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SHORT COMMUNICATION

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## Illustration of a market segmentation technique using family-focused prevention program preference data

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### Abstract

Using family-focused prevention programs as an example, this paper illustrates how consumer research techniques can be employed to segment populations targeted for the promotion of preventive interventions. Two multivariate statistical techniques, conjoint analysis and cluster analysis, can be used to clarify differences in program preferences among target population segments which can be helpful in tailoring program promotions to those segments. Following a summary of the rationale and indications for preference-based segmentation, an application of the two techniques is presented. Using data on parents' preferences for various features of family skills programs, three clusters were identified which varied along several dimensions, including preferred level of effort expended for a program. Practical strategies for program promotions suggested by segmentation analyses are outlined.

### Introduction

The purpose of this report is twofold. First, it will summarize the rationale for the application of consumer research techniques to the segmentation of populations targeted for family-focused prevention programs. Second, this report will illustrate how the techniques of conjoint preference analysis

and cluster analysis can facilitate this type of segmentation effort.

Recently, researchers evaluating the effectiveness of interventions promoting health or health risk reduction have emphasized the need to investigate factors influencing recruitment response rates (Erfurt *et al.*, 1990; Orden *et al.*, 1990; Spoth and Redmond, 1991a,b, 1995; Wagner *et al.*, 1991; Glasgow *et al.*, 1992; Spoth and Molgaard, 1993; Spoth *et al.*, 1993). A market segmentation approach to the improvement of recruitment response rates focuses on (1) identification of population segments with members sharing similar program preferences and needs, and (2) tailoring recruitment strategies to those segments.

Market segmentation is a process for splitting a population of potential consumers into two or more groups. Simple rules of dividing the population can be used to guide market segmentation (e.g. splitting the audience targeted for parenting skills programs into dual versus single parents). Alternatively, multivariate statistical techniques can be applied toward this end. Regardless of the method employed to segment a population, each segment must contain elements which are generally more like each other than they are like the elements in other segments. The bases of these similarities should be easily interpretable and should provide useful guidelines for the promotion of products or services specific to each segment.

The study of population segments defined by preferences for family-focused prevention programs is an example of 'social' market segmentation. Although market segmentation techniques are frequently applied to the promotion of consumer products, there are precedents for their use in

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social marketing contexts. For example, a project conducted by the Canadian government segmented Canadian teenagers into nine groups, based upon lifestyles, attitudes and beliefs considered relevant to drug abuse behaviors. This allowed the government to promote drug-abuse prevention programs in ways that took advantage of the intervention-relevant differences among the groups most at risk (Mintz, 1993).

The literature indicates that market segmentation analyses offer a number of possible benefits. First, these analyses have been shown to facilitate the development of effective product or service promotional strategies directed toward subpopulations with relatively well-defined sets of preferences and needs (Zikmund and D'Amico, 1986). Additionally, consumer research has demonstrated that segmentation of markets typically aids the design of more satisfactory products or services (Haley, 1968; Boyd and Walker, 1990; Kotler and Armstrong, 1991). Market segmentation also allows an organization to target the market it can serve most effectively, facilitating delivery of products or services which serve those markets better than competing organizations.

Although segmentation generally facilitates the development of satisfactory products or services and guides effective product promotion, it can also incur significant costs. For example, creating several programs to better satisfy families with different needs may incur more program development and promotion costs than an organization offering the programs can afford. Adjusting advertising themes or programs to more effectively reach and persuade different target audiences or population segments can also be expensive. These costs must be balanced against the benefits to program participants and sponsoring organizations, as well as the potential increment in program participation levels achieved.

One important consideration in addressing the utility of market segmentation strategies concerns the manner in which variables used to derive segments will be quantitatively treated. The approach illustrated in this paper applies multi-

variate statistical techniques which can require more resources than some alternative methods. More rudimentary methods of segmentation are also available. For example, one might decide to divide a target audience for family skills programs into dual versus single parent segments, recognizing that these groups may not only have different parenting concerns, but also may require different meeting times and lengths, and may be more easily reached and persuaded by different types of promotions. However, the use of a single variable, such as marital status, often fails to take into account the many other variables which may affect potential program participants' interest in program participation or ultimate satisfaction with the program. Therefore, it is often argued in the marketing literature that multivariate approaches to segmentation are preferable, particularly in the case of products and services with multiple attributes of interest to consumers (Weinstein, 1987; Boyd and Walker, 1990). Multivariate approaches will generally yield a more accurate grouping on the important bases of consumer choice, unless consumers typically use only one or two features of a product or service class in making those choices.

The consumer research literature describes a wide range of variables used to segment markets. These include demographics, psychographics (values, lifestyle, social class and personality variables), product-relevant attitudes, product usage information, involvement in the product category, perceived benefits and attribute preferences (Peter and Donnelly, 1992). The choice of variables guiding segmentation is important to consider, given that these variables must reflect both the likely determinants of consumer choice, as well as provide useful data to guide marketing decisions (e.g. new product development, pricing and promotion decisions; see Wind, 1978).

To address this study's objectives, the authors decided to base segmentation analyses upon prospective consumer preferences for program features (e.g. program locations, program schedules, types of facilitators). This type of segmentation divides the population into groups based upon preferred

features of the program, so that a segment consists of individuals or families which desire similar features. Knowledge of the target segment's program feature preferences can be especially helpful in guiding the development of optimal mechanisms for program delivery (e.g. scheduling of program sessions). In terms of promotion, such knowledge will also suggest which features of the program should be emphasized in communications to the consumer. Conjoint analysis was employed to evaluate the importance of prevention program features. This type of analysis is frequently used by consumer researchers to estimate the desirability of each feature of a program or service for prospective consumers.

Although there can be some drawbacks to the application of conjoint analysis, it can be particularly useful when consumer preferences for complex services are being evaluated. More specifically, there are various methods which can be used to assess preferences for each feature of a prevention program, many of which are more straightforward than conjoint analysis. For example, prospective program consumers could be asked to directly rate the desirability of each program feature and these features could be rank ordered on the basis of their desirability ratings. However, researchers have argued that this type of approach often has questionable validity, particularly in the case of a program which (1) has multiple attributes often considered in participation decisions and (2) elicits considerable consumer involvement in the decision-making process (see Engel *et al.*, 1991a,b). In such cases, decisions are frequently the result of a complex evaluative process in which prospective consumers weigh the *relative values* of program features through trade-off analyses. For instance, in choosing a skills training program, a parent might be willing to 'trade-off' the desired features of a program having a convenient location and a low monetary cost for one that has other relatively more highly desired features (e.g. weekday evening schedule and focus on drug prevention), but is less conveniently located and has a program fee. The

advantages of conjoint analysis in the evaluation of consumer preferences has been extensively covered in relevant literature (e.g. Johnson, 1987; Spoth, 1989, 1992a; Spoth and Redmond, 1993).

The preference data derived from conjoint analyses can be used in cluster analyses to define segments of a targeted population. Procedures for combining the application of conjoint preference analyses with cluster analyses are described in the next section.

## Method

### Subjects

Subjects for this study were 202 parents of sixth and seventh grade students selected from economically stressed rural midwestern counties. Economically stressed counties were chosen since the authors were planning to target these counties for the promotion of family-focused prevention programs subsequent to this study. Economic stress was determined by school district eligibility in a federally supported school lunch program. Eligibility for this program is based upon the average gross annual income level for families in a given school district.

A survey was administered which was designed to assess parent preferences regarding family skills-focused prevention programs and thus requested detailed preference information from respondents. A screening question was employed in order to minimize threats to the reliability and validity of preference data posed by eliciting responses from parents with little interest in the topic. Respondents were thus asked whether they would ever consider participation in a parenting program. Parents who indicated no interest in participating in any such program were considered inappropriate for the survey. Parents who said that they might be interested, or who were definitely interested, were invited to continue participation in the survey; 81% of all contacted families with sixth or seventh graders indicated such interest and were considered eligible for survey participation. Nonetheless, limits on the

generalizability of the findings associated with the survey's screening procedures should be held in mind when considering survey results. Complete preference information was obtained from 79.5% of eligible respondents ( $N = 202$ ).

Demographic information from the sample revealed that 168 of the respondents (82.8%) were mothers, 184 (90.6%) were married and 161 (79.3%) were employed at least part-time. Eight (3.9%) of the respondents had received less than a high school education, with 132 (65%) completing some post-high school training. The average number of children in each family was 2.8. The majority (89%) of households studied consisted of four or five family members. Approximately 95% (195) of the respondents were between the ages of 30 and 50.

### Procedures

First, conjoint analysis was used to estimate the desirability of the various features of parenting programs to each respondent in the study. Cluster analysis was then utilized to assign these respondents to groups in which similar features were desirable. Segmentation *per se* does not require the use of any particular statistical technique. However, as indicated in the Introduction, the combination of these two multivariate statistical techniques represents a reasonable approach to the complex case addressed in this study.

#### Conjoint analysis

The relative desirability of various program features assessed by conjoint analysis is indicated by part-worth utilities. A part-worth utility is an empirically derived parameter indicating the extent to which an individual desires a particular program feature. Each respondent is asked to give an overall preference rating for a number of hypothetical programs that have systematically varying features. These ratings allow derivation of part-worth utilities for the program features composing the hypothetical programs. Essentially, the calculation involves dummy-variable regression analyses, with the features of the hypothetical programs dummy-coded as the independent variables, and the program preference rating as the dependent variable.

The value of deriving part-worth utilities through conjoint analysis has been frequently indicated in marketing contexts (Wittink and Cattin, 1989) and applications to prevention programming have been previously demonstrated (Spoth, 1989, 1991, 1992a,b).

In this study, conjoint data were collected through computer-assisted telephone interviews. Multiple callback procedures (up to 20) were applied in contacting the selected households. The conjoint analysis software, known as 'Adaptive Conjoint Analysis' (Johnson 1987), guided the conjoint portion of the telephone interviews. This software is useful in enhancing the reliability and validity of findings (Wittink and Walsh, 1988) and improving the cost effectiveness of conjoint data collection, by serving to maintain respondent interest and reduce the likelihood of information overload in respondents (Johnson, 1987).

The conjoint survey instrument used in this study was based upon prior survey research and literature reviewed by the authors. Categories of program features and individual features (in parentheses) selected for evaluation were as follows.

- *Meeting length* (lasts 1 h, 2 h, 3 h).
- *Program duration* (lasts 1 week, 5 weeks, 10 weeks, 15 weeks).
- *Time of meetings* (weekdays in the daytime, weekday evenings, weekends).
- *Travel distance to meetings* (5 miles, 10 miles, 20 miles).
- *Meeting location* (meets in homes of parents enrolled in the program, at a school, at a church, at the respondent's workplace, at an extension service office).
- *Research base* (based on extensive research, not research based).
- *Program focus* (teaches ways to improve family communication, to manage family conflict, to help children say no to drugs, to manage children's behavior, to keep children involved in the family).
- *Facilitator background* (taught by parents, experts in drug prevention, school teachers, child development specialists).
- *Program format* (program has self-help home-

work only and no program meetings, meets only once and has self-help homework, meets once every 2 weeks and has self-help homework, meets once each week and has self-help homework).

- *Types of support* (parenting specialist will periodically call, participants can call with questions, program uses support group of other parents).
- *Program endorsements* (endorsed by parents, by teachers, by school administrators).

Thus, a pool of 11 categories of features was used in this study, with a total of 39 individual features.

In order to estimate the degree of preference for each of the 39 features evaluated during the interview, subjects were presented with several sets of possible programs, each of which was based upon a combination of features. The initial segment of the computer-guided interview requested that respondents indicate their rankings of the individual features within each feature category, in addition to the importance they placed on the difference between the most and least preferred individual features on a four-point scale. Interviewers next presented a series of computer generated pairs of possible programs, which were composed of subsets of the 39 features. Respondents were asked to indicate a preference for each of the pairs of programs and the magnitude of that preference. Detailed descriptions of these and subsequent interview components have been provided elsewhere (e.g. Spoth, 1989; Spoth and Redmond, 1993; Spoth *et al.*, 1993). In addition to the conjoint interview, respondents were queried about sociodemographics, parenting beliefs and utilization of parenting resources (e.g. books on parenting).

### Cluster analysis

The cluster analysis approach chosen for this study consisted of (1) identifying outliers via hierarchical clustering, (2) eliminating outliers from the analysis, (3) hierarchically clustering the remaining respondents, such that clusters were maximally similar, and (4) determining the best number of clusters, based primarily upon the 'interpretability' of the cluster solution. Interpretability refers to the

degree to which clusters can be clearly understood as coherent groups which have different program feature preferences, and therefore might respond differently to varying promotions and programs. Although a number of numerical and graphical techniques have been suggested (e.g. Mojena, 1977), the solution chosen must remain somewhat subjective, based on the relevant substantive interpretation of the clusters formed.

After deriving the part-worth utilities of the 39 features using conjoint analysis, the cluster analysis was performed on the part-worth utilities. Based on a recommendation from Punj and Stewart (1983), the between groups average linkage (based on Euclidean distance) with Ward's minimum variance method of cluster formation (Ward, 1963) was used to identify and eliminate respondents considered to be outliers. In this case, a total of six respondents, out of the original 202, were determined to be outliers. Therefore, the final cluster analysis was based on 196 survey respondents. Once the outliers were identified and removed, the within groups average linkage clustering method was utilized to formulate three-, four- and five-cluster solutions. Each of these cluster solutions displayed an adequate degree of cohesion. Additional analyses were employed to determine the most significant characteristics of each of the final clusters. Specifically, an analysis of variance was conducted to compare the part-worth utilities for each of the individual cluster solutions. Examination of salient program feature preferences identified through this procedure revealed the three-cluster solution to be the one providing the most substantively interpretable results. Each of the clusters in the three cluster solution had several part-worth utilities significantly different from one another. These differences allowed the identification of the important program features for each of the final three clusters.

### Results

Table I summarizes selected, statistically significant preference differences among the three clusters of parents. More detailed descriptions of cluster differences are provided below.

**Table 1.** Differences in parent clusters based upon analyses of part-worth utilities associated with program attribute levels

Cluster	Preferred program duration	Type of facilitator preferred	Preferred program content	Endorsement
1: 'Lower effort'	strongest for 1 week weakest for 10 weeks	parent facilitator	no strong preferences	by parent
2: 'Higher effort'	weakest for 1 week strongest for 10 weeks	drug prevention expert	strongest for drug prevention	by parent
3: 'Moderate effort'	middle range for 1 and 10 week programs	child development specialist	strongest for family communication/ weak for drug prevention	by teacher

### Cluster 1: lower preferred effort and limited preference for specific program content

Compared to the other clusters, the respondents in this cluster appear to prefer program features associated with the expenditure of relatively limited time and effort. They show strong preferences for lower levels of program time commitments, while exhibiting few strong preferences concerning other program features. Cluster 1 members prefer shorter meetings and strongly prefer 1-week programs to 10-week programs. Additionally, members of this cluster do not have strong preferences concerning the content focus of the program, exhibiting a slight preference for family communication and not much preference for drug abuse prevention. This may reflect a lower level of perceived need for such programs, or a lack of knowledge of these programs and a consequent inability or unwillingness to make distinctions among key program features. This cluster is also characterized by lower levels of use of books on parenting, parent support groups and parent education programs. Moreover, Cluster 1 members would apparently prefer a program endorsed by parents rather than by teachers or school administrators.

### Cluster 2: higher effort and drug abuse prevention preference

This group has a strong preference for programs that focus on preventing drug use among children. Members of this group indicate relatively stronger preference for a 10-week program, longer meetings and more frequent meetings. They also report the

greatest past use of educational programs for parents. Finally, they prefer a program facilitated by a drug use prevention expert and program endorsements by other parents.

### Cluster 3: moderate effort and family communication preference

This group prefers a family communication focus and shows a relative lack of preference for drug abuse prevention. They also show equal preference to Cluster 2 for frequent meetings, but show a weaker preference for lengthier programs. They strongly prefer the facilitation services of a child development specialist. Finally, they report reading more books on parenting but less use of educational programs for parents than Cluster 2 members.

## Discussion

The primary purpose of this paper is to illustrate methods for identifying segments of consumers based upon their preferences for family-focused prevention programs. Such segmentation analyses can be used to guide more precisely targeted promotions, resulting in higher program recruitment rates (*cf.* Peter and Donnelly, 1992). Related to this point, promotions guided by preference segments can facilitate consumer self-selection processes and a better match between consumer preference and program delivery, format and content, thus improving the likelihood of consumer satisfaction and compliance (see Kotler and Armstrong, 1991).

As suggested previously, market segmentation

can serve two purposes: (1) development of prevention programs with features specifically designed to meet target consumer needs and/or (2) development of tailor-fit promotional themes or media-based mechanisms appealing to each specific segment. The present report illustrates an approach that primarily serves the second purpose. The results indicated some clear differences among the segments with respect to program features preferred; in some cases, these differences suggest tailor-fitting key program design elements to the segment, such as program duration and type of facilitator. Tailor-fitting design elements may or may not be possible given (1) the need to be consistent with program designs indicated by available outcome research and (2) limits imposed by the sponsoring organization's budget or other constraints. However, demonstrated differences among segments nonetheless argue for careful consideration of program promotional plans. Thus, consistent with the primary objective of illustrating the application of preference-based segmentation analyses, the following discussion will provide examples of practical promotional strategies suggested by the segmentation analysis results in this study. The intent is to illustrate possible strategies which could be evaluated in future research, rather than to draw definitive conclusions from the study's results.

All of the segments defined by the cluster analyses could be considered a target for a family-skills focused prevention program promotion. Since access to preference-based segments cannot be readily achieved via mechanisms often available to program or product promoters (e.g. media advertisements targeting specific audiences based on local sociodemographics), broad-based promotions reaching large concentrations of parents, but targeting specific clusters, could be employed (e.g. through schools or media utilized by most parents). Additionally, findings indicate Cluster 1 members would likely be the hardest to reach and persuade to attend, since they read fewer publications about parenting, attend fewer education and support programs, and report relatively less use of parenting resources. Members of this cluster may perceive a

lower need for programs and therefore would likely be reluctant to make much of an effort to seek information about such programs or to attend them. Given these limitations, practical strategies for promoting programs among families in this cluster might focus on brief awareness building or motivation-oriented programs promoted by schools and designed to help parents become more aware of circumstances under which it is helpful to improve parenting skills, particularly family communication skills.

In general, consumer research literature suggests that for lower motivation consumers, successful program promotions should utilize messages which are highly memorable, frequently repeated, simple or limited in number of preferred attributes presented, and suggestive of positive images to associate with program use (e.g. Engel *et al.*, 1991a,b). To attract parents who are less ready to utilize parenting resources, engage in prevention program activities or actively seek out parenting resources and information about programs, information on a small number of high-importance program attributes (e.g. short, infrequent meetings at convenient times) might best be presented in a simple and attention-getting format in the media, or places parents frequent. For example, television, radio or newspaper ads may be effective. In addition, promotional materials at local store counters, physician offices, schools and in places of work, may also increase program salience. Finally, the use of recognized experts to promote programs to this segment, or endorsements from other parents, should be helpful.

In contrast to Cluster 1, Cluster 2 has specific strong preferences and will likely be easier to persuade to utilize programs. Because of their preferences for expending higher levels of effort, the members of this cluster would likely engage in a more active information search (Beatty and Smith, 1987); they are thus more likely to actively seek out ways to address concerns about their children's use of substances. Therefore, advertising in such media as the *Yellow Pages* will be more likely to succeed than with Cluster 1 (although this does not imply that mass media should be

ignored in the latter case). Specific promotion themes could focus on the credentials of the facilitator and the importance of positive drug abuse prevention outcomes. Programs which are relatively more intensive should be relatively more appealing, and this can be used as a point of persuasion in promotions. This segment would be more likely than Cluster 1 to read promotional ads, books and magazines on parenting, as well as those displayed by educational and civic institutions. Cluster 3 may also be reachable in ways similar to Cluster 2, but promotions would likely be more effective if they emphasized the credentials of the facilitator as a child development specialist and a family communications program focus, as appropriate.

In conclusion, this paper illustrates the combined application of conjoint and cluster analyses to the segmentation of prospective family-focused prevention program participants on the basis of program feature preferences. Despite the cultural and geographic homogeneity of the sample, results suggested that there were important differences in respondents' program preferences; these differences defined subgroups preferring substantially different features in a prevention program. For example, these subgroups indicated relatively different levels of preference for various types of effort-related program features and for program content. Findings indicating that families differ in the kind of family-focused prevention program they prefer provide some suggestions about effective program promotional efforts. Thus, results highlight the potential utility of the analytic approach demonstrated in this study; the authors view it as particularly helpful as a complement to program efficacy study. Much additional research is needed to determine how to best incorporate the methods demonstrated in this study with program efficacy research and with other segmentation or marketing methods. Future research could thereby guide the design of family-focused prevention programs which are both efficacious and appealing to well-defined target populations.

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