

Application of Mindsets to Health Education and Behavior Change Programs

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Abstract

Successful health promotion programs are characterized in part, by the willingness of audiences to engage, participate, and adopt healthier behaviors. But presentation of messages that reach and resonate with the intended audience remains challenging. This is due in part to the variety of mindsets—viewpoints, attitudes, and beliefs—within a population. These mindsets play an essential role in understanding and predicting behaviors and lifestyle factors associated with health or chronic diseases. The purpose of this study is to demonstrate how a specific survey-based method of mindset segmentation can distinguish predominant mindsets and then be used to create, adapt, and/or market health programs to appeal to these mindsets. Steps in survey construction, distribution, and analysis are described. Interpretation of the results, yielding three primary mindsets, is the critical outcome of this segmentation method. The applications of this interpretation to community health education programs are suggested. This approach has potential to inform, enhance, or customize programs, tailoring activities, methods, and messages to the preferences of the community.

Keywords

Mindset Segmentation, Health Promotion, Cognitive Science, Community Program Development

1. Introduction

Community education is a fundamental strategy for influencing lifestyle behaviors, to promote health and mitigate impact of chronic disease. An ongoing challenge in community health education is the organization of content and development of programs or services that reach and resonate with the intended

audience. In part, this is due to the distinct viewpoints, attitudes, and beliefs *i.e.*, mindsets, of those comprising the audience. Distinguishing the primary mindsets within a group or across seemingly similar groups (mindset segmentation) and adapting methods or materials to appeal to these mindsets, could enhance program engagement and boost the realization of program objectives. There are several audience segmentation strategies for influencing health behaviors [1]. The combination of conjoint analysis and cluster analysis is an emerging method utilized in this approach.

1.1. Previous Applications

The complexity of human behaviors creates a challenge for health educators. An individual's decision is generally influenced by a network of factors [2]. Disentangling the more important factors in the decision-making process can help educators develop more successful behavior change programs. Conjoint analysis is a technique that can be used to help determine which factors of a particular human experience are most important to a study participant [3].

The value of conjoint analysis in public health education programs was demonstrated several decades ago. Previous studies have used this method to evaluate specific aspects of health programs, to identify what type of program would be most successful for the target population. In 1989, conjoint analysis was used to evaluate attributes of a smoking cessation program [4]. Later, in 2006, this technique was used to evaluate preferences for cost and intervention strategies for diabetes prevention programs [5]. In 2009, conjoint analysis was used to help develop walking programs for older adults, to ascertain the preferred program duration, frequency, incentives and setting, to maximize acceptability and participation [6]. Despite its potential, few recent applications of this method to health promotion program development have been located.

Mindset segmentation takes conjoint analysis a step further by identifying response differences among the population as opposed to treating participants as a single group. It has been suggested that segmentation by individuals' attitudes and behaviors plays an essential role in health communication and disease prevention efforts, and this has been explored as a general strategy [1] [7] [8]. However, the combination of conjoint and cluster analysis through mindset segmentation appears to be primarily applied to product development.

Mindset segmentation has been recognized as a relatively quick way to describe individuals' preferences and how they vary among a given population. Recent studies have demonstrated the principle of conjoint analysis and mindset segmentation in food product development. This has included consumer responses to the appeal, preferences, and consumption of meat-free alternatives, rice products, and conventional dairy products [9] [10] [11]. These same principles have extensive potential for creating or marketing health education programs. Educators can use mindsets to inform a wide range of program development features (e.g., cost, setting, delivery mechanism, content) as a way of tai-

loring interventions to the unique preferences and values of specific segments of target populations. As such, mindset segmentation is a way of integrating the science of consumer behavior with the science of behavior change to magnify the impact of public health initiatives across communities [4].

1.2. Purpose

The purpose of this study is to demonstrate how mindset segmentation can be used to create and/or market health programs. This is achieved through exploration of an example study to determine if willingness to participate in health education surveys varies with different consumer mindsets.

1.3. Context/Example Application

Questionnaires and surveys are a useful tool in health research and commonly used to inform program development and evaluation. A survey application can help assess customer expectation and satisfaction, justify need for program and/or budget (accountability), measure behavior change or intent to change behavior. Accuracy of results generated from questionnaires is often limited by quantity or quality of responses. Finding a way to improve the survey experience is one way to overcome these limitations.

To address this challenge, a study was developed using mindset segmentation to determine how mindsets among the public can be used to improve survey participation. This type of information can be used to inform health educators on how to appeal to the primary mindsets, improve participation in the survey process, and ultimately use this data to increase the impact and reach of their programs.

2. Materials & Methods

The study, *Taking Surveys*, focuses on why people will or will not participate in the survey process. This example applies most directly to survey methods used for program development or evaluation, but the concept of mindset segmentation has the potential for application to other aspects of education, health interventions and behavior programs as well.

2.1. Study Design

This study utilized the Mind Genomics® (MG) system, a cognitive science that applies a combination of conjoint and cluster analysis to identify patterns of thoughts (mindsets) within a population [12]. This system uses responses to a set of specifically constructed survey elements to address the overarching question, *what factors motivate decision making?*, as a means of highlighting the factors that can help predict behaviors.

The MG survey design can produce meaningful statistics with a relatively small number of participants (approximately 50 - 100). The technique categorizes a population into subsets, based on the importance ascribed to the survey

elements. The BimiLeap (<https://www.bimileap.com>) online software application was used in this study to facilitate the segmentation of primary mindsets within our study population. This program handles inputting of the MG survey design and calculates basic statistics for segmentation analysis.

2.2. Procedure

The steps involved in designing the study and survey questions are consistent regardless of the topic; they are outlined below [12].

- 1) Clearly state the purpose of the study.
- 2) Formulate the topic/question of interest and the rating scale.
- 3) Identify four main attributes that describe the topic of interest.
- 4) Describe distinct elements within the main attributes.
- 5) Distribute to target audience.

A clear purpose statement is fundamental to formulating the overarching question for survey design. The goal of this study was to identify motivations for survey participation *i.e.*, what motivates people to participate in the survey process (step 1). By understanding the motivations, community health educators can design surveys to better engage their target audience.

2.3. MG Survey Design

Conjoint analysis involves asking a single question multiple times while varying key features and asking the participant to assign a rating to each variation. In this study, the root question of interest was: “How likely are you to take this questionnaire?” with a rating of 1 = NOT very likely to 5 = VERY likely (step 2). This technique is demonstrated in **Figure 1**.

For conjoint analysis to be effective in predicting human behavior, the study must include attributes relevant to the human experience and the decision making process (step 3). This involves identifying overarching themes that impact the question of interest. For this study, a literature search was conducted using the following key words: survey, participation, willingness, determinants, perspective. Informal interviews among colleagues were also conducted to create a list of survey qualities that are salient to those debating survey participation. An iterative process of discussion, prioritization and comparison to literature was used to reduce the list to four specific topics or “silos” that are appropriate across a wide range of questionnaire types and styles. The silos, as labeled in **Table 1**, are referred to as Question A, B, C, and D.

The fourth step in study design is to identify distinct elements within each silo, to capture a range of scenarios that reflect the real-world experience. Elements are stand-alone phrases that elicit an emotion or feeling while “painting a word picture” [13] for the participant. Ultimately, participants are asked to rank these elements; the more succinct but descriptive the element, the more constructive the response. The final list of elements developed for this study are presented under each silo in **Table 1**, labeled as A1, A2, ... D4.

| |
|--|
| <p>How likely are you to take a questionnaire with the following characteristics? 1 = NOT very likely to 5 = VERY likely.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Addresses concerns in your community <input type="checkbox"/> Takes 10 to 12 minutes <input type="checkbox"/> Donation to charity will be made upon completion <input type="checkbox"/> Pen and paper ... delivered and submitted by post (mail) |
| <p>How likely are you to take a questionnaire with the following characteristics? 1 = NOT very likely to 5 = VERY likely.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Addresses concerns in your community <input type="checkbox"/> Takes 4 to 6 minutes <input type="checkbox"/> Small monetary compensation upon completion |
| <p>How likely are you to take a questionnaire with the following characteristics? 1 = NOT very likely to 5 = VERY likely.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Contributes to society as a whole <input type="checkbox"/> Takes 2 to 3 minutes <input type="checkbox"/> Donation to charity will be made upon completion <input type="checkbox"/> Pen and paper ... delivered and submitted by post (mail) |

Figure 1. Survey questions/vignettes as viewed by participant. Vignettes are unique permutations or sets of 2 to 4 elements presented one at a time to participants for ranking.

The BimiLeap software captures basic demographic information such as age and gender, and provides an option for the researcher to include an additional, preliminary multiple-choice question and open-ended question to help further identify the audience. Once the foundational design is complete, the software creates a series of distinct permutations of the design, known as “vignettes”, by combining 2 to 4 elements from different silos [13]. A total of 24 vignettes are presented to each participant, who rates them using the rating scale identified in step 2. This design ensures that all elements are equally represented while no two participants see the same combination of questions. Examples of vignettes that a participant would have encountered as part of this study are shown in **Figure 1**.

2.4. Distribution and Participation

Once the survey is ready for distribution, the software generates a link which allows the researcher to directly source participants and deliver the survey via email, social media, or other forms of outreach. Local participants were recruited for this study via the Nextdoor community social platform and by e-mail to previous community program participants. The Nextdoor filters were used to target local participants, preferred for this study to more accurately inform community educators in the immediate region.

A participation cap of 150 was set as part of the design. This number exceeds

Table 1. Top-Down and Bottom-Up Analysis of Study Data. Green numbers indicate attributes that are significant to each mindset. These attributes, along with additive constants, are used to interpret unique preferences for each mindset cluster.

| Group / Mindset (MS ¹) | Top-Down Analysis | | | | Bottom-Up Analysis | | | |
|------------------------------------|--|-----|-----|-----|--------------------|-----|-----|-----|
| | Total | MS1 | MS2 | MS3 | Total | MS1 | MS2 | MS3 |
| | 150 | 41 | 54 | 55 | 150 | 41 | 54 | 55 |
| Base Size ² | 61 | 57 | 66 | 59 | 23 | 30 | 18 | 20 |
| Additive Constant ³ | | | | | | | | |
| Element | Question A: What is the benefit of participating? | | | | | | | |
| A1 | Benefit of participation: Contributes to society as a whole | | | | 1 | 3 | 3 | |
| A2 | Benefit of participation: Addresses concerns in your community | | | | | | 1 | |
| A3 | Benefit of participation: Impacts you or your family directly | | | | 2 | 8 | 1 | |
| A4 | Benefit of participation: Interests you but doesn't directly impact you | | | | 3 | 5 | 6 | |
| Element | Question B: How long does it take to complete? | | | | | | | |
| B1 | Takes 2 to 3 minutes | | | | 2 | | 12 | |
| B2 | Takes 4 to 6 minutes | | | | 3 | | 12 | |
| B3 | Takes 8 to 10 minutes | | | | 3 | | 12 | |
| B4 | Takes 10 to 12 minutes | | | | 3 | | 11 | |
| Element | Question C: What is the motivating factor (i.e., incentive)? | | | | | | | |
| C1 | Small monetary compensation upon completion | | | | 2 | | | 6 |
| C2 | Entered into a draw for a prize upon completion | | | | 1 | 1 | | 2 |
| C3 | Donation to a charity will be made upon completion | | | | 1 | 8 | | 4 |
| C4 | Summary of how the results are being used | | | | | | 2 | 2 |
| Element | Question D: How is it delivered (i.e., accessibility)? | | | | | | | |
| D1 | Participate electronically from the comfort of your home | | | | 4 | 8 | | 6 |
| D2 | Participate from your phone ... take the survey anywhere, anytime | | | | 2 | 10 | | 6 |
| D3 | In-person participation ... at a convenient location such as work or a store | | | | 4 | 5 | | 10 |
| D4 | Pen and paper ... delivered and submitted by post (mail) | | | | | 11 | | 8 |

¹ Group / Mindset (abbreviated MS) - Total and subsets of population based on "mindsets" using k cluster analysis

² Base Size - number of participants that fall within each mindset, with sum equal to the total number of participants

³ Additive Constant - quantification of overall "attitude" toward topic, despite elements (i.e. taking questionnaires)

the minimal statistical threshold while adhering to budget constraints. All responses were received in approximately 3 days. Most of the participants, 99.3%, ranged in age from 25 to 65+ years old, with the greatest representation (25%) falling within the range of 45 to 54 years old; 75% of the participants were female.

2.5. Analysis

The data is analyzed with the study software, using ordinary least squares regression to estimate the relative value of each element related to the topic. K-means cluster analysis is then used to group the respondents into two and three population segments of mindsets [14]. The output is presented on a large spreadsheet from which the researcher can review the clustered data to summarize and interpret these segmentations as mindsets. The interpretation is the primary outcome of this analytic method.

The population segmentations in **Table 1** display regression coefficients for each element. Based on patterns evolved from previous applications of this method in a variety of studies, coefficients of 8 or higher (≥ 8) are considered strong contributors to a given mindset [14]. Negative coefficients indicate that the presence of the element is not of value to the given mindset. For clarity, these have been removed from the table. The data are presented in two directions: top-down analysis and bottom-up analysis. The top-down analysis assesses participant ratings from highest to lowest, to look at those attitudes which drive positive reactions (*i.e.*, motivations for participating in the survey process). The bottom-up analysis assesses participant ratings from lowest to highest, to look at those attributes which drive people away from the desired action or product (*i.e.*, diminish likelihood of participating in the survey process). Both perspectives are useful tools in interpreting mindsets.

Another relevant data point is the additive constant which is unique for each mindset. The additive constant corresponds to the overall attitude or interest towards the topic, regardless of the elements presented in the vignettes [4]. A high additive constant (>50) indicates high baseline interest and typically correlates with lower regression coefficients among elements. High additive constants also indicate a potential for further increasing interest as the identified elements are employed. In this study, the high additive constant in the top-down analysis means that the participants are likely to engage in the survey process regardless of the factors described by the elements. These tools are to be analyzed in unison (**Figure 2**).

3. Results

Several key drivers were identified as important for survey participation including impact of survey, and the time and ease of completion. Three unique mindsets, as interpreted and named at the discretion of the researcher, are identified and described in **Figure 3**. The additive constants for all three mindsets are

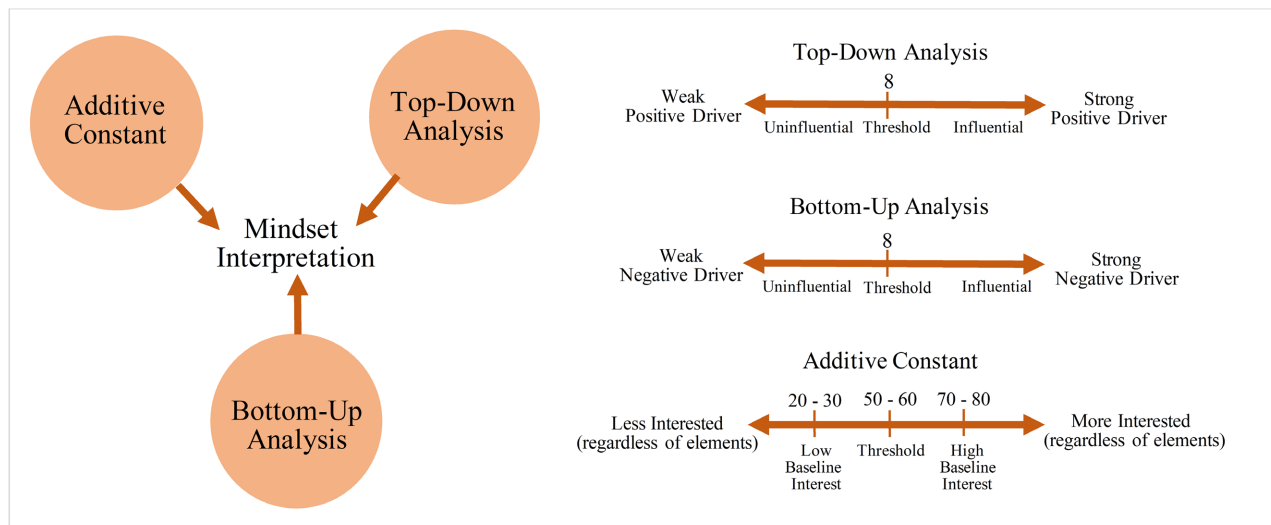


Figure 2. Mindset Interpretation and Evaluation Scales. Mindset interpretation relies on multiple inputs: additive constants, top-down analysis and bottom-up analysis. Thresholds, which are based on historical applications of this method, are used to assign relative importance to the question and elements.

Mindest Summaries:

Mindset 1: For The People

This mindset cares more about how the survey will impact others than themselves, whether it be through donations or the study's contributions to others.

Mindset 2: On My Own Time

This mindset values their time immensely and prefers to take surveys when they have free time, especially from the comfort of their own home.

Mindset 3: Intrigued Techie

This mindset is very interested in the the impact of the survey, regardless of who benefits from results. They are comfortable with modern technology and prefer to use it.

Figure 3. Mindset Summaries. The interpretations are identified and described based on the preferences of mindsets identified in **Table 1**.

considered high (**Table 1**), which results in relatively low regression coefficients. Still, the top-down and bottom-up analysis allows the researcher to hone in on elements that drive each group to take, or not to take, the questionnaire. These three facets (top-down, bottom-up, additive constants) are interpreted together to generate an overall preference or personality for each mindset. Next, the mindsets are compared and contrasted to pinpoint their distinctive characteris-

tics, and to refine or explain any ambiguities. These interpretations are frequently iterative.

The three mindsets found in this study provide key information on how to structure the survey process to maximize participation. Based on the results shown in **Figure 3** the following tactics can be used to customize community surveys for this region, to increase participation and quality of responses in the targeted population:

Mindset 1: To attract members of the community who relate to Mindset 1, create a survey that links a monetary donation to each completed questionnaire and appeals to emotions by explaining how the data will impact quality of life for others.

Mindset 2: To draw more participation from community members in Mindset 2, create a short and concise questionnaire that is to the point and delivered electronically outside of work/school hours.

Mindset 3: To increase participation by community members who relate to Mindset 3, create a digital questionnaire that clearly states how the data will be used, and its potential impact.

4. Discussion

Mindset segmentation relies on the interplay of conjoint and cluster analysis. The utility of information that can arise from this type of analysis has been demonstrated in the science of consumer behavior for product development and marketing [9]-[14]. The *Taking Surveys* study was conducted to demonstrate the potential application of this process to community health programs. In the current analysis, study participants were clustered according to how they think; the combinations and strengths of their preferences resulted in three distinct mindsets within this study population (**Table 1**). This type of output is what sets this approach apart from other methods.

The comparison of the three groups individually to the total population in **Table 1**, illustrates that the three distinct mindsets are unique in their preferences. Cluster analysis, the second phase of this analytic approach, generated the regression coefficients used to make these distinctions. Mindset segmentation provides key information that would go unrealized if the analysis only consisted of regression coefficients from the population as a whole. Additionally, this type of segmentation is not commonly achieved through socio-demographic analyses. An examination of these results by age and gender [not reported here], provided no apparent distinctions. This is an important observation because it further suggests the value of mindset segmentation for interpretations of human preferences and behaviors. Whereas socio-demographic factors are typically used to uncover broad and general trends in a population, mindset segmentation can be used to help predict behaviors [15].

The success of a health promotion program relies on the willingness of the public to participate. Mindset segmentation provides a means of identifying the

variety of potential motivators across a given population. A primary limitation of the MG process is that it is impossible to capture all elements in a single study. For this current technique, qualities of the topic of interest are limited to 4 main attributes or silos, requiring the researcher to strategically select and omit factors (step 3) that may play a pivotal role in mindset evaluation. A second study could be conducted to test additional attributes. In this study, time of day the survey is sent and survey structure (*i.e.*, type and number of questions) are two additional characteristics that could be evaluated in a second study. MG is a developmental science, as experience with the process increases, ability to interpret and apply the data improves. Additionally, as with most studies, adequate representation of the identified target population plays a major role in the utility of the analysis.

5. Conclusion and Implications for Research

Mindset segmentation can be used to evaluate and customize programs, activities, methods, and messages to positively influence healthier behaviors. In reference to a specific topic and within a targeted community, the process of mindset segmentation facilitates identification of predominant preferences and enhances insights into probable behaviors. Understanding and adjusting to the values and attitudes as identified, increases potential to successfully reach, engage, and motivate our communities. By acknowledging and embracing this diversity of thought, and with a better understanding of the factors and preferences driving individuals' behaviors, educators and researchers can be better equipped to develop programs that effectively influence behavior change.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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