Small groups are an important and widely used educational format in adult church education. It is estimated that ninety percent of the churches that belong to the Conservative Baptist Association of Oregon provide some type of small group educational opportunity for their adult members. The purpose of this study was to explore the question, "Given certain demographic variables common to all adult Conservative Baptists, can some or all of these variables be used to accurately classify (predict) persons as either small group attenders or nonattenders?"

A literature review established the fact that adult participation in small groups is a neglected topic within educational research in general. No research was found on adult participation in small groups within churches.
A copy of the survey instrument was mailed to 396 randomly selected subject-participants. Data was sought on eight common demographic variables. A return rate of 76 per cent was achieved. Two-group linear discriminant analysis was the statistical technique utilized to derive a discriminant function and the associated classification scores.

While a significant discriminant function was obtained, the subsequent classification analysis failed to yield acceptable results. The percentage of participants in the cross-validation sample who were correctly classified was less than what could have been expected if the classification was based on nothing more than simple random assignment. These results did not support the notion that it was possible to predict small group attendance or nonattendance based on the demographic variables under investigation.
SELECTED DEMOGRAPHIC VARIABLES AS PREDICTORS OF SMALL GROUP ATTENDANCE OR NONATTENDANCE AMONG ADULT CONSERVATIVE BAPTISTS: A DISCRIMINANT ANALYSIS

by

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SELECTED DEMOGRAPHIC VARIABLES AS PREDICTORS OF SMALL GROUP ATTENDANCE OR NONATTENDANCE AMONG ADULT CONSERVATIVE BAPTISTS: A DISCRIMINANT ANALYSIS

I. INTRODUCTION

The use of small groups within Christianity, especially within adult church education, is vital. Providing an opportunity to grow and share in smaller, more intimate groupings, is an essential part of the strategy needed in structuring church life for ministry to and by adults (Richards, 1975).

The fact that participation in small groups is in most cases voluntary (McBride, 1977) raises a significant question. Who is most likely to attend, or not attend, if we offer small groups as a part of our church education program for adults? Such a query is of potential concern for many individuals who have the responsibility for planning and conducting adult education within their churches. Yet, interestingly enough, a very recent and extensive LIRS (Library Information Retrieval Service) search using four major data bases (ERIC, Psychological Abstracts, Sociological Abstracts, and Dissertation Abstracts) revealed that the question and its potential answers has been almost totally overlooked in the literature on small groups in general. It is not surprising then to find this
same neglect in the specific literature on small groups within adult church education.

A potential complicating factor arises due to this void in this basic information. That is, local and national church organizations could potentially adopt the use of small groups without first clearly asserting whether or not such an educational programming format is appropriate for the adult clientele they serve. This less than desirable situation could take place, for example, within the Conservative Baptist Association of Oregon (CBA of O).

Founded in 1949, the CBA of O is a voluntary association of more than 150 churches divided into 11 regional associations located throughout the State of Oregon (with several Northern California churches included). The CBA of O is in turn a member of the Conservative Baptist Association of America (CBA of A). This national body of approximately 1200 churches, established in 1947, is a voluntary association of churches which is located throughout the United States, but especially in the Western, Midwestern, and New England States. The national headquarters is located in Wheaton, Illinois, and the CBA of O headquarters is located in Salem, Oregon.
Statement of the Problem

The central problem that this study addressed was the formulation of a linear model, based on selected demographic variables, to predict (classify) small group attendance or nonattendance among adult Conservative Baptists in the State of Oregon. The model was in pursuit of the question, "Given certain demographic variables common to all adult Conservative Baptists, can some or all of these variables be used to accurately classify persons as either small group attenders or nonattenders?" The following steps were taken to resolve this question:

1. Commonly obtainable demographic variables were selected that would potentially best serve as predictor (independent) variables in a discriminate model.

2. A survey instrument was constructed to secure accurate and reliable data on the dependent (attendance or nonattendance) and independent variables.
   a. Items were developed which adequately measured the variables.
   b. An effective instrument format was designed.
   c. The initial instrument was evaluated by the questionnaire development specialist at
Oregon State University's Survey Research Center.

d. The instrument was revised based on the suggestions provided by the Survey Research Center.

3. The precise instrument was administered to a random sample of the adult members of randomly selected constituent churches in the Conservative Baptist Association of Oregon.

4. Data were analyzed through the use of linear discriminant analysis to obtain a discriminant function, discriminant scores, and classification results.

5. Conclusions were formulated for consideration in using the classification model.

**Objectives of the Study**

Given the nature of the problem and the steps outlined to approach its solution, the following specific objectives related to establishing an adequate classification model were undertaken (Huberty, 1975; Gondek, 1981):

1. Perform a stepwise discriminant analysis using the development sample, the stepping procedure based on Wilks' Lambda, and including all eight of the original independent variables.
2. Obtain the discriminant function based on a reduced number of independent variables.

3. Examine the effect of the individual independent variables in the stepwise discriminant function.

4. Ascertained how well the variables discriminate.

5. Classify the cross-validation sample.

6. Evaluate the effectiveness of the classification results.

7. Test for model assumptions.

**Rationale**

The logical basis for this study is contained in three areas of discussion; namely, (1) the history and nature of small groups as a part of adult education in the local church, (2) an examination of adult participation in educational activities in general and, (3) an overview of linear discriminant analysis as a statistical technique suitable for building the predictive (classification) model which was the focus of this study.

**Small Groups in the Local Church.** Throughout the history of the protestant church small groups have played a major role in meeting the spiritual needs which their members have faced. In past centuries church leaders have used small groups as tools of church spiritual revitalization (Clemmons and Nester, 1974). For example, Hess and
Hess (1977) point out that the "Lesere" or "Readers" arose in Scandinavian countries during the eighteenth and nineteenth centuries because the people wanted a close fellowship not found in the state church. Consequently, they met together in small groups in their homes. Out of these small group meetings grew the Free Church movement.

Within this century, a new small group movement was begun in the 1930's. Institutions such as the University of Michigan, Harvard University, Columbia University, University of Chicago, Temple University, and men such as Kurt Lewin, Jacob Moreno, Raymond Cattell, and Robert Bales played significant roles in pursuing the scientific study of group behavior (Knowles and Knowles, 1959). From this foundational work, along with later works by other men like Carl Rogers, Fritz Perls, Abraham Maslow, Eric Berne, and William Schutz, many studies began to emerge under the rubrics of group dynamics, small groups, encounter groups, growth groups, and training groups (Clemmons and Nester, 1974).

By the late 1950's, small groups had gained acceptance and were increasing in use within industry, education, and in specific, church education. Authors such as Casteel (1957) and periodicals like Pastoral Psychology (1955) extolled the virtues of small groups in the local church.
Snyder (1981), in discussing trends that have brought significant changes in local church life since the mid-fifties, emphasized the fact that small groups often became a key aspect in producing new strength, vitality, and influence for the church. He noted that groups have been used extensively --though sometimes erratically and unwisely-- in evangelical and other protestant movements.

Griffin (1982) is one of many recent advocates of small groups as a part of the programming for adults offered by local churches. Speaking from first-hand knowledge and experience, he says, "I am excited about groups. They have such potential for good" (p. 7). But just what exactly is the nature of the groups he is excited about?

Small groups in the local church can take many shapes and forms. But despite the diversity, Griffin suggests that most all of them can be classified under one of three categories: (1) task groups, groups formed to accomplish a job which cannot be done by one person alone; (2) relationship groups, groups that focus on interpersonal relationships and human companionship; and (3) influence groups, groups composed of people who admit the need for change in their lives and meet voluntarily for mutual exhortation impacting on behavior and attitudes.

Richards (1975), in a discussion on small groups as an educational strategy with adults in the church, lists
eight different applications of small groups: (1) work groups, (2) prayer groups, (3) study groups, (4) therapy groups, (5) nurture groups, (6) action groups, (7) evangelistic Bible studies, and (8) T-group experiences. He stresses the point that any group can be thought of as a small group when the number of persons involved permits and encourages the fullest participation of each individual. However, he also notes that the purpose for which the group meets will have the utmost impact on the way it will ultimately function.

Howard Clinebell (1972), in an earlier volume, lists twenty-three different kinds of groups appropriate for the church. But regardless of the type of group discussed, Clinebell, along with the other authorities, failed to address the question, "Who is most likely to participate in small groups sponsored by the church?" Consequently, in order to adequately address the question, the focus must be shifted to an examination of adult participation in educational opportunities in general, and within church education in specific.

**Adult Participation.** The issue of participation is central to a theory and practice in adult education because the vast majority of adults are voluntary learners (Darkenwald and Merriam, 1982). The National Center for
Education Statistics (1978) reports that such voluntary learning caused about one adult in nine to participate in some type of organized adult education (excluding self-learning) opportunity. This would suggest that some 18,197,000 adults participated. A staggering number, but with the rapid growth trends that are taking place in adult education today, no doubt this figure is now even higher. Calculations show a maximum participation rate of 17.5% of the adult population and an annual growth rate of 2.1% during the 1980's (O'Keefe, 1977).

Concerted efforts have been made to understand how the average or typical participant in adult education could be described. Certainly the idea of an "average participant" is a bit tenuous, but Darkenwald and Merriam (1982) report that such an individual is white, middle class, a high school graduate, and married. These authors further note that, in general, participants tend to be younger, more affluent, and not limited primarily to either sex. Other researchers such as Johnson and Rivera (1965), Aslanian and Brickell (1980), and Cross (1981) support these generalizations.

Numerous factors go into building a profile on the average participant. Long (1983) identifies ten variables that are often investigated in adult education participation studies: (1) age, (2) education, (3) ethnic and
racial factors, (4) family and youthful characteristics, (5) income, (6) learning location, (7) marital status, (8) place of residence, (9) sex, and a general category, (10) other socioecomic variables. Included in his discussion are the names of the key investigators who have conducted research in each of the variables. With respect to the present study, it is interesting to note that in discussing the learning location variable, Long cites research conducted in 1980 by the Illinois State Board of Education. It was found that 60.6% of the major organizations and institutions in Illinois that provided adult instruction were noncollegiate institutions. Contributing to this figure were churches which accounted for 6.1%. Only business (9.6%) contributed more to the total.

Darkenwald and Merriam (1982) conclude that the weight of the evidence suggests that amount of formal schooling and age are the two most important sociodemographic variables in predicting participation. A person who has succeeded in school, who is at ease in the role of a learner, and who values education would more likely be expected to participate in organized adult education. They argue, likewise, that numerous and varied barriers prevent older adults from participating. Consequently, it is no wonder younger adults seem to be more prone to participate than are older adults.
Participation studies in adult church education are scarce. An extensive computer search of three data bases revealed no relevant or recent research on the topic. It is not surprising to further discover that predictive models related to small groups within adult church education are virtually nonexistent. Consequently, the need for undertaking such research becomes increasingly clear.

**Linear Discriminant Analysis.** Participation data analyzed through multivariate procedures are much more useful than those derived from simple correlations (Long, 1983). Specifically, linear discriminant analysis is one such statistical technique.

Discriminant analysis, in its simplest form, is a procedure for estimating the relationship between a nominal (categorical) dependent variable and one or more independent variables that serve as explanatory variables (Wentz, 1979). Alternatively, Kachigan (1982) points out that it can be thought of as a method for identifying boundaries between groups of objects or persons, the boundaries being defined in terms of those variable characteristics which distinguish or discriminate the objects or persons in the respective criterion groups.

Johnson and Wichern (1982) suggest that discriminant analysis has two immediate goals. First, to describe
either graphically or algebraically the differential features of objects (observations) from several known populations; to find "discriminants" (discriminant functions) whose numerical values are such that the populations are separated as much as possible. Secondly, to sort observations into two or more labeled classes. The goal is to derive a rule (linear model) that can be used to optimally assign new objects or persons to the labeled classes. The first goal can be thought of as "analysis" and the second as "classification."

Discriminant analysis may be thought of as a special case of multiple linear regression (Marascuilo and Levin, 1983). Consequently, the benefits of the technique are the same as for regression analysis. The first benefit is in being able to determine which variables are linearly related to the criterion variable; the second, is the ability to predict values on the criterion variable when given values on the predictor variables. However, with discriminant analysis, the purpose is to predict which of G discrete groups an individual belongs to, rather than to predict an individual's score on some continuous variable, Y, as with multiple regression.

A number of underlying assumptions are associated with the use of discriminant analysis. Klecka (1980) notes first that the data cases should be members of two
or more mutually exclusive groups. The groups (e.g., people, animals, countries, conditions, etc.) must be defined so that each case belongs to one, and only one, group. Next, he points out that no variable may be a linear combination of other discriminating variables. This prohibition makes sense both mathematically and intuitively. Variables with a perfect or extremely high correlation do not contain any new information beyond what is contained in the components, so they are redundant. A further assumption given by Klecka is that each group is drawn from a population which has a multivariate normal distribution; this assumption is important to the precise computation of tests of significance and probabilities of group membership.

Kachigan (1982) discusses two key assumptions with regard to the variances of the predictor variables and their inter-correlations: (1) it is assumed that the variance of a given predictor variable is equal in the respective populations from which groups of individuals or objects have been drawn. Different predictor variables can have different variances, but the variance of a given variable must be equal in each criterion group population; and, (2) it is necessary that the correlation between any two predictor variables is the same in the respective populations from which the alternative criterion groups
have been sampled. That is, the correlation matrix of predictor variables must be the equal for each group.

According to Wentz (1979), while there is more than one discriminant analysis algorithm from which to choose--of which Fisher's (1936) is mostly commonly used--each produces some kind of a discriminant function and a classification function. A linear discriminant function is a linear combination of discriminant (independent) variables. The discriminant function tells us how powerful each discriminator is in determining the classification of a respondent or object. To do this, Cohen and Cohen (1983) explain that discriminant analysis treats k independent variables jointly and analytically by solving for a set of k weights, which produce a linear composite that maximally discriminates between the groups. Applying these weights to the score on the variables produces a discriminant function for each subject. And since interest is usually attached to the nature of the function, interpretations are usually made by reference to the discriminant weights (scores). When a first discriminant function is partialled from the scores, a second set of k weights may then be determined that, when applied to the predictor variables' residuals, yields a second discriminant score that maximally discriminates among the G groups. And so forth. Cohen and Cohen further explain
that subsequent discriminant functions are decreasingly discriminating, they are mutually uncorrelated, and there can be no more than the lesser value of $g-1$ and $k$. But in practice, only the $q$ statistically significant discriminant functions are included in the final model.

The second product that a discriminant analysis yields is a classification function. Classification, according to Klecka (1980), is the process by which a decision is made that a specific respondent (case or object) "belongs to" or "most closely resembles" one of the discrete groups under investigation. Wentz (1979) adds the fact that to assign respondents to a group a criterion is needed. Several are available depending on the algorithm used. For example, if the mean for each group was known, a respondent could be assigned to the group with the mean closest to his/her discriminant score. In a simple discriminant analysis-- one with a criterion variable with two levels or groups, such as attenders and nonattenders in this study-- a critical value would be used. A critical value is the mathematical boundary between a pair of adjoining groups. Respondents with discriminant scores above the critical value would be assigned to one level, while those scoring below the critical value would be assigned to the other group. This critical value is found in the boundary function which is
produced by the selected algorithm. A boundary function is a simple formula specifying the critical value.

Wentz identifies another method of classification. This alternate method is to have a set of classification functions that calculate the probability of group membership for each of the criterion variable groups. The respondent is assigned to the group for which she has the highest probability of membership.

Integral to the discrimination and classification tasks of discriminant analysis is the initial selection of variables. Assuming that valid and reliable measures have been obtained on k predictor variables pertinent to the research, what processes utilized to select those variables which yield the "best" discrimination and classification functions? Two broad approaches, with a number of sub-approaches possible under each, are common; direct and stepwise discriminant analysis. The direct method enters all of the independent variable into the analysis concurrently. The discriminant functions are created directly from the whole set of predictor variables, regardless of the discriminating power of each variable. This method is appropriate when, for theoretical reasons, the researcher wishes to have all the independent variables entered in the analysis and is not concerned with obtaining intermediate results based on subsets of the predictor variables.
When there are large numbers of independent variables, it is often desirable to select a relatively smaller subset of variables that would contain almost as much information as the original collection. Johnson and Wichern (1982) suggest that this process of variable selection/reduction is best handled with stepwise discriminant analysis. "Stepwise" means that the procedure begins by selecting the variable which "best" discriminates between the groups in the analysis, developing discriminant functions using this variable, and then continues by selecting the second best variable, developing functions using these two variables, selecting the third best variable, and so on. The stepwise procedure chooses the entering variable by means of some entry criterion, as discussed previously. Gondek (1981) argues that with more than a half dozen different methods possible, the specific method chosen for stepping should be carefully chosen. However, when no guidelines exist for choosing the optimum stepping procedure for a given research situation, Gondek notes that the only recommendation possible is to use the procedure based on Wilk's Lambda. Since it is a widely accepted multivariate statistic which can be found in most, if not all, discriminant analysis computer packages, it is the most appropriate stepping procedure to
use in the greatest majority of cases.

Finally, Wentz (1979) notes that discriminant analysis will rarely provide a model that will properly classify every respondent. Members of one group will be classified as members of the other group, and so forth. In fact, one way a discriminant model is evaluated is by the portion of respondents correctly classified; the larger the percentage correctly classified, the better the model. Occasionally a model does little better at classification that could be accomplished by random assignment. This is because, like other multivariate methods, discriminant analysis sometimes works poorly, or not at all, depending on the situation, the specific data, and other research variables.

In summary, an examination of the history and nature of small groups as a part of adult education in the local church, an overview of adult participation, and an understanding of the nature and use of discriminant analysis all demonstrate the need and value of this study.

**Definition of Terms**

The following definitions serve the purpose of standardizing the terms used in this study. Other terms or phrases not listed are assumed to be understood or self explanatory.
**Adult Education** - A process whereby persons whose major social roles are characteristic of adult social status undertake systematic and sustained learning activities for the purpose of bringing about changes in knowledge, attitudes, values, or skills (Darkenwald and Merriam, 1982).

**Adult Church Education** - A logical subset of adult education in which the systematic and sustained learning activities are fostered by churches and changes in knowledge, attitudes, values, and/or skills are primarily geared toward religious (spiritual) ends.

**Church** - A body of professed Christian believers meeting regularly in a given locale for worship, instruction, prayer, and sacraments. Or more generally, any religiously oriented organization wishing to be so designated for legal or other reasons.

**Demographic Variable** - Vital social statistics that can vary along some dimension and can be measured (e.g., sex, age, income, etc.). Simply put, a variable is something who's value can change from one person to the next.

**Linear Discriminant Analysis** - A statistical procedure for identifying such relationships between qualitative criterion variables and quantitative predictor variables; a method for identifying boundaries between groups of objects, the boundaries being defined in terms of those
variable characteristics which distinguish or discriminate the objects in the respective criterion groups (Kachigan, 1982).

**Predictive Model** - A mathematical equation or function that represents the linear relationship between the dependent variable and the independent variable(s) such that a value for a future dependent variable can be asserted based on that relationship.

**Sample, Development** - An independent random sample used to derive the initial discriminant function.

**Sample, Cross-Validation** - A second independent random sample used to test or validate the discriminant function classification derived with the development sample (Afifi and Clark, 1984).

**Small Group** - Two or more individuals (between two and fifteen) who (a) interact with each other, (b) are interdependent, (c) define themselves and are defined by others as belonging to the group, (d) share norms concerning matters of common interest and participate in a system of interlocking roles, (e) influence each other, (f) find the group rewarding, and (g) pursue common goals (Johnson and Johnson, 1982).
II. METHOD

Subjects

The subject-participants comprising the sample in this study were drawn from the population of adult (age eighteen or older) members or regular attenders whose names and addresses appeared in the published directories of randomly selected churches affiliated with the Conservative Baptist Association of Oregon (CBA of O). Specifically, the sample consisted of persons who were not members of the clergy and/or paid church staff members.

Since two-group linear discriminant analysis is considered a special case of multiple linear regression (Marascuilo and Levin, 1983), the minimum sample size needed for this study was determined by applying Cohen and Cohen's (1983) tables and formula for determining $n$ when testing for the significance of the regression multiple coefficient of determination ($R^2$), with 8 independent variables, a power level of .80, an effect size of .10, and a .05 level of significance. The computed minimum sample size was determined to be 160 subject-participants (see Appendix A).

Adequate time and finances were available to secure a sample size larger than the necessary minimum. Consequently, a sample size of 400 was targeted. This number provided a sample large enough for both the development and
cross-validation of the discriminant analysis.

A two-stage random sampling design was utilized. Initially, an equal probability random sample (Cochran, 1977) was used to select 35 churches that were subsequently invited to participate in the survey (see Appendix B). A total of 23 churches agreed to participate. However, three churches were excluded from the sample because the churches either did not provide sufficient information, namely zip codes in their directories, or their directories were not made available until after the initial mailing.

The next step in the selection of the sample consisted of drawing at random the names of 20 adults from the published directory, the sampling frame, for each of the 20 participating churches. In both stages of the sampling design, a random numbers table was used as the basis for selection decisions (Downie and Heath, 1983). In several instances the selected individual was eliminated from the sample for one of two reasons. First, the entry in the directory did not provide a complete mailing address. Or secondly, the address supplied was either out of the State of Oregon, outside of the United States (missionaries, military personnel), or was clearly inappropriate to the goals of this study (i.e., college students listing a college address). When one of these
situations arose, the individual next in order was selected as an alternate.

A initial sample size of 396 was secured; four less that the 400 originally targeted. Of this number, 301 (76%) subject-participants returned their surveys. However, 16 surveys were either incomplete (13) or unanswered (3) and were subsequently eliminated from the sample. The final sample size was 285 (72%) usable responses. Of this number, 157 of the respondents were female and 138 male. Further descriptive statistics are provided in the Results Section of this study.

**Variables**

Discriminant analysis, the statistical method used in this study, allows for the study of the differences between two or more groups of objects (subjects) with respect to several predictor variables simultaneously (Klecka, 1980). To accomplish this objective, one criterion variable and eight predictor variables were used in deriving the discriminant/classification function.

**Criterion Variable.** The dependent, or criterion variable sought nominal data at two levels (groups): non-attenders or attenders. Question two on the survey instrument asked, "Do you, or do you not, attend a small group that meets regularly and is sponsored by your church?"
Two responses were provided: "No, do not attend," and "Yes, attend." Respondents selecting the first option were considered "nonattenders," while those selecting the second option were considered "attenders."

Attenders were further asked to provide information on two questions which were outside the scope of this study. The questions were seeking data that would be used by the sponsoring agency. Nevertheless, descriptive statistics for these questions are included in the Results Section of this study.

Predictor Variables. The first two independent variables were selected because they reflect characteristics unique to the prediction of small group attendance within the target population. In specific, they are variables that echo church related behavior. The remaining six variables were chosen from variables common to predictive studies in adult education as discussed by Long (1983). The aggregate set of independent variables was selected because each of the variables could be 1) easily determined or measured by respondents, researchers, and those using the final predictive model; and, more significantly, 2) they were actual factors that represented the social status and identity of adults comprising the population for this study.

Five of the eight independent variables were measur-
able on a true interval scale. However, since the data on the variables were most commonly available in nominal (categorical) form within the population, this form of measurement was sought. But, an underlying interval structure was used in formulating the six response categories for each of these five variables (see below; variable numbers 1, 2, 4, 5, 7).

In specific, the eight independent or predictor variables investigated in this study were as follows:

1. YEARS - Years of regular attendance at the specific church. Respondents were asked how many years they had been regularly attending their church. Rather than placing a restrictive, external definition on the term "regular", each respondent was allowed to define for themselves what they considered regular. Six categories were provided: 1) Less than 1 year, 2) 1 to 5 years, 3) 6 to 10 years, 4) 11 to 15 years, 5) 16 to 20 years, and 6) 21 or more years.

2. SAVED - Number of years the subject had been a ("saved" or "born-again") believer. This variable was extremely pertinent within the population studied. The claim of salvation was/is mandatory for membership in any of the churches comprising the sample or population. The scale was: 1) Less than 1 year, 2) 1 to 5 years, 3) 6 to 10 years, 4) 11 to 15 years, 5) 16 to 20 years, and 6) 21
or more years.

3. COUNTY - Geographic area of Oregon in which the subject lived. The respondent was asked to write down the name of the Oregon county in which he/she lived. The area in which a person lives often effects the types of social organizations in which he/she participates. Based on this thinking, the variable was included in the initial discriminant analysis. However, this variable was recoded for the final discriminant analysis. It was changed to TYPE, Whether the subject-participant was a member of a (1) suburban or (2) rural church.

4. EDUC - Highest educational level completed. In order to avoid confusion on the part of the respondent and to operationalize this variable, only the highest level of education completed was sought. There were six categories offered: 1) 8th grade or less, 2) Some High School, 3) High School Graduate, 4) Some College or Technical Training, 5) College Degree, and 6) Graduate Degree. These categories were selected, based on advice secured from the Survey Research Center, Oregon State University.

5. INCOME - Total family income from all sources. This variable asked for the respondent's total household income as it fell into one of six categories: 1) Under $10,000; 2) $10,001 to 20,000; 3) $20,001 to 30,000; 4) $30,001 to 40,000; 5) $40,001 to 50,000; 6) Over $50,000.
These divisions are based on the median household income in the United States as reported by the U.S. Census Bureau (1980).

6. MARITAL - The respondent's marital status. Six options were set forth: 1) Married, 2) Never married, 3) Divorced, 4) Divorced and Remarried, 5) Widow/Widower, and 6) Widow/widower and Remarried. These alternatives are the options that are recognized and reflected within the population and the sample investigated in this study.

7. AGEGP - Age group of the respondent. Six categories were made available to the sample: 1) 18-22 years of age, which represents the college age adult; 2) 23-29 years of age, 3) 30-39 years of age; 4) 40-49 years of age; 4) 50-59 years of age, 6) 60 or More Years. The categorical age divisions were based on the fact that most adults tend to view themselves as college students or members of distinct ten-year age segments or groups. For example, the comment, "I'm in my forties (or twenties or thirties)," is commonly used by many adults when referring to their age.

8. SEX - Gender of the respondent. The last independent variable was the identification of the respondent's sex. The normal response of either male or female were the options provided.

Table 1. summarizes the original set of predictor
variables used in this study.

### Table 1

Variables Included in the Discriminant Analysis*

<table>
<thead>
<tr>
<th>Criterion (dependent) Variable:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ATTEND - Two groups: attenders and nonattenders of small groups</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Predictor (independent or classification) Variables:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>YEARS - Years of regular attendance at the specific church.</td>
<td></td>
</tr>
<tr>
<td>SAVED - Number of years the respondent had been a (&quot;saved&quot; or &quot;born again&quot;) believer.</td>
<td></td>
</tr>
<tr>
<td>TYPE - Suburban or urban church membership.</td>
<td></td>
</tr>
<tr>
<td>EDUC - Highest educational level completed.</td>
<td></td>
</tr>
<tr>
<td>INCOME - Total family income from all sources.</td>
<td></td>
</tr>
<tr>
<td>MARITAL - The respondent's marital status.</td>
<td></td>
</tr>
<tr>
<td>AGEGP - Age group of the respondent.</td>
<td></td>
</tr>
<tr>
<td>SEX - Gender of the respondent.</td>
<td></td>
</tr>
</tbody>
</table>

*Listed in order as they appear on the survey questionnaire.
Instrument

A short, twelve-item, survey questionnaire was used to collect the data on the criterion and predictor variables. A copy of the instrument appears in Appendix C. Question structure and format design were based on the standards set forth by Dillman (1978). Three successive versions of the questionnaire were developed under the guidance of the Survey Research Center at Oregon State University. The last version met the requirements and approval of the Center and, subsequently, was used.

The first two questions served as "filters." That is, they were used to establish the purpose of the survey in the minds of the respondents and to instruct them on how to proceed and complete the questionnaire. Item 3 constituted the dependent variable. Questions 3a and 3b, as previously mentioned, were included for reasons apart from this study. Items 4 through 11 sought to acquire data on the predictor variables. Item 12, the last item, served as an "escape valve" question. It provided the respondents with an opportunity to say anything or offer any advice that may have entered their minds while answering the questionnaire. The item was included for its psychological value on behalf of the respondents, as recommended by the Survey Research Center, and was not considered in formulating the results of this study.
Data Collection

The questionnaire, along with a cover letter (see Appendix D) and a postage-paid return envelope, was mailed to the respondents on January 13, 1984. Ten days later, on January 23, a follow-up postcard was sent. The card thanked the respondents who had already completed the questionnaire and returned it, and encouraged those who had not returned their questionnaires to do so as soon as possible. A copy of the postcard appears in Appendix E. A third mailing, which consisted of another cover letter and a second questionnaire (see Appendix F), was mailed on February 10, to those who as of that date had not yet responded. A total of 76 per cent (301) of the subject-participants had returned their questionnaires by March 15, 1984, when the data collection phase of this study was terminated. This return rate was considered "very good" (Babbie, 1983).

Statistical Design

The major focus of this study was to develop a linear discriminant function to predict (classify) small group attendance or nonattendance among adult members of the CBA of Oregon. Linear discriminant analysis was the statistical technique best suited for this purpose (Johnson and Wichern, 1982).
The objective of a discriminant analysis was to classify persons, by a set of independent (predictor or classification) variables, into one of two mutually exclusive and exhaustive categories. Morrison (1980) sets forth the Fisher discriminant function that served as the basis for the statistical analysis in this study:

\[ Z_i = b_0 + b_1X_{1i} + b_2X_{2i} + \ldots + b_pX_{pi} \]

where,
\[ Z_i \] = the ith individual's discriminant score;
\[ b_0 \] = the fixed constant;
\[ b_i \] = the discriminant coefficient for the ith individual;
\[ X_{pi} \] = the ith individual's value of the pth independent variable;
\[ p \] = the number of independent (discriminating) variables.

The Statistical Package for the Social Sciences (SPSS; Nie, et al., 1975) was used to perform a stepwise discriminant analysis using all eight of the original independent variables. Wentz (1979) states that a stepwise linear discriminant analysis is the preferred method when there are more than five or six independent variables in the data set.
In addition, Gondek (1981) notes that there is no absolute set of guidelines for choosing the optimum stepping procedure from among the several alternatives. He concludes that since Wilks' Lamda is a widely accepted multivariate statistic, it is the most appropriate stepping procedure to use. Consequently, this was the stepping procedure used in this study.

As a variable selection criterion, Wilks' Lamda is the ratio between the within generalized dispersion \( \det(E(\mathbf{x})) \), and the total generalized dispersion \( \det(H(\mathbf{x})) + E(\mathbf{x}) \) (Morrison, 1976) for the discriminating variables in the analysis; in specific,

\[
(\mathbf{x}) = \frac{\det(E(\mathbf{x}))}{\det(H(\mathbf{x}) + E(\mathbf{x}))}
\]

where \( \mathbf{x}' = (x_1, x_2, \ldots, x_p) \). The values for Wilks' Lamda range between zero and one with large values indicating poor separation between groups while smaller values denote good separation between groups.

The multiplicative increment

\[
\Lambda(u | \mathbf{x}) = \Lambda(\mathbf{x}, u) / \Lambda(\mathbf{x})
\]

in \( \Lambda(\mathbf{x}) \) resulting from adding some variable \( u \) to the set \( \mathbf{x} \) is called a partial \( \Lambda \)-statistic. Rao (1965) explains that
the corresponding F-statistic

\[
F = \frac{n - p - q}{q - 1} \cdot \frac{1 - \Lambda(u \mathbf{X})}{\Lambda(u \mathbf{X})}
\]

is used to test the significance of the change in \(\Lambda(\mathbf{X})\) which results from adding \(u\). This F-statistic serves two roles and is accordingly called "F-to-enter" for the entry of \(u\) into the set \(\mathbf{X}' = (x_1, x_2, ..., x_p)\) or "F-to-remove" for the deletion of \(u\) from the set \((x_1, x_2, ..., x_p, u)\).

The following entry and deletion standards were used:

1. Minimum F-to-enter for stepwise selection was 1.0.

2. Minimum F-to-remove for avoiding removal from the stepwise selection was 1.0.

3. Minimum tolerance level for stepwise selection of a variable was .001.

Gondek (1981) is careful to point out that there are no simple rules for determining entry or removal thresholds for any of the statistical criteria used in stepwise selection. He recommends values that are set low enough so as to allow all of the variables to enter the analysis, values that are normally the default settings in most computer statistical packages. Since this study was exploratory in nature, and no previous research had
established discriminant analysis guidelines within the
field of adult religious education, the threshold default
values used in the SPSS program DISCRIMINANT were used in
this study.

The independent variables that were without question
categorial in nature (TYPE, MARITAL, AND SEX) were trans-
formed into "dummy variables" prior to the stepwise analy-
sis. This transformation allowed the variables in ques-
tion to be treated as continuous data. SPSS data handling
procedures were used to accomplish the transformation.
The remaining variables were treated as continuous data in
the discriminant analysis.

A reduced stepwise model, the canonical discriminant
function, resulted from the stepwise analysis. The mag-
nitude of the multivariate differences was evaluated using
several criteria (Klecka, 1980). First, the relative
importance of each of the variables was evaluated by
examining their standardized discriminant function coeffi-
cients. The standardized coefficients provided a measure
of the relative importance of each of the independent
variables. The larger the magnitude of the coefficient
the greater is the variable's contribution to the dis-
criminant function.

Second, the reduced model's overall prediction value
was assessed by examining its associated canonical corre-
The canonical correlation is a measure of association between the discriminant function and the groups. It is a coefficient that measures how closely the function and the dependent variable are related, an indicator of the function's ability to discriminate among the groups (Nie, et al., 1975).

And third, the overall Wilks' Lambda, and its associated Chi-square test, provided a test of significance. Klecka (1980) explains that Wilks' Lambda is a multivariate measure of group differences over the discriminating variables. As such, Lambda is an "inverse" measure. Values of Lambda that are near zero indicate high discrimination. Values near the maximum value of 1.0, denote that the group centroids (means) are close and not distinct relative to the amount of dispersion within the groups. In addition, Lambda can be converted into a Chi-square statistic and serve as a test of significance.

To further test the adequacy of the derived discriminant function, its application to a cross-validation sample, was undertaken (Kachigan, 1980). Classification was achieved through the use of two classification functions, one for each group. No Bayesian adjustment for a priori estimates of group membership was attempted because such an adjustment was not considered necessary. That is, the two groups involved in the analysis-- attenders and
nonattenders-- shared equal probabilities of occurring in the population.

SPSS uses a traditional classification equation which is derived from the pooled within-groups covariance matrix and the centroids for the discriminating variables (Nie, et al., 1975). The resulting classification coefficients are then multiplied by the raw variable values, added together, and a constant added. The equation for one group is as follows:

\[ C_i = c_{i1}X_1 + c_{i2}X_2 + \ldots + c_{ip}X_p + c_{i0} \]

where \( C_i \) is the classification score for group \( i \), the \( c_{ij} \)'s are the classification coefficients with \( c_{i0} \) being the constant, and the \( X \)'s are the raw scores on the discriminating variables.

A classification table was provided by SPSS and it was used to judge the relevant merit of the classification procedure. The table reported the actual percentage of cases correctly classified.

Finally, tests for model assumptions were undertaken. The equality of covariance matrices was tested using Box's M and its associated F test (Cooley and Lohnes, 1971). The assumption of multivariate normality was approached by computing a Chi-square goodness-of-fit test for all con-
tinuous variables in the discriminant function (Johnson and Wichern, 1982).
III. RESULTS

The intent of this research was to determine if selected demographic variables could be used to predict, or classify, small group attenders and nonattenders among adult members of the Conservative Baptist Association of Oregon. Presented in this section are the results of the linear discriminant analysis that was conducted to investigate the problem. Three subsections are presented: (1) Discriminant Analysis Results, (2) Classification Results, and (3) Tests for Model Assumptions.

Discriminant Analysis Results

A pilot discriminant analysis was conducted early in the data analysis phase of the study. The independent variable COUNTY was found to be nondiscriminating and was, therefore, recoded to reflect whether the subject was a member of a (1) suburban church (located in or near a large population center) or a (2) rural church. This recoded variable, called TYPE, and two other categorical variables (MARITAL and SEX) were transformed into dummy variables. TYPE and SEX were already bivariate categorical variables, but were transformed anyway in order to maintain the same scale (0 and 1) for all categorical
independent variables. As a result, this increased the final number of independent variables to 12; seven dummy variables plus the remaining five original continuous variables.

SPSS, the statistical package used for data analysis, permitted the sample to be randomly split into two parts; one for developing the discriminant function and one part for cross-validating the derived discriminant function. Of the total sample (n = 285), 175 subject-participants were randomly selected for the development sample used in the stepwise discriminant analysis.

Descriptive statistics and the results of the stepwise discriminant analysis are summarized in Table 2. Of the original 12 variables which entered the stepwise analysis, only four remained in the discriminant function: SAVED, INCOME, AGEGP, and D4 (dummy variable 4; the divorced category of the variable MARITAL). It was not until Step 3 that the function produced a significant, $F(3, 171) = 2.674$, $p < .05$, difference between pairs of groups. Descriptive statistics, Wilks' Lambdas, and univariate F-ratios for all the original variables entered into the stepwise analysis appear in Appendix G. None of the Lambdas and their associated univariate F-ratios were significant prior to entering the stepwise analysis.

Table 3 presents the standardized and unstandardized
TABLE 2
DESCRIPTIVE STATISTICS
AND
STEPWISE DISCRIMINANT ANALYSIS SUMMARY TABLE
(Development Sample)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Attenders (n = 98)</th>
<th>Nonattenders (n = 77)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>D4 (Divorced)</td>
<td>.031</td>
<td>.173</td>
</tr>
<tr>
<td>INCOME</td>
<td>2.959</td>
<td>1.209</td>
</tr>
<tr>
<td>SAVED</td>
<td>3.867</td>
<td>1.967</td>
</tr>
<tr>
<td>AGE GP</td>
<td>3.837</td>
<td>1.314</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step</th>
<th>Variable Entered</th>
<th>Variables Included</th>
<th>Wilks' Lambda</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>D4</td>
<td>1</td>
<td>.986</td>
<td>2.404</td>
</tr>
<tr>
<td>2</td>
<td>INCOME</td>
<td>2</td>
<td>.972</td>
<td>2.523</td>
</tr>
<tr>
<td>3</td>
<td>SAVED</td>
<td>3</td>
<td>.955</td>
<td>2.674*</td>
</tr>
<tr>
<td>4</td>
<td>AGE GP</td>
<td>4</td>
<td>.945</td>
<td>2.466*</td>
</tr>
</tbody>
</table>

*p < .05
### TABLE 3

STANDARDIZED AND UNSTANDARDIZED DISCRIMINANT FUNCTION COEFFICIENTS  
(Reduced Model)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Standardized Coefficient</th>
<th>Unstandardized Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>D4</td>
<td>.553</td>
<td>4.262</td>
</tr>
<tr>
<td>INCOME</td>
<td>.676</td>
<td>.553</td>
</tr>
<tr>
<td>SAVED</td>
<td>-.672</td>
<td>-.352</td>
</tr>
<tr>
<td>AGEGP</td>
<td>.456</td>
<td>.327</td>
</tr>
<tr>
<td>Constant</td>
<td>N/A</td>
<td>-1.449</td>
</tr>
</tbody>
</table>
discriminant function coefficients. Each of the four standardized coefficients represents the relative contribution of its associated variable to the function. INCOME was found to make the largest positive contribution (.676), with SAVED making the largest negative contribution (-.672). Variables D4 and AGEGP followed with positive coefficients of .553 and .456 respectfully. None of these coefficients were more than one standard deviation from the mean. In specific, all were within a range of less than ± .70 standard deviations. None of the standardized coefficients made a large contribution to discriminating power of the function.

The unstandardized coefficients, while not useful in terms of ascertaining the relative importance of the variables because they were not adjusted for the variability and measurement scales in the original data, provided a measure of the absolute contribution of a variable in determining discriminant scores. These scores were used in the classification phase of this study. This phase and its results are summarized later in this section.

Measures of the canonical discriminant function are shown in Table 4. A canonical correlation of .234 was computed for the discriminant function. A value of this magnitude indicated a low correlation. A definite, but small, relationship existed between the groups and the
### TABLE 4
DISCRIMINANT FUNCTION SUMMARY TABLE

<table>
<thead>
<tr>
<th>Percent of Variance</th>
<th>Canonical Correlation</th>
<th>Wilks' Lambda</th>
<th>Chi-Square</th>
<th>D.F.</th>
</tr>
</thead>
<tbody>
<tr>
<td>100.00</td>
<td>.234</td>
<td>.945</td>
<td>9.644*</td>
<td>4</td>
</tr>
</tbody>
</table>

*\( p < .05 \)**
discriminant function. Squaring the canonical correlation revealed the fact that only .055 per cent of the variation in the discriminant function was explained by the two groups (attenders and nonattenders). Furthermore, when the function's group centroids (means) were evaluated, the evidence suggested that the typical positions of the groups were relatively close together and, consequently, lacked definite discriminatory strength.

A Wilks' Lambda was computed for the canonical discriminate function (see Table 4). A Lambda with a value near zero would have denoted that the variables were high in their joint discrimination between attenders and nonattenders. Therefore, the computed Lambda of .945, revealed the fact that the discriminant function produced only a slight discrimination between the two groups. The lambda's associated Chi-square statistic was significant, \( \chi^2(4) = 9.644, p < .05 \). In other words, a Chi-square of this magnitude would be obtained only five times out of one hundred when there was actually no differences between the group centroids. It was appropriate to assume, therefore, that the results came from a population that had a difference between groups—however slight that difference.

**Classification Results**

Given that a statistically significant discriminant
function was derived, the next step was to determine the degree of accuracy with which adult members could be classified as either attenders or nonattenders. The remaining 110 subject-participants who were not randomly selected for the analysis phase of the study (to derive the discriminant function) were used in the classification phase. Using an orthogonal sample, the cross-validation sample, eliminated any potential classification bias.

Table 5 reports the classification or confusion matrix for both the development and cross-validation samples. The discriminant scores, based on the pooled within-groups covariance matrix (see Appendix H) for the discriminant function, were used to perform the classifications.

The initial classification of the development sample resulted in 53.71 percent of the subject-participants being correctly classified. This represented the classification of the same individuals used to derive the discriminant function. A classification table obtained in this manner contains a serious upward bias and overestimated the classification accuracy of the obtained function. Consequently, classification of the cross-validation sample produced more valid and reliable results.

A total of 45.45 percent of the cross-validation
TABLE 5
CLASSIFICATION (CONFUSION) MATRICES

Classification Results for Development Sample

<table>
<thead>
<tr>
<th>Actual Group Membership</th>
<th>Number of Cases</th>
<th>Predicted Group Membership</th>
<th>Attenders</th>
<th>Nonattenders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attenders</td>
<td>98</td>
<td></td>
<td>52</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>53.1%</td>
<td>46.9%</td>
</tr>
<tr>
<td>Nonattenders</td>
<td>77</td>
<td></td>
<td>48</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>62.3%</td>
<td>37.7%</td>
</tr>
</tbody>
</table>

Percent of Grouped Cases Correctly classified = 53.71%

Classifications Results for Cross-Validation Sample

<table>
<thead>
<tr>
<th>Actual Group Membership</th>
<th>Number of Cases</th>
<th>Predicted Group Membership</th>
<th>Attenders</th>
<th>Nonattenders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attenders</td>
<td>57</td>
<td></td>
<td>28</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>49.1%</td>
<td>50.9%</td>
</tr>
<tr>
<td>Nonattenders</td>
<td>53</td>
<td></td>
<td>21</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>39.6%</td>
<td>60.4%</td>
</tr>
</tbody>
</table>

Percent of Grouped Cases Correctly Classified = 45.45%
Sample was correctly classified. This figure was 8.26 percentage points less than the classification results for the development sample, but it represented a true percentage without bias. As adult members had a 50-50 chance of being classified as either attenders or nonattenders, a final classification percentage of this magnitude for the cross-validation sample was less than could have been achieved by simple random assignment.

Tests for Model Assumptions

Two major assumptions were central to the statistical analysis in this study. Those assumptions were multivariate normality and equality of covariance matrices. Testing to determine if the group covariance matrices were equal was a straightforward process and was undertaken first. Table 6 presents the results for the test of equality using Box's M. A coefficient of 43.106 for the pilot analysis was found to be significant as determined by its associated F-test, $F(10, 357351) = 4.2442$, $p <$

Testing the assumption of multivariate normality presented a more difficult problem. No straightforward method or statistic was available to accomplish such a test. As an alternative, Huberty (1975) suggests the use of multiple goodness-of-fit tests, based on large samples. Since this study incorporated a large sample ($n > 100$),
TABLE 6

RESULTS FOR TESTS OF ASSUMPTIONS:
BOX'S M AND GOODNESS-OF-FIT

<table>
<thead>
<tr>
<th>Box's M</th>
<th>Approximate F</th>
<th>D.F.</th>
</tr>
</thead>
<tbody>
<tr>
<td>43.106</td>
<td>4.244*</td>
<td>10, 357350.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable</th>
<th>Chi-Square</th>
<th>D.F.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAVED</td>
<td>112.368*</td>
<td>5</td>
</tr>
<tr>
<td>INCOME</td>
<td>108.158*</td>
<td>5</td>
</tr>
<tr>
<td>AGEGP</td>
<td>100.074*</td>
<td>5</td>
</tr>
</tbody>
</table>

*p < .0001
the goodness-of-fit approach was used. Three continuous type variables (SAVED, INCOME, AGEGP) were subjected to Chi-square analysis. The results were all significant, p < .0001 (see Table 6).
IV. DISCUSSION

Chapter Four presents a discussion of this investigation's findings that were set forth in Chapter Three. Three sections are included in the discussion: (1) Summary and Discussion of Results, (2) Conclusions, and (3) Suggestions for Further Study.

Summary and Discussion of Results

The purpose of this exploratory study was to investigate the question, "Given certain demographic variables common to all adult Conservative Baptists, can some or all of these variables be used to accurately classify persons as either small group attenders or nonattenders?" In pursuit of this question, linear discriminant analysis was the statistical technique used to develop a significant discriminant function and its associated classification or discriminant scores. A number of steps or procedures both preceded and followed the derivation of the discriminant function and the subsequent classification of attenders and nonattenders in the sample.

Identifying a potential sample from the population of adult members of the Conservative Baptist Association of Oregon was the first major task. A random sample of the 150 CBA churches in Oregon yielded 20 churches which were willing to cooperate with the research. From among these
churches 396 subject-participants were randomly identified. Based on previously established criteria, this target sample size was adequate. While 76 percent (301) of the subject-participants returned their questionnaires, a total of 72 percent (285) were complete and useable. A return rate of this magnitude was notable and improved the inferential quality of the study.

Commonly obtainable demographic variables were selected to serve as predictor (independent) variables in the discriminant analysis. Eight such variable were identified: YEARS, years of regular attendance at their specific church; SAVED, the number of years the subject had been a ("saved" or "born-again") believer; TYPE, whether the participant was a member of a suburban or rural church; EDUC, highest educational level completed; INCOME, total family income from all sources; MARITAL, the respondent's marital status; AGEGP, Age group of the respondent; and SEX, the participant's gender. All the independent variables were indicative of the population and in keeping with previous research on adult participation in general.

A survey instrument was next constructed to secure accurate and reliable data on the dependent variable (small group attendance or nonattendance) and the predictor variables. The twelve-item questionnaire was developed according to accepted format standards. Oregon State
University's Survey Research Center personnel served as consultants on the construction of the questionnaire. After three revisions of the instrument, it met their approval and was adopted for use. No difficulties due to the design and format of the final questionnaire were encountered in the data collection phase of this investigation.

The precise questionnaire was mailed to the random sample of subject-participants previously identified. Three mailings were conducted. The first mailing included an introductory cover letter, a questionnaire, and a postage-paid return envelope. Ten days later a follow-up postcard was sent. The third mailing was sent to those individuals who had not responded after a period of four weeks. This final mailing consisted on a second letter (a more urgent plea), a second questionnaire and return envelope. The data gathering phase of the study was terminated on March 15, 1984, after receiving 285 questionnaires that were complete and useable.

The SPSS program DISCRIMINANT was then utilized with a random sub-sample of 175 of the subject-participants—referred to as the development sample—to derive the discriminant function. The stepwise procedure based on Wilks' Lambda was used and produced a significant function (p < .05) which incorporated four of the original predic-
tor variables; D4 (the divorced category of the MARITAL variable which had been transformed into a dummy variable), INCOME, SAVED, and AGEGP.

The four variables that remained in the discriminant function were among those ten variables listed by Long (1983) as being often investigated in adult education participation studies. However, Darkenwald and Merriam (1982) ascertainment that the two most important sociodemographic variables, the amount of formal schooling and age was not substantiated by this study. Neither of these variables were significant discriminators, and as a result, were excluded from the stepwise discriminant analysis and resulting function. This was a surprising result because informal conversations with various pastors and members of the target population would cause one to suspect that both age and amount of formal schooling should have been significant discriminators.

An examination of the standardized function coefficients revealed that the four remaining variables were all within ± .70 standard deviations from the mean. This suggested that the discriminant function, while statistically significant, lacked definite discriminatory strength. Such a conclusion was supported by the fact that the group centroids were fairly close together, a condition which likewise reflects real, but weak, discrim-
ination between attenders and nonattenders.

The computed canonical correlation of .234 was less than dramatic and caused doubt to be cast on the substantive utility of the derived discriminant function. A coefficient of this magnitude indicated that a strong relationship did not exist between the groups and the discriminant function. This meant that the groups were not very different on the set of variables that were analyzed and the subsequent discrimination was almost nonexistent. That is, the discriminant function did little to explain the differences between small group attenders and nonattenders.

The calculated Wilks' Lambda (.945), and its associated significant Chi-square (9.644, p < .05), supported the fact that the discriminant function was weak. With a maximum value of 1.0, values of Lambda near zero denote high discrimination. It was obvious that a coefficient as high as .945 denoted that the variables, as elements of a random sample, were very low in their joint discrimination between attenders and nonattenders. The significant Chi-square would sustain the inference that these same variables would not be good in discriminating attenders and nonattenders among the larger population.

Since the objective of the study was to determine if some or all of the independent variables could be used to
accurately classify (or predict) small group attendance or nonattendance, and regardless of the fact that the discriminant function failed to provide a strong discrimination between the groups, a classification of the remaining 110 subject-participants was undertaken. Discriminant scores, based on the discriminant function, were used to classify the subjects as either attenders or nonattenders. These predictions were compared with the actual attendance category and reported in a classification matrix. Only 45.45 percent of the participants were correctly classified. A classification rate of this magnitude was less than what would be expected if the subject-participants were merely classified by simple random assignment; two groups would present a 50-50 chance of correct classification. This low classification rate was congruent with the findings previously mentioned. In fact, had the classification rate been more successful, it would have caused suspicion because the discriminate function had been so weak in discriminating.

Tests for model assumptions comprised the last major consideration. Results from the computed Box's M indicated that the covariance matrices were indeed equal. This fact met the requirement for equality of covariance matrices. The second major assumption that was tested was multivariate normality. Since a straight-forward
method for testing this assumption was not available, Chi-square goodness-of-fit statistics were calculated for the continuous-type independent variables SAVED, INCOME, and AGEGP. All the variables were significant (p < .001) and this could suggest that the assumption of multivariate normality was not achieved.

The validity of equal population mean vectors depends upon the conditions of multivariate normality and equal covariance structure being met. Given these requirements, it is appropriate to question the validity of the statistical technique used in this study because only one, not both, of the conditions were met. However, the degree of the problem was difficult to completely ascertain. Marascuilo and Levin (1983) argue that the linear prediction of a dichotomous variable (participation: attendance or nonattendance) is based on the assumption of normality if a test for significance is desired. Otherwise the assumption is not needed. But, if the number of independent variables is large and n is much larger still, normality of the dependent variable ceases to be of importance, since the predicted values approach a normal form as a result of the Central Limit Theorem. Since this study incorporates both a large number of predictor variables and a large n, the issue of normality may not have been a debilitating concern, and the results can be
The use of stepwise discriminant analysis for this study resulted in an optimal set of variables being selected. The result was optimal, but not maximal, because not every possible subset of variables was considered. Data analysis proceeded on the assumption that the stepwise procedure was the most efficient way of approximately locating the best set of discriminating variables. A maximal solution would have required testing every possible subset of the nine independent variables. This course of action was not taken because the univariate F-ratios were nonsignificant. This meant that none of the individual predictor variables were effective discriminators in and of themselves. Only when they were combined and analyzed via stepwise discriminant analysis was a significant discriminant function derived. Unfortunately, the resulting significant discriminant function was ineffective in its discriminatory power.

Conclusions

This study pursued the question, "Given selected demographic variables common to all adult Conservative Baptists in Oregon, can some or all of these variables be used to accurately classify persons as either small group attenders or nonattendees?" Four major conclusions were reached:
1. A significant discriminant function, composed of four variables, was derived from the original eight demographic variables (twelve variables total after transforming three variables to dummy variables) using stepwise linear discriminant analysis. This suggested that the ability to discriminate between small group attenders and nonattenders among the population was possible. However, upon close examination of the standardized function coefficients, the canonical correlation, and the computed Wilks' Lambda, the discriminant function was shown to be extremely weak in its ability to discriminate.

2. The derived significant discriminant function was used as the basis for the classification phase of this study. But, because the function was weak in its ability to discriminate, the classification results were inadequate. The percent of respondents correctly classified was less than what could be expected if nothing other than simple random assignment was the basis for classification. Consequently, the degree of classification (prediction) accuracy was judged to be less than the minimum level that would be acceptable in order to advocate the use of the linear model.

3. Results of the discriminant analysis were within the assumptions that underlie the statistical technique. This conclusion was accepted even though there was room to
pursue a continuing discussion on whether or not the assumption of multivariate normality had been met. Since no one test of this assumption was available to "prove" its existence or nonexistence, and logic for its acceptance was found in the literature on the subject, it was concluded that the assumption had been met, even though some evidence would suggest otherwise. This conclusion was not meaningful, however, because the classification results were inadequate.

4. Lastly, despite the fact that the stepwise discriminant analysis produced a significant discriminant function, the utility of the model to predict or classify small group attenders or nonattenders was rejected because of low classification results which were obtain when the model was applied to the cross-validation sample. This would support the conclusion that accurate classification of attenders or nonattenders among the adult members of the Conservative Baptist Association of Oregon is not possible when the linear model used for such a classification is limited to the information represented by the eight demographic variables included in this study.

Suggestions for Further Study

The following recommendations for future research are made in light of this study and its resulting conclusions:
1. As the present study was the first such research of its kind, additional studies need to be undertaken to either ratify or call to question the results of the present work. Replication would shed further light on the subject of adult participation in small groups within the local church, as well as provide further insights into the use of linear discriminant analysis in adult church education research.

2. The demographic variables that were investigated in this study did not prove to be significant discriminators in and of themselves. Therefore, other variables need to be identified which could serve to better discriminate between adults who either attend or do not attend small groups. In specific, sociopsychological and spiritual variables need to be investigated in relation to their contribution to attendance or nonattendance at small group meetings.

3. Methodological studies need to be undertaken to explore the use of stepwise linear discriminant analysis in contexts similar to this study. Of specific importance would be studies that endeavor to establish criteria for selecting the appropriate stepwise procedure, selecting "F-to-enter" and "F-to-remove" thresholds, and selecting the appropriate classification technique.

4. The results of this exploratory investigation are
appropriately limited to the specific population studied. Other ecclesiastical bodies or organizations that provide small group opportunities for adults need to be studied. The selected demographic variables included in this study, while not significant discriminators in the population studied, may in fact be adequate discriminators in other adult church education settings and populations.

5. Future researchers may profit from using a larger sample taken from a larger number of constituent churches. While the sampling methodology and sample size were adequate in the present study, increased numbers may better serve to accurately represent a population under similar investigation.
BIBLIOGRAPHY


Bubna, Donald L. and Sarah M. Ricketts. **Building People Through a Caring, Sharing Fellowship.** Wheaton, IL: Tyndale House, 1978.


APPENDIX A

CALCULATIONS FOR SAMPLE SIZE DETERMINATION
SAMPLE SIZE DETERMINATION

Cohen and Cohen's (1983, p. 117) formula for determining the number of cases necessary to have the specific probability of rejecting the null hypothesis (power) at the Alpha level of significance when ES (Effect Size) in the population is posited.

\[ n^* = \frac{L}{ES} + k + 1 \]

where,

- \( n^* \) = necessary number of cases;
- \( L \) = a value taken from the L Table provided by Cohen which is based on degrees of freedom and the power level selected;
- \( ES \) = effect size;
- \( K \) = number of independent variables.

\[ n^* = \frac{15.02}{0.10} + 8 + 1 \]

\[ n^* = 159.20 \quad \text{(or rounded: 160)} \]
APPENDIX B

CHURCHES INCLUDED IN THE STUDY
25 November 1983

Pastor David W. Croy
First Baptist Church
649 Crater Lake Ave.
Medford, OR 97501

Dear Pastor Croy:

Which adults attend the various types of small groups sponsored by our CBA churches? What generalizations can be identified in building a "profile" of these adults? Can we predict who is most likely to attend?

Pastor Croy, your assistance is earnestly requested. First Baptist Church has been selected as one of thirty churches that are being asked to provide information in pursuit of these important questions. You were selected in an equal probability random sample of all the CBA churches in Oregon. Specifically, I would like your permission to survey eighteen of your adult members. These adults would be selected from a random sample of your membership and asked to complete a short questionnaire, sent to them in the mail, that consists of only ten very brief information-type questions.

Please be assured that this study is not designed to evaluate you or your church in any manner whatsoever. In fact, the churches or individuals that participate in the study will not be even listed in the article that will appear in the CBA FAMILY NEWS. And, of course, our CBA of Oregon Executive Director, Rev. Larry McCracken, is in full support of this relevant study.

PLEASE agree to participate and then do the following as soon as possible. Please send me a copy of your church membership list or church directory. Send it to the following address:

CBA Survey
1230 N.W. 26th Street
Corvallis, OR 97330

I would be most happy to answer any questions you might have. Please call me after 5:30 p.m. at 752-3040.

Thank you for your assistance!

Your brother in Christ's service,

Neal F. McBride, Ed.D.
Associate Professor and Chair,
Department of Church Education
RANDOMLY SELECTED CHURCHES
INVITED TO PARTICIPATE IN THE STUDY*

1. Hinson Memorial Baptist Church, Portland*
2. First Baptist Church, Medford*
3. First Baptist Church, Salem*
4. First Baptist Church, Eugene*
5. First Baptist Church, Milwaukie*
6. First Baptist Church, Albany*
7. First Conservative Baptist Church, Roseburg*
8. First Baptist Church, Lebanon
9. Salem Heights Baptist Church, Salem
10. Burlingame Baptist Church, Portland*
11. Bethel Baptist Church, McMinnville*
12. Gateway Baptist Church, Portland*
13. First Baptist Church, La Grande*
14. First Baptist Church, Gladstone*
15. River Road Baptist Church, Eugene
16. Lake Baptist Church, Lake Oswego*
17. First Baptist Church, Prineville*
18. Molalla Conservative Baptist Church, Molalla*
19. First Baptist Church, Newberg*
20. First Conservative Baptist Church, Springfield*
21. Grace Baptist Church, Salem*
22. Elm Street Baptist Church, Sweet Home
23. Faith Baptist Church of Harney County, Burns*
24. Eastmont Baptist Church, Portland
25. Boones Ferry Baptist Church, Tualatin
26. Sellwood Baptist Church, Portland*
27. First Baptist Church, Forest Grove
28. Jefferson Baptist Church, Jefferson*
29. Berean Baptist Church, Portland*
30. Mt. View Baptist Church, Corvallis
31. Montavilla Baptist Church, Portland*
32. Tri-City Baptist Church, Myrtle Creek
33. Summerville Baptist Church, Summerville
34. First Baptist Church, Corvallis*
35. Evangel Baptist Church, Portland*

(* one of the 23 churches agreeing to participate)
APPENDIX C

SURVEY INSTRUMENT
The Conservative Baptist Association of Oregon
ADULT SMALL GROUPS QUESTIONNAIRE

1. Apart from Sunday School, does your church offer some type(s) of regularly scheduled small groups (Bible studies, fellowship groups, etc.) for adults? (Circle the number of your answer)
   1 NO (Skip to question 4)
   2 YES

2. Does your church offer more than one type of small group?
   1 I DON'T KNOW (Skip to question 3)
   2 NO (Skip to question 3)
   3 YES
   2a. How many different types? THE NUMBER: 

3. Do you, or do you not, attend a small group that meets regularly and is sponsored by your church?
   1 NO, DO NOT ATTEND (Skip to question 4)
   2 YES, ATTEND
   3a. Thinking about your group, or the group you attend most often if you attend more than one group, which of the following best describes the frequency of your attendance:
      1 LESS THAN 1 OUT OF EVERY 5 MEETINGS
      2 ABOUT 1 OUT OF EVERY 5 MEETINGS
      3 ABOUT 1 OUT OF EVERY 4 MEETINGS
      4 ABOUT 1 OUT OF EVERY 3 MEETINGS
      5 ABOUT 1 OUT OF EVERY 2 MEETINGS
      6 ABOUT EVERY TIME IT MEETS
   3b. Would you describe the STATED MAIN PURPOSE of this group as: (Circle only one number)
      1 BIBLE STUDY
      2 CHRISTIAN FELLOWSHIP/SOCIAL
      3 DISCUSSION
      4 EVANGELISM
      5 SHARING AND PRAYER
      6 OTHER (Please Specify): 

4. How many years have you regularly attended your church?
   1 LESS THAN 1 YEAR
   2 1 TO 5 YEARS
   3 6 TO 10 YEARS
   4 11 TO 15 YEARS
   5 16 TO 20 YEARS
   6 21 OR MORE YEARS

(OVER)
5. How many years have you been a ("saved" or "born-again") believer?

   1. LESS THAN 1 YEAR
   2. 1 TO 5 YEARS
   3. 6 TO 10 YEARS
   4. 11 TO 15 YEARS
   5. 16 TO 20 YEARS
   6. 21 OR MORE YEARS

6. In which Oregon county do you live? ____________________________ COUNTY

7. What is the highest educational level that you have completed?

   1. 8TH GRADE OR LESS
   2. SOME HIGH SCHOOL
   3. HIGH SCHOOL GRADUATE
   4. SOME COLLEGE OR TECHNICAL TRAINING
   5. COLLEGE DEGREE
   6. GRADUATE DEGREE

8. Which category includes your total gross family income (all sources) before taxes in 1983?

   1. UNDER $10,000
   2. $10,000 - 20,000
   3. $20,001 - 30,000
   4. $30,001 - 40,000
   5. $40,001 - 50,000
   6. OVER $50,000

9. Which of the following best describes your marital status?

   1. MARRIED
   2. NEVER MARRIED
   3. DIVORCED
   4. DIVORCED AND REMARRIED
   5. WIDOW/WIDOWER
   6. WIDOW/WIDOWER AND REMARRIED

10. Which of the following categories represents your age group?

    1. 18 - 22 YEARS
    2. 23 - 29 YEARS
    3. 30 - 39 YEARS
    4. 40 - 49 YEARS
    5. 50 - 59 YEARS
    6. 60 OR MORE YEARS

11. What is your gender?

    1. MALE
    2. FEMALE

12. Is there anything else you would like to tell us about the use of small groups in church education for adults?

    THANK YOU! PLEASE PROMPTLY RETURN THIS QUESTION IN THE PROVIDED ENVELOPE.
Many of our Conservative Baptist Churches have elected to provide some type of small group ministry for their adult members. These small groups have greatly facilitated the spiritual growth of many adults. However, there are important questions that need to be answered if we hope to continue to profit from small group ministries. In specific, what can be said about the "average" adult that attends, or does not attend, a small group? And second, can we predict how frequently an average adult is most likely to attend?

You are one of a small number of adults that are being asked to provide information on these important questions. Members and regular attenders were randomly selected from about 25 Conservative Baptist Churches in Oregon to participate in this valuable study.

We are interested in what you have to tell us about yourself. You may be assured of complete confidentiality. The enclosed questionnaire has an identification number on it for mailing purposes only. This is so that we may check your name off of the mailing list when your questionnaire is returned. Your name will never be placed on the questionnaire or be made public in any manner whatsoever.

The overall results of this survey will be published in a future issue of the CBA FAMILY NEWS. Consequently, your input is very much needed because it will benefit our entire state association. Please complete the enclosed questionnaire in a timely manner and return it in the postage-paid envelope provided for your convenience. As you answer the questionnaire keep in mind that there are no right or wrong answers. Also, Please answer all the questions.

I would be most happy to answer any questions you might have. Please feel to call me any weekday after 5:30 p.m. The telephone number is 752-3040.

THANK YOU FOR YOUR ASSISTANCE!

Your brothers in Christ,

Rev. Neal F. McBride
Project Director
Associate Professor and Chair,
Department of Church Education

Rev. Lauren McCracken
General Director
CBA of Oregon

enclosure
APPENDIX E

POSTCARD - SECOND MAILING
23 January 1984

Last week a questionnaire seeking your input on attendance at church sponsored small groups was mailed to you. Your name was drawn in a random sample of members or regular attenders of Oregon Conservative Baptist Churches.

If you have already completed and returned it please accept my sincere thanks. If not, please do so today. Because it has been sent to only a small, but representative, sample of individuals it is extremely important that your input also be included in the study.

If by some chance you did not receive the questionnaire, or it got misplaced, please call me right now, collect (752-3040), and I will get another one in the mail to you today.

Sincerely,

Neal F. McBride
Western Conservative Baptist Seminary
APPENDIX F

COVER LETTER - THIRD MAILING
Greetings in the name of our Lord Jesus Christ!

Several weeks ago you were sent a questionnaire on adult small groups in your church. Your completed questionnaire has not yet been received.

The number of returned questionnaires has been very encouraging. But, YOUR input is still very much needed if we are to gain an accurate profile of the average adult who does or does not regularly attend a small group sponsored by his or her church.

This is the first statewide study of this type. Therefore, the results are of particular importance to many pastors, adult Christian education workers, myself, and to our churches in general. The usefulness of our results depends on the number of questionnaires returned by the 398 adults who were randomly selected to participate. So you see, your response is very important!

It is for these reasons that another questionnaire is enclosed. Please, may I urge you to complete and return it as quickly as possible. Your contribution to the success of this study is greatly appreciated. Thank you!

Sincerely,

Redacted for Privacy

Neal F. McBride, Ed.D.
Project Director
Associate Professor and Chair,
Department of Church Education
APPENDIX G

UNIVARIATE STATISTICS
UNIVARIATE STATISTICS FOR THE ORIGINAL VARIABLES:
MEAN, STANDARD DEVIATION, WILKS' LAMBDA, AND F-RATIO

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NOTE: All F-Ratios were nonsignificant (p > .05).

D1 = TYPE dummy variable
D2 thru D6 = MARITAL dummy variable
D7 = SEX dummy variable
APPENDIX H

WITHIN-GROUP COVARIANCE MATRIX
POOLED WITHIN-GROUPS COVARIANCE MATRIX
(173 Degrees of Freedom)

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