID-19. They may not have heard about it, do not know what it is, or are unaware of the signs, symptoms, and problems associated with it. As a result, they may not be receptive to messaging or information about COVID-19, making it challenging to effectively communicate with them or influence their behavior regarding the virus. Targeting this segment might require significant educational efforts and resources, which may not yield immediate or impactful results.</p> <p><b>List what is missing or should be known about this segment, in question form:</b></p> <ol style="list-style-type: none"><li>1. Do you have any previous knowledge or understanding of COVID-19 and its impact on individuals?</li><li>2. Have you taken any steps to educate yourself about COVID-19 and its potential signs and symptoms?</li><li>3. Are you aware of the possible problems or complications that can arise from contracting COVID-19?</li><li>4. Do you have a clear understanding of the specific symptoms associated with COVID-19?</li><li>5. Have you received any information or guidance on how to prevent or protect yourself from COVID-19?</li></ol> <p><b>Which messages will interest this segment:</b> Based on the attributes mentioned, this segment is likely interested in learning more about COVID-19 and its potential effects on their health. They may have varying levels of knowledge or awareness about the virus, its symptoms, and the problems it can cause.</p> <p><b>Potential messages that could interest this segment:</b> These messages try to address the segment’s curiosity, offer information, and address their desire to know more about COVID-19 and its implications on their well-being.</p> <p>“Understanding COVID-19: Stay informed and learn how it could affect you.”</p> <p>“Signs and Symptoms of COVID-19: Discover what to look out for and how it may impact your health.”</p> <p>“Exploring COVID-19: Let’s chat about the problems it can cause and what it means for you.”</p> <p>“Know Your COVID-19 Symptoms: Educate yourself about the common signs and how they might affect your body.”</p> <p><b>List and briefly describe attractive new or innovative products, services, experiences, or policies for this segment:</b></p> <ol style="list-style-type: none"><li>1. <b>COVID-19 Education Chatbot:</b> An automated chatbot that provides accurate information about COVID-19, including its symptoms, prevention measures, and available resources. This interactive tool can be accessed through various messaging platforms, allowing individuals to stay informed and make well-informed decisions regarding their health.</li><li>2. <b>Telemedicine Services:</b> Virtual healthcare services that enable individuals to consult with healthcare professionals remotely. This innovative approach allows patients to receive medical advice, prescriptions, and guidance without leaving their homes, reducing the risk of exposure to COVID-19 in healthcare settings.</li><li>3. <b>Work-From-Home Assistance Apps:</b> User-friendly applications designed to enhance productivity and well-being while working remotely. These apps provide features like time management tools, ergonomic tips, mindfulness exercises, and virtual team collaboration platforms to help individuals adapt to the new work environment effectively.</li><li>4. <b>Contactless Delivery Services:</b> With the increase in online shopping and food delivery, contactless delivery services have emerged to minimize physical contact between customers and delivery personnel. These services can include options like doorstep deliveries, electronic signatures, and secure online payment methods, ensuring safety and convenience during the pandemic.</li><li>5. <b>Remote Learning Platforms:</b> Online educational platforms that offer a wide range of courses and learning opportunities for individuals of all ages. These platforms provide interactive solutions, including virtual classrooms, video lectures, quizzes, and assessments, enabling continuous learning during periods of physical distancing and school closures.</li><li>6. <b>Enhanced Cleaning Technologies:</b> Advanced disinfection and sanitization technologies that effectively eliminate pathogens, including the COVID-19 virus, from various surfaces and environments. These innovative solutions can include UV sterilization devices, antimicrobial coatings, and air purification systems, ensuring clean and safe settings for individuals in public spaces.</li><li>7. <b>Mental Health Support Apps:</b> Mobile applications that offer mental health resources, counseling services, and self-care tools to address the emotional and psychological impact of the pandemic. These apps provide access to professional therapists, mindfulness exercises, guided meditation, stress management techniques, and coping strategies to support individuals struggling with anxiety, depression, and other mental health challenges.</li><li>8. <b>Travel Insurance with COVID-19 Coverage:</b> Insurance policies tailored to cover travel-related expenses, cancellation fees, and medical costs specifically related to COVID-19. These policies provide reassurance to individuals planning to travel during uncertain times, offering financial protection and coverage in case of unexpected situations or health emergencies related to the virus.</li></ol>
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- 9. Online Fitness and Wellness Platforms:** Virtual platforms offering a wide range of fitness classes, workouts, and wellness programs for individuals to maintain their physical health and well-being from the comfort of their homes. These platforms may include live streaming sessions, on-demand workout videos, personalized training plans, and nutritional guidance to meet individuals' specific fitness goals.
- 10. Community Support Initiatives:** Local programs and initiatives that facilitate community engagement, support vulnerable populations, and ensure mutual assistance during challenging times. These initiatives can include food banks, neighborhood assistance networks, volunteer platforms, and community-driven efforts to provide essential resources and support to individuals affected by the pandemic.

#### MIND-SET 2 OF 2 - TOP

**Interested in:** What do you know about COVID-19? It's a type of germ that can cause coughing and fever.; Can you tell me what you've heard about COVID-19? It's a contagious disease that can cause cough, fever, and trouble breathing.; So, can you break it down for me? What's your understanding of COVID-19?; I'd like to talk about your concerns and COVID-19.; Let's discuss your worries and share info about COVID-19.; Can we talk for a bit about what worries you regarding COVID-19?; Can we take a quick chat about your worries and COVID-19?

**Create a label for this segment:** Information about COVID-19 and concerns

**Describe this segment:** This segment consists of individuals who have some knowledge and understanding of COVID-19. They associate COVID-19 with symptoms such as coughing, fever, and difficulty breathing. They might have concerns or worries about the virus and are open to discussing and sharing information about it.

**Describe the attractiveness of this segment as a target audience:** The segment described in the attributes is an appropriate target audience for information and discussion about COVID-19. They have a basic understanding of the virus, including its symptoms and transmission. They also express concerns and worries about the virus, indicating a desire for more information and support. This segment appears open and receptive to engaging in conversations and discussions about COVID-19, making them an attractive target audience for educational campaigns, interventions, or support services related to the virus.

**Explain why this segment might not be attractive as a target audience:** This segment might not be attractive as a target audience because they already have a basic understanding of COVID-19. They have heard about it and know that it is a contagious disease that can cause cough, fever, and trouble breathing. They seem to be concerned about the topic and may have worries, but it is unclear if they are looking for further information or just discussing their concerns. Therefore, this segment may not be the most receptive to educational or awareness messaging about COVID-19, as they already have some understanding of the topic.

**List what is missing or should be known about this segment, in question form:**

1. What specific symptoms of COVID-19 have you heard about, other than coughing, fever, and trouble breathing?
2. How is COVID-19 transmitted from one person to another?
3. Are there any measures that can be taken to prevent the spread of COVID-19?
4. What are the long-term effects of COVID-19?
5. Are there any specific risk factors associated with developing severe symptoms from COVID-19?
6. What is the current global situation in terms of COVID-19 cases and mortality rates?
7. Have you heard about any potential treatments or vaccines for COVID-19?
8. How has COVID-19 impacted different communities or populations?

**Which messages will interest this segment?** This segment is likely to be interested in messages that provide accurate information and address their concerns about COVID-19. They may be looking for clarification on what COVID-19 is, its symptoms, and how it spreads. Messages that offer reassurance, share information about preventive measures, and provide updates on the current situation are likely to be of interest to this segment. They may also be interested in hearing about any available resources or support related to COVID-19.

**List and briefly describe attractive new or innovative products, services, experiences, or policies for this segment:**

- 1. Virtual doctor consultations:** With an increasing need for social distancing, virtual doctor consultations have gained popularity. These services allow individuals to have consultations with healthcare professionals from the comfort and safety of their own homes.
- 2. Contactless delivery services:** To minimize contact and reduce the risk of transmission, contactless delivery services have emerged. These services ensure that products are delivered to customers without any physical interaction, providing a safe and convenient option for consumers.
- 3. Telecommuting tools and software:** With the widespread adoption of remote work, there has been a surge in the development of telecommuting tools and software. These innovative solutions enable employees to collaborate, communicate, and manage projects effectively from different locations.
- 4. Self-sanitizing surfaces:** As hygiene and cleanliness have become significant concerns, products with self-sanitizing surfaces have gained attention. These surfaces have the ability to continuously disinfect themselves, ensuring a safer and more sanitized environment.
- 5. Mental health support platforms:** The COVID-19 pandemic has highlighted the importance of mental health support. Innovative platforms and services have emerged to provide accessible and convenient mental health support, including online therapy sessions, mindfulness apps, and virtual support groups.
- 6. Automation technologies:** To minimize human interaction and the risk of exposure, automation technologies have become increasingly popular. From touchless payment systems to self-checkout options, these innovations offer a safer and more efficient experience for consumers.
- 7. Remote learning platforms:** With the closure of schools and educational institutions, remote learning platforms have become crucial for continuing education. These platforms provide students and teachers with a virtual learning environment, ensuring continuity in education during these challenging times.
- 8. Health monitoring wearables:** Wearable devices that track vital signs and provide real-time health monitoring have gained attention in the context of COVID-19. These innovative products enable individuals to monitor their health and detect potential symptoms, allowing for early intervention and prevention.
- 9. Flexible work policies and remote work incentives:** Employers have been embracing flexible work policies and remote work incentives to accommodate employees during the pandemic. These policies offer greater work-life balance and flexibility, enhancing employee well-being and productivity.
- 10. Hygiene-focused travel experiences:** As travel resumes, there is a growing demand for hygiene-focused experiences. Innovative travel companies are offering services that prioritize safety and sanitization, such as contactless check-ins, enhanced cleaning protocols, and private transportation options.

## Discussion and Conclusions

Mind Genomics experiments improve medical communication by understanding patient mind-sets and preferences. By analyzing patterns in patient responses to different types of communication, healthcare professionals can tailor their approach to better meet individual needs. This personalized approach can lead to improved patient satisfaction, adherence to treatment plans, and overall health outcomes.

AI can further enhance the understanding of patient communication preferences by analyzing large amounts of data and identifying patterns that may not be immediately apparent to human researchers. By developing a corpus of knowledge based on Mind Genomics experiments, medical students and nurse practitioners can learn about the diverse mind-sets of patients and how to effectively communicate with them. This knowledge can help healthcare professionals provide more personalized care and support ongoing professional development.

**Table 9:** Using AI to simulate possible mind-sets in the populations regarding communicating with the patient about COVID-19.

<p><b>INSTRUCTIONS TO THE AI TO IDENTIFY AND DESCRIBE MIND-SETS IN THE POPULATION</b></p> <p>We are dealing with the doctor communicating to the patient about COVID-19.</p> <p>We know that there are several mind-sets of medical professionals regarding how they communicate with their patients about COVID-19</p> <p>For each mind-set of medical professional tell me:</p> <ol style="list-style-type: none"><li>1. <b>The name of the mind-set. Preface by NAME:</b></li><li>2. <b>The style of communicating with the patient and a detailed explanation of why the medical professional uses that style. Preface by STYLE OF COMMUNICATING WITH PATIENT.</b></li><li>3. <b>Three questions or phrases that the mind-set would use to communicate with the patient. Preface by: USES THESE QUESTIONS.</b></li><li>4. <b>Summarize the effort through slogans</b></li></ol> <p><b>AI RETURNS WITH FIVE POSSIBLE MIND-SETS</b></p> <p>(MS A and B similar to MS1, MS D and E similar to MS 2, MS C similar to both M1 &amp; MS2)</p> <p><b>A. NAME: The Informative Educator (Similar to Mind-Set 1)</b> STYLE OF COMMUNICATING WITH PATIENT: This medical professional focuses on providing the patient with detailed information about COVID-19, including symptoms, prevention methods, and treatment options, in order to empower the patient to make informed decisions about their health. USES THESE QUESTIONS: "Have you heard about the latest updates on COVID-19 and how it may affect you?" "Let me explain how the virus spreads and what you can do to protect yourself and others." "Do you have any questions about COVID-19 that I can help clarify for you?"</p> <p><b>B. NAME: Action-oriented Problem Solver (Similar to Mind-Set 1)</b> STYLE OF COMMUNICATING WITH PATIENT: The Action-oriented Problem Solver style focuses on identifying potential issues or concerns related to COVID-19 and implementing practical solutions to address them. This medical professional is proactive in finding ways to protect the patient's health and safety. USES THESE QUESTIONS: "Have you encountered any challenges in following the recommended guidelines for preventing the spread of COVID-19? Let's brainstorm together on how we can overcome them." "Are you experiencing any symptoms that may be related to COVID-19? Let's discuss next steps and potential treatment options to ensure your well-being." "How can we work together to create a plan for managing your health during the COVID-19 pandemic? I'm here to support you every step of the way."</p> <p><b>C. NAME: Collaborative Partner (Similar to Mind-Sets 1 and 2)</b> STYLE OF COMMUNICATING WITH PATIENT: The Collaborative Partner style focuses on establishing a strong partnership with the patient to work together towards a common goal of managing COVID-19 effectively. This medical professional encourages open communication and shared decision-making with the patient. USES THESE QUESTIONS: "How can we collaborate to create a personalized plan for protecting your health and safety during the COVID-19 pandemic? Your input is valuable in guiding our approach." "Are there any specific concerns or preferences you have regarding your treatment for COVID-19? Let's discuss how we can tailor our approach to meet your needs." "Would you like to be involved in making decisions about your care and well-being during this challenging time? Your active participation is key to our success in managing COVID-19 together."</p> <p><b>D. NAME: The Empathetic Listener (Similar to Mind-Set 2)</b> STYLE OF COMMUNICATING WITH PATIENT: This medical professional actively listens to the patient's concerns, fears, and emotions regarding COVID-19, showing empathy and understanding to create a supportive and compassionate environment. USES THESE QUESTIONS: "I can sense that you are feeling anxious about COVID-19. How can I best support you during this time?" "Tell me more about your worries and fears related to the pandemic." "I want you to know that your feelings are valid, and we are here to listen and provide guidance."</p> <p><b>E. NAME: Reassuring Advocate (Similar to Mind-Set 2)</b> STYLE OF COMMUNICATING WITH PATIENT: The Reassuring Advocate style focuses on providing comfort and support to patients while also advocating for their health and well-being. This medical professional uses a caring and compassionate tone to help alleviate any fears or concerns the patient may have about COVID-19. USES THESE QUESTIONS: "I understand that you may be feeling anxious about COVID-19. I'm here to help guide you through this uncertain time. How are you feeling today?" "I want to reassure you that we are taking all necessary precautions to keep you safe during your visit. Is there anything specific you would like to know about our safety protocols?" "It's important for us to work together to protect your health. Are there any concerns or questions you have about COVID-19 that we can address together?"</p> <p><b>THREE SLOGANS SUGGESTED BY AI</b></p> <p>Sometimes truths can be conveyed with slogans, cutting through the noise and getting straight to the point. In the context of medical professionals learning to communicate with patients about COVID, three slogans can help guide their approach:</p> <ol style="list-style-type: none"><li>1. <b>"Personalized care for individual needs"</b>: This slogan emphasizes the importance of tailoring messages to each patient's unique mind-set and concerns, which is vital in the context of COVID where fear and uncertainty abound.</li><li>2. <b>"Building trust through understanding"</b>: By acknowledging and addressing patients' specific worries and emotions surrounding COVID, medical professionals can establish trust and foster a more open and effective dialogue.</li><li>3. <b>"Empowering patients through clear communication"</b>: Providing clear and concise information about COVID and its implications can help patients feel more in control and confident in their decisions, leading to better outcomes and overall satisfaction.</li></ol>
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The value of Mind Genomics experiments goes beyond improving patient satisfaction; it can also lead to better health outcomes. When patients feel heard, understood, and cared for, they are more likely to follow treatment plans and adhere to medical advice. By analyzing patterns in patient responses to different types of communication, healthcare providers can tailor their communication style to better connect with and engage their patients.

Incorporating the findings of Mind Genomics experiments

into training can help young medical professionals develop the communication skills needed to excel in their clinical practice and provide more personalized care to their patients. Empathy plays a crucial role in effective communication between doctors and patients, as it allows them to understand and connect with their emotions, concerns, and perspectives.

Mind Genomics experiments can be used to enhance the communication skills and patient-centered care of organizations. By

incorporating these findings into training and practice, healthcare providers can better understand patient communication preferences and tailor their communication strategies to meet their unique needs. This can lead to better patient understanding, adherence to treatment plans, and overall satisfaction with care.

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