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## An Analysis of Expenditure Patterns of Weating Apparel of University of North Dakota Students

Cyril M. Logar

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AN ANALYSIS OF EXPENDITURE PATTERNS OF  
WEARING APPAREL OF UNIVERSITY OF  
NORTH DAKOTA STUDENTS

by

Cyril M. Logar

Bachelor of Arts, Colorado College 1968

A Thesis

Submitted to the Faculty

of the

University of North Dakota

in partial fulfillment of the requirements

for the Degree of

Master of Arts

Grand Forks, North Dakota

June  
1970



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This thesis submitted by Cyril M. Logar in partial fulfillment of the requirements for the Degree of Master of Arts from the University of North Dakota is hereby approved by the Faculty Advisory Committee under whom the work has been done.

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Dean of the Graduate School



Permission

Title An Analysis of Expenditure Patterns of Wearing Apparel of  
University of North Dakota Students

Department Marketing

Degree Master of Arts

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Date May 22, 1970

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## ABSTRACT

This thesis analyzes the expenditures of University of North Dakota students on wearing apparel in Grand Forks. The period for which the study was conducted extended from November 1, 1969 to February 1, 1970. The data used in this thesis were obtained from 100 personal interviews with students attending the University. A structured questionnaire was used to gather the information. Two statistical techniques, the multiple linear correlation and the t-test, were used to analyze the data.

Eight factors were selected that would possibly influence the expenditure patterns of U.N.D. students on wearing apparel. The four factors that were continuous by nature were the respondent's monthly income, the age of the respondent, the respondent's parents' yearly income if single or the respondent's yearly income if married, and income spent on wearing apparel in cities other than Grand Forks. These four factors had no significance on the expenditure patterns of U.N.D. students on wearing apparel.

The four factors that were discrete by nature were sex, marital status, place of residence, and campus fraternity affiliation.

Female students did spend significantly more on wearing apparel than did male students. Students that were members of a campus fraternity did spend significantly more on wearing apparel than did students that were not members. There was no significant difference in the dollar expenditures on wearing apparel for students that were either married or single or for students that were either living on campus or off campus.



## CHAPTER I

### PURPOSE AND ORGANIZATION

#### Introduction

This thesis is an evaluation of the expenditure patterns of University of North Dakota students on wearing apparel. The ability to understand why individuals purchase what they do and how purchasing behavior can be influenced by various members of society is the central purpose for studying consumer behavior. James F. Engel, David T. Kollat and Roger D. Blackwell define consumer behavior as "the acts of individuals directly involved in obtaining and using economic goods and services, including the decision processes that precede and determine these acts."<sup>1</sup> Behavior as used in the definition refers not only to overt acts, but also to the covert, less observable, acts involved in the decision processes that accompany consumption. Six of the buying patterns or acts that are definitely

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<sup>1</sup>Roger D. Blackwell, James F. Engel, and David T. Kollat, Consumer Behavior (New York: Holt, Rinehart, and Winston, Inc., 1968), p. 5.





significant to marketing are: 1) Where people buy; 2) When people buy; 3) What people buy; 4) How people buy; 5) Who does the buying; and 6) Who makes the buying decision.<sup>2</sup>

The area of consumer behavior can be further subdivided into the study and analysis of consumer expenditure patterns. For the purpose of this study, expenditure patterns are defined as the amount of disposable personal income that is spent on products in relation to population distribution and income distribution.

Expenditure patterns can be expected to vary at different income levels according to the composition and age of the family.<sup>3</sup> In the middle of the nineteenth century a German statistician, Ernest Engel, developed what are known today as "Engel's Laws." These laws concern themselves with variations of expenditure patterns in relation to income changes. Some of the laws hold true to this day while others do not. Despite variations in expenditure patterns according to income and population distribution, a definite trend toward similarities of expenditure patterns has been developing

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<sup>2</sup>Richard H. Buskirk, Principles of Marketing (3rd ed.; New York: Holt, Rinehart, and Winston, Inc., 1970), pp. 107-113.

<sup>3</sup>Delbert J. Duncan and Charles F. Phillips, Marketing Principles and Methods (6th ed.; Homewood, Illinois: Richard D. Irwin, Inc., 1968), p. 93.



between different income and population groups as living standards advance.

In Life's "Study of Consumer Expenditures" it was reported that the professional and managerial occupations are not radically different from the clerical, skilled or unskilled workers in the share of total expenditures going on in each broad category (Housing, Food, Transportation, Clothing, Medical Care, Personal Care, Recreation, Tobacco, Alcoholic Beverages, Reading and Education).<sup>4</sup>

Knowledge of growing similarity in expenditure patterns is significant to the marketing man. It suggests not only the existence of greater mass markets but also a wider distribution of income resulting in a considerable amount of "trading up," that is, the desire for and purchase of better quality merchandise. A study conducted by the McGraw-Hill economics department revealed that "the U.S. consumer has not lost his appetite for more and better goods."<sup>5</sup> Awareness of expenditure patterns and the growth in similarity in expenditure patterns provide marketing personnel with information that will lead to more effective and efficient promotion, distribution, price and product decisions.

Through various statistical techniques it was possible to determine the expenditure patterns and buying patterns of students

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<sup>4</sup>Ibid., pp. 94-95.

<sup>5</sup>Ibid.





attending the University of North Dakota. The relationship between what students spend in Grand Forks retail institutions on wearing apparel and population and income distribution can be determined.

### Purpose and Scope of the Study

The purpose of this study is to analyze the expenditure patterns of wearing apparel of University of North Dakota students. The study was limited to those students attending the University of North Dakota and living in Grand Forks, North Dakota or East Grand Forks, Minnesota. The period for which the study was conducted extended from November 1, 1969 to February 1, 1970.

### Limitations

The study was conducted under the following limitations:

1. This study was limited to those variables which were believed to have had the greatest effect on the expenditure patterns of University of North Dakota students on wearing apparel. It is highly possible that there are other variables that have positive effects on expenditure patterns.

2. Only those students attending the University of North Dakota, living in Grand Forks, North Dakota and East Grand Forks, Minnesota, and listed in the U.N.D. student directory were considered as members of the universe population. Students taking



correspondence courses, commuting from outside the designated area and not listed in the directory were not considered in the total universe.

3. The item under consideration, student expenditures, was limited to wearing apparel that had been purchased in Grand Forks retail institutions during a three month time period extending from November 1, 1969 to February 1, 1970. The study was not intended to be a detailed analysis of all of the expenditure patterns of University of North Dakota students nor was it intended that the results accurately mirror annual consumption patterns. The study was, however, intended to lay the groundwork for future studies in the area of U.N.D. student expenditure patterns.

4. The sample size was limited to one hundred students, or approximately 1.4 per cent of the universe population. With a sample size of one hundred a sampling error of  $\pm$  five (5) per cent was allowed.

### Approach

The preliminary groundwork for the study included a review of sources of secondary data relating to the study. Very little secondary data was available, therefore, it was necessary to gather primary data. Before this could be done, a determination was made of the variables to be evaluated. A structured questionnaire was





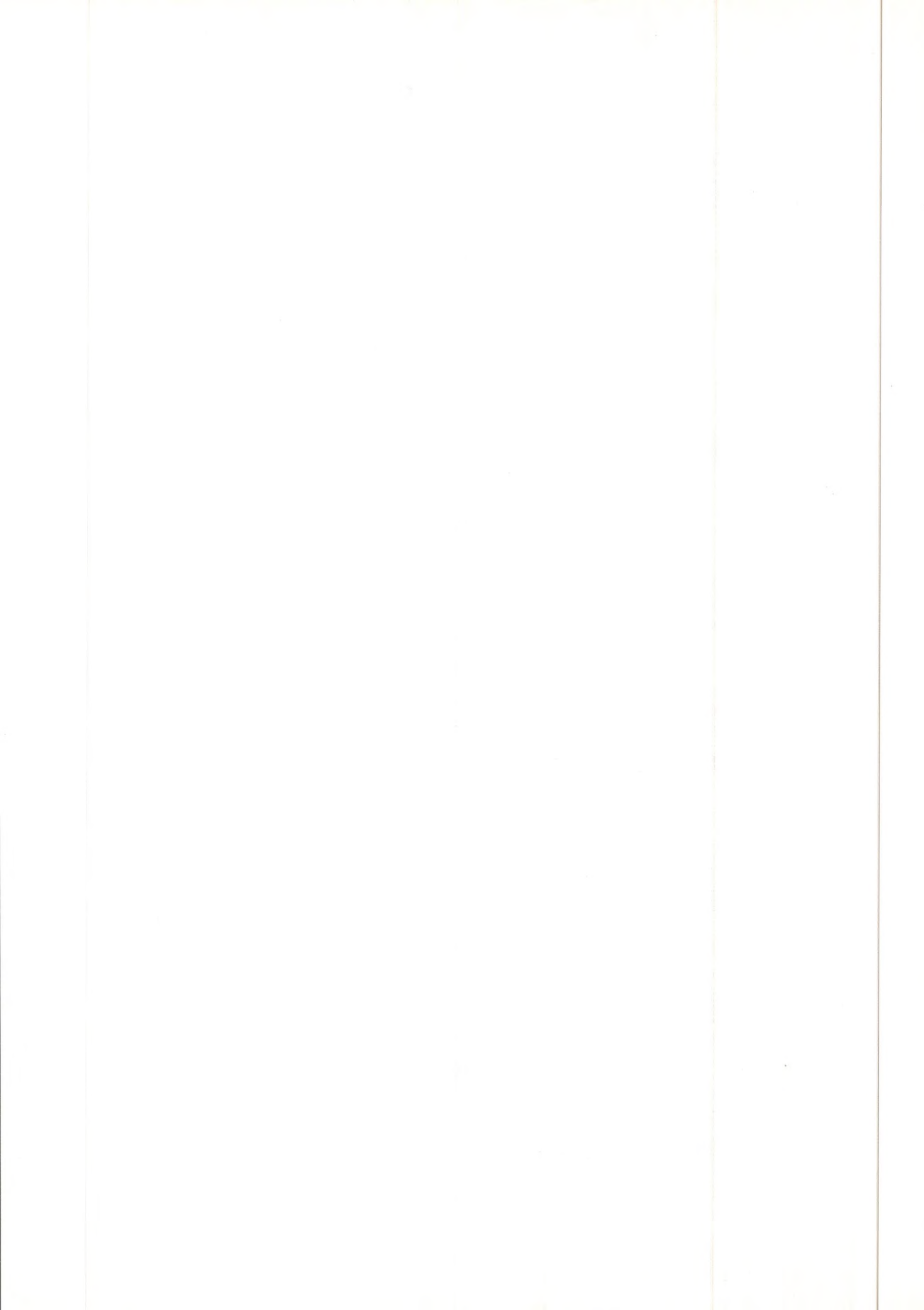
used to gather the information for the study. The questionnaire was pretested in January, 1970. Results showed that students were unable to remember as far back as five months, therefore so-called "Laws of Memory"<sup>6</sup> were violated. Using a three instead of a five month memory span, the questionnaire was pretested a second time with acceptable results.

The sample frame for the universe population consisted of single male, single female, and married students attending the University of North Dakota. The method used for drawing a sample from the sample frame was a quota sample. One hundred personal interviews were conducted to gather the primary data. The interviews were conducted during the month of February, 1970. The selection of the respondents was based on four demographic characteristics: 1) sex; 2) marital status; 3) place of residence; and 4) campus fraternity affiliation. The names were selected from the University of North Dakota Directory 1969-70.

Two techniques, the multiple correlation and the t-test, were used to analyze the collected data. The results of the study were evaluated to determine if there was a relationship between the dependent variable (expenditure patterns) and the independent variables (sex, marital status, place of residence, fraternity affiliation,

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<sup>6</sup>Albert Wesley Frey, ed., Marketing Handbook (2nd ed. New York: The Ronald Press Company, 1965), p. 28 (sec. 24).



the respondent's monthly income, the age of the respondent, the respondent's parents' yearly income if single or the respondent's yearly income if married and the income that was spent on wearing apparel in cities other than Grand Forks, North Dakota). Finally, recommendations were drawn from the results of the study.

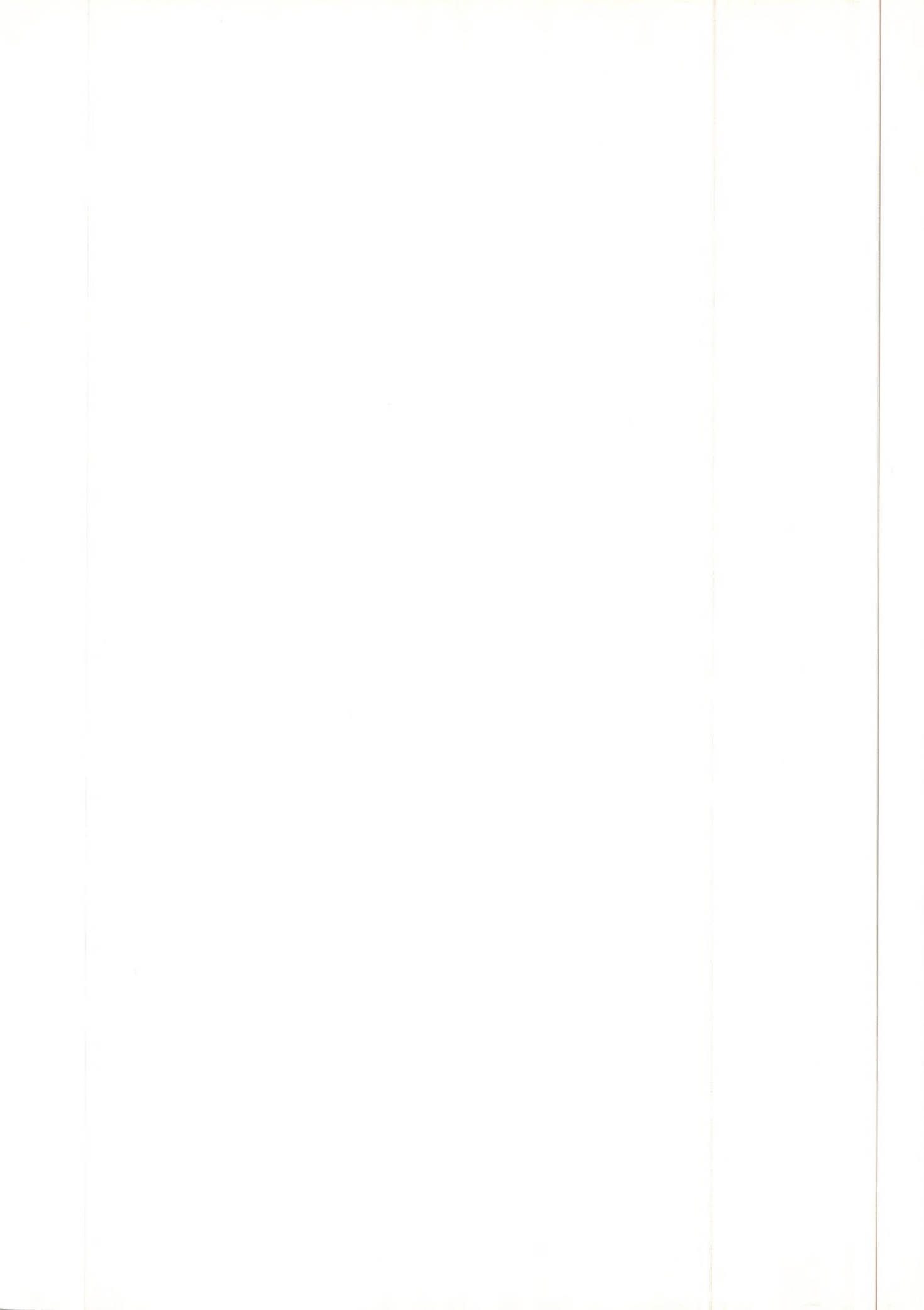
### Organization of the Study

Chapter II describes the procedure for determining the factors affecting the expenditure patterns on wearing apparel of University of North Dakota students.

Chapter III presents a description of the findings and an analysis of the results.

Chapter IV contains conclusions and a summation of the thesis.





## CHAPTER II

### PROCEDURE FOR DETERMINING THE FACTORS AFFECTING THE EXPENDITURE PATTERNS OF WEARING APPAREL OF UNIVERSITY OF NORTH DAKOTA STUDENTS

The first part of this chapter is concerned with the selection of the phenomenon of fundamental interest in this study, the expenditure patterns of University of North Dakota students on wearing apparel. The second part of this chapter explains the procedure used to obtain the data, the selection of those factors that were felt to have an effect on the expenditure patterns of University of North Dakota students on wearing apparel, and the statistical tools used to analyze the relationship between clothing expenditures and the pertinent factors. The procedure was divided into two areas: 1) the process of selecting the respondents to be interviewed for the study and 2) the questionnaire used in the study and the time period in which the study was conducted. The eight factors that were selected that would possibly influence the expenditure patterns of U.N.D. students on wearing apparel were: 1) the respondent's monthly income; 2) the age of the respondent; 3) the respondent's parents' yearly



income if single or the respondent's yearly income if married; 4) the income that was spent on wearing apparel in cities other than Grand Forks; 5) the sex of the respondents; 6) the marital status of the respondents; 7) the place of residence of the respondents; and 8) the campus fraternity affiliation of the respondents. Two techniques, the multiple correlation and the t-test, were used to analyze the collected data.

The Phenomenon of Fundamental Interest:  
Expenditure Patterns of Wearing Apparel

The expenditure patterns of University of North Dakota students on wearing apparel was the variable that was analyzed in the study. Wearing apparel was defined as any clothing including shoes, boots and overshoes. Wearing apparel was selected as the item under consideration in the study for several reasons.

First, purchases of wearing apparel are often made with either a check or a charge account plate where a receipt is given and a record is kept. The likelihood of records, therefore, facilitated the respondent's recall of expenditures on wearing apparel when questioned. Second, some thought by the respondent goes into the purchase of wearing apparel, therefore, the respondent would better be able to recall clothing purchases than the purchase of many other kinds of products. Third, a characteristic of clothing



items is that they are purchased infrequently. Therefore, the infrequency of the number of purchases would possibly make it easier for the respondent to recall the purchases. The procedure used to obtain the data, the selection of the influencing factors, and the analysis of the factors that have an effect on the expenditure patterns of U.N.D. students on wearing apparel are presented in the remaining portion of this chapter.

Procedure Used to Obtain the Data and the  
Selection of the Influencing Factors

The sample frame for the universe population consisted of single male, single female and married students attending the University of North Dakota. The method used for drawing a sample from the sample frame was a quota sample. The quota sample is a nonprobability sampling technique that embodies three basic steps:

1. Selection of the "Control Characteristics" and determination of the proportion of the universe having each set of characteristics.
2. Allocation of the sample among cells.
3. Selection of the sample items.<sup>7</sup>

A quota sample of one hundred students was chosen from the University of North Dakota student directory. The selection of

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<sup>7</sup>Harper W. Boyd, Jr. and Ralph Westfall, Marketing Research Text and Cases (Homewood, Illinois: Richard D. Irwin, Inc., 1964), pp. 432-433.



the respondents was based on four known demographic characteristics: 1) sex; 2) marital status; 3) place of residence; and 4) campus fraternity affiliation. The percentage of those respondents in each of the four demographic classifications was determined from the information obtained in "The University of North Dakota Student Body Profile" published in a U.N.D. Faculty Letter.<sup>8</sup> For example, 24 per cent of the students on campus were married, therefore, from the sample size of one hundred respondents, twenty-four were taken from married couples with either the male spouse or the female spouse attending the University.

The quota sample was used because the control or known demographic characteristics (sex, marital status, place of residence, and campus fraternity affiliation) and the percentage of representation of each on the U.N.D. campus could be determined. Knowing the control characteristics, the percentage of representation of each and the sample size, the one hundred respondents to be personally interviewed were allocated among the sample cells and were then selected. Table 1 presents a breakdown of the cells in a four-control quota sample.

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<sup>8</sup>University of North Dakota, "University of North Dakota Student Body Profile," Faculty Letter, XLV (February 13, 1970), pp. 9-11.

In the universe sampled 46 per cent of the students were single male students, 30 per cent were single female students and 24 per cent were married (17 per cent male and 7 per cent female). Of the 68 per cent of the students that lived on campus, 19 per cent were members of a campus fraternal organization and 49 per cent were independent. Of the 32 per cent living off campus, 8 per cent were members of a campus fraternal organization. The sample size of one hundred students was assumed to be representative of the University population of 7,925 students.

TABLE 1

PERCENTAGE BREAKDOWN OF THE SAMPLE SIZE OF  
100 STUDENTS BY SEX, MARITAL STATUS,  
PLACE OF RESIDENCE, AND  
FRATERNAL AFFILIATION

Marital Status and Sex	Place of Residence and Fraternal Affiliation				Total
	On Campus		Off Campus		
	Frater- nal	Indepen- dent	Frater- nal	Indepen- dent	
Single male	8	30	2	6	46
Single female	9	13	4	4	30
Married male	2	4	1	10	17
Married female	0	2	1	4	7
Total	19	49	8	24	100





### Purpose and design of the questionnaire

Personal interviews were conducted with each of the 100 persons included in the study. A structured questionnaire was used to gather the data.<sup>9</sup> The questionnaire was comprised of both open-end and closed-end questions. These questions were concerned with obtaining information on expenditure patterns of University of North Dakota students for wearing apparel in Grand Forks, campus fraternity affiliation, amount of income spent in cities other than Grand Forks by the respondent, respondent's age, marital status, respondent's monthly income, respondent's parents' yearly income, sex, and place of residence.

The time period for which expenditure information was solicited extended from November 1, 1969 to February 1, 1970. This three month period was chosen because a pretest of the questionnaire indicated that respondents were unable to recall with accuracy expenditures prior to the three month time period preceding the inquiry. Therefore, the 100 personal interviews were conducted during the first two weeks of February, 1970.

### Factors influencing clothing purchases

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<sup>9</sup>See Appendix A.

Eight factors were selected that would possibly influence the expenditure patterns of U. N. D. students on wearing apparel. The four factors that were continuous by nature were the respondent's monthly income, the age of the respondent, the respondent's parents' yearly income if single or the respondent's yearly income if married, and the amount of income spent on wearing apparel in cities other than Grand Forks.

These four factors were selected on the basis that they might have an effect on the expenditure patterns of University of North Dakota students on wearing apparel. The amount of income the respondent received per month would possibly have an effect on the amount available to be spent on wearing apparel during the three month time period. The respondent's age was considered as a factor influencing expenditures. Younger students might spend more or less on wearing apparel than older students. Parents are the main source of income for many students. Other things being equal, the greater the yearly income of the parent, the greater the availability of money for the student. The amount that was spent on clothing other than in Grand Forks would possibly have an effect on the amount that was spent in Grand Forks. The relationship could have either a positive effect or a negative effect. Information was obtained on these four factors and a multiple correlation was conducted



to determine if there was a relationship between the expenditure patterns and the four factors.

The null hypotheses that were tested were: 1) There is no relationship between the expenditure patterns of University of North Dakota students on wearing apparel and the student's monthly income; 2) There is no relationship between the expenditure patterns of University of North Dakota students on wearing apparel and the age of the student; 3) There is no relationship between the expenditure patterns of University of North Dakota students on wearing apparel and the student's parents' yearly income if single or the student's yearly income if married; and 4) There is no relationship between the expenditure patterns of University of North Dakota students on wearing apparel and the amount of income that was spent in cities other than Grand Forks.

Clothing expenditures was designated as the dependent variable. The four factors: the respondent's monthly income; the age of the respondent; the respondent's parents' yearly income if single or the respondent's yearly income if married; and the amount of income spent on wearing apparel in cities other than Grand Forks were considered independent variables.

In addition to determining the net association between the whole set of independent variables and the dependent variable, partial correlation analysis was used to indicate the contribution of

each variable to the total relationship. The increase in variation of the computed values of the expenditures of U.N.D. students on wearing apparel resulting from the introduction of another factor is presented in Appendix B.

The four factors that were discrete by nature were sex, marital status, place of residence, and campus fraternity affiliation. These four factors were selected on the basis that they might have an effect on the expenditure patterns of University of North Dakota students on wearing apparel. Every student who was included in the universe population possessed four demographic characteristics: male or female; single or married; living on campus or off campus; and a member or not a member of a fraternity or a sorority. These factors were then analyzed to determine if there was a relationship between the expenditure patterns of U.N.D. students on wearing apparel and the factors. The null hypotheses that were tested were:

- 1) There is no significant difference in the dollar expenditures of students who are either male students or female students;
- 2) There is no significant difference in the dollar expenditures of students who are either married students or single students;
- 3) There is no significant difference in the dollar expenditures of students who either live on campus or live off campus; and
- 4) There is no significant difference in the dollar expenditures of students who are either members of a campus fraternity or are not members of a



campus fraternity. The level of testing used to test the significance of the null hypotheses was a one-tailed 10 per cent probability level curve for 99 degrees of freedom. The alternative hypotheses tested were: 1) The dollar expenditures on wearing apparel is greater for female students than for male students; 2) The dollar expenditures on wearing apparel is greater for married students than for single students; 3) The dollar expenditures on wearing apparel is greater for students living on campus than for students living off campus; 4) The dollar expenditures on wearing apparel is greater for students who are members of a campus fraternity than for students who are not members of a campus fraternity.

In this study the t-test was used to analyze the relationship between the dependent variable, expenditure patterns of U.N.D. students on wearing apparel, and the discrete independent variables that could not be analyzed using the multiple linear correlation. The four factors which were designated as independent variables were sex, marital status, place of residence, and campus fraternity affiliation. The t-test analysis tested the significant difference, if any, of expenditures that may exist between students who are either male or female, married or single, live on campus or off campus, and a member or not a member of a fraternity or a sorority respectively.

Summary

The variable that was analyzed in the study was the expenditure patterns of University of North Dakota students on wearing apparel. Eight factors were selected that would possibly influence the expenditure patterns of U.N.D. students on wearing apparel. The four factors that were continuous by nature were the respondent's monthly income, the age of the respondent, the respondent's parents' yearly income if single or the respondent's yearly income if married, and the amount of income spent on wearing apparel in cities other than Grand Forks. The four factors that were discrete by nature were sex, marital status, place of residence, and campus fraternity affiliation.

Personal interviews were conducted with each of the 100 respondents included in the study. The selection of the respondents was based on four known demographic characteristics: 1) sex; 2) marital status; 3) place of residence; and 4) campus fraternity affiliation. The time period for which the study was solicited extended from November 1, 1969 to February 1, 1970.

Two methods, the multiple correlation and the t-test, were used to analyze the data that was obtained from the survey of the 100 respondents. The multiple correlation analysis was used to test the null hypotheses: 1) There is no relationship between the



expenditure patterns of University of North Dakota students on wearing apparel and the student's monthly income; 2) There is no relationship between the expenditure patterns of University of North Dakota students on wearing apparel and the age of the student; 3) There is no relationship between the expenditure patterns of University of North Dakota students on wearing apparel and the student's parents' yearly income if single or the student's yearly income is married; and 4) There is no relationship between the expenditure patterns of University of North Dakota students on wearing apparel and the amount of income that was spent in cities other than Grand Forks. The t-test analysis was used to test the null hypotheses:

1) There is no significant difference in the dollar expenditures of students who are either male students or female students; 2) There is no significant difference in the dollar expenditures of students who are either married students or single students; 3) There is no significant difference in the dollar expenditures of students who either live on campus or live off campus; and 4) There is no significant difference in the dollar expenditures of students who are either members of a campus fraternity or are not members of a campus fraternity. A description of the findings and an analysis of the results are contained in Chapter III.

## CHAPTER III

### DESCRIPTION OF THE FINDINGS AND AN ANALYSIS OF THE RESULTS

The first part of this chapter is concerned with the data that were obtained from personal interviews with one hundred University of North Dakota students. All of the questions in the questionnaire were answered by the one hundred students. The second part represents an interpretation of the results that were obtained from the multiple linear correlation analysis and the t-test.

#### Description of the Findings

##### Student source of income

All of the respondents interviewed indicated receiving a monthly income. The dollar range of the monthly income of the respondents is presented in Table 2. Monthly incomes ranged from less than \$25 to \$950. Eighteen of the respondents received a monthly income of more than \$300. The majority of the respondents in this category were married students.

TABLE 2

MONTHLY INCOME OF THE RESPONDENTS<sup>a</sup>

Monthly Income In \$25 Intervals	Number of Respondents
\$ 0	0
1 - 25	1
26 - 50	3
51 - 75	5
76 - 100	17
101 - 125	8
126 - 150	13
151 - 175	1
176 - 200	17
201 - 225	5
226 - 250	7
251 - 275	1
276 - 300	4
Over \$300	<u>18</u>
Total	100

<sup>a</sup>Survey of one hundred University of North Dakota students by Cyril M. Logar, February, 1970.

Table 3 presents the sources of income and the percentage of income received from each source by the one hundred respondents. Five respondents indicated receiving all of their monthly income from a single source. Ninety-five respondents indicated receiving their monthly income from more than one source. Three sources of income were most frequently indicated. These were parents, personal savings, and loans. Sixty-three respondents



TABLE 3

SOURCES OF INCOME AND THE PERCENT OF INCOME RECEIVED  
FROM EACH SOURCE BY THE 100 RESPONDENTS<sup>a</sup>

Per Cent Of Income Received	Sources of Income											Other (wife hus- band)	
	Par- ents	Sav- ings (per- son- al) Loan	Part- time job off cam- pus	Schol- ar- ship Grant	Work Study on Cam- pus	Full- time job	Rel- a- tives	G.I. bill	Al- low- ance	Trust Fund			
Number of Respondents													
1 - 25	31	36	8	19	6	8	6	0	3	1	3	0	5
26 - 50	11	10	28	9	7	4	7	2	2	3	0	0	4
51 - 75	7	5	8	1	4	1	0	1	1	1	0	0	4
76 - 100	14	3	0	0	1	0	0	3	0	0	0	1	6
Total <sup>b</sup>	63	54	44	29	18	13	13	6	6	5	3	1	19

<sup>a</sup>Survey of one hundred University of North Dakota students by Cyril M. Logar, February, 1970.

<sup>b</sup>Total number of respondents that indicated an income from selected sources was not equal to 100 because not all respondents indicated each source.

indicated receiving a portion of their total monthly income from parents, 54 respondents indicated personal savings as a source of income, and 44 respondents mentioned receiving a portion of their monthly income from loans. A few students related receiving a portion of their total monthly income from part-time jobs. Employment was not a major source of income for students who were single. Most married students did, however, have jobs.

#### Student expenditure patterns

Table 4 contains information on the percentage of expenditures on wearing apparel made in various Grand Forks retail institutions by the one hundred respondents.

During the time period for which the study was conducted, all respondents who spent more than \$10 on wearing apparel made their purchases in two or more stores. Respondents who indicated expenditures of less than \$10 confined their purchases to a single store. More respondents made purchases in Norby's than in any retail institution where wearing apparel was purchased in Grand Forks. Of the men's specialty stores, Straus, Ruettell's, Silverman's, and McDonald's, more respondents made purchases in Straus than in the other three men's stores mentioned. Of the seven women's specialty stores, Vanity was the most popular women's store mentioned.

TABLE 4

THE PERCENTAGE OF EXPENDITURES ON WEARING APPAREL  
MADE IN GRAND FORKS RETAIL INSTITUTIONS  
BY RESPONDENTS<sup>a</sup>

Per Cent of Total Ex- penditures in Each of the Retail Institutions	Retail Institutions																	
	Norby's	Straus	Penney's	Vanity	Griffith's	K-Mart	Ruettell's	Silverman's	Sears	Mandel's	McDonald's	Stevenson's	Seeger's	Herberger's	Diana Hughes	Mary Elizabeth	Wards	Others
	Number of Respondents																	
1 - 25	21	16	16	18	19	15	10	12	7	9	3	10	8	5	2	3	2	16
26 - 50	13	10	10	6	5	4	4	2	7	4	9	0	1	0	1	0	0	5
51 - 75	4	3	2	2	2	0	0	2	1	1	0	0	0	0	0	0	0	2
76 - 100	1	3	2	3	2	2	2	0	0	0	1	0	0	0	0	0	0	2
Total <sup>b</sup>	39	32	30	29	28	21	16	16	15	14	13	10	9	5	3	3	2	25

<sup>a</sup>Survey of one hundred University of North Dakota students by Cyril M. Logar, February, 1970.

<sup>b</sup>Total number of respondents that indicated purchases in selected Grand Forks retail institutions was not equal to 100 because not all respondents indicated each store.



The dollar range of expenditures in Grand Forks on wearing apparel by the respondents and the dollar range of expenditures on wearing apparel in communities other than Grand Forks are presented in Table 5.

TABLE 5  
RESPONDENTS' EXPENDITURES IN GRAND FORKS  
COMPARED TO EXPENDITURES IN <sup>a</sup>CITIES  
OTHER THAN GRAND FORKS

Total Dollar Expenditures in \$25 Intervals	Number of Respondents	
	Expenditures on Wearing Apparel in Grand Forks	Expenditures on Wearing Apparel in Communities Other Than Grand Forks
\$ 0	15	25
1 - 25	12	26
26 - 50	15	16
51 - 75	9	12
76 - 100	20	7
101 - 125	6	4
126 - 150	6	4
151 - 175	1	0
176 - 200	2	3
201 - 225	1	0
226 - 250	4	2
251 - 275	1	0
276 - 300	5	0
Over \$300	3	1
Total	100	100

<sup>a</sup>Survey of one hundred University of North Dakota students by Cyril M. Logar, February, 1970.

The expenditures by respondents in Grand Forks ranged from \$0 to \$500 with 71 of the 100 students spending \$100 or less on clothing. Fifteen of the respondents did not purchase wearing apparel in Grand Forks retail institutions from November 1, 1969 to February 1, 1970. When these 15 persons were asked if they purchased wearing apparel in communities other than Grand Forks, 13 of the 15 indicated making purchases in other cities during the period. Of the 100 respondents, 25 did not purchase wearing apparel in communities other than Grand Forks during the three month time period.

Table 6 represents the percentage of the total expenditures made in Grand Forks by the respondents in each of the three months comprising the reporting period. Of the three months, November, December, and January, 92 per cent of those purchasing in Grand Forks indicated that purchases were made during the month of December, 65 per cent bought in January, and 64 per cent purchased in November. The majority of those who purchased wearing apparel in December reported that 51 per cent to 100 per cent of their total expenditures on wearing apparel for the three months were made in December. The majority of those students who purchased wearing apparel in November and January indicated



that up to 50 per cent of their total expenditures on wearing apparel for the three months were made in November and in January.

TABLE 6  
PERCENTAGES OF TOTAL EXPENDITURES ON  
WEARING APPAREL MADE IN GRAND FORKS  
BY MONTH<sup>a</sup>

Per Cent of the Total Respondents' Expenditures	November	December	January
	Percentage of Respondents		
0 - 25	33	12	37
26 - 50	20	27	18
51 - 75	6	17	3
76 - 100	5	36	7
Total <sup>b</sup>	64	92	65

<sup>a</sup>Survey of one hundred University of North Dakota students by Cyril M. Logar, February, 1970.

<sup>b</sup>Total is not equal to 100 per cent because not all respondents indicated purchases of wearing apparel in each of the months of November, December, and January.

The percentage of the total expenditures made in cities other than Grand Forks by respondents in each of the three months comprising the reporting period is presented in Table 7. As previously indicated, 75 respondents indicated expenditures of wearing

apparel in communities other than Grand Forks during the three month time period, November 1, 1969 to February 1, 1970. The greatest proportion of expenditures of wearing apparel were made in December in communities other than Grand Forks. Of those who purchased wearing apparel, 60 per cent indicated that their purchases were made during the month of December, 29 per cent reported purchases in January, and 17 per cent purchased in November. Ninety per cent of the students who indicated purchases of wearing apparel made in December reported that 51 per cent to 100 per cent of their expenditures on wearing apparel for the three months were made in December. Sixty-three per cent of the respondents who indicated purchases of wearing apparel made in November and January indicated that up to 50 per cent of their expenditures on wearing apparel for the three months were made in November and January.

TABLE 7

PERCENTAGES OF TOTAL EXPENDITURES ON  
WEARING APPAREL MADE IN COMMUNITIES  
OTHER THAN GRAND FORKS BY MONTH<sup>a</sup>

Per Cent of the Total Respondents' Expenditures	November	December	January
1 - 25	8	0	11
26 - 50	4	6	6
51 - 75	1	8	1
76 - 100	4	46	11
Total <sup>b</sup>	17	60	29

<sup>a</sup>Survey of one hundred University of North Dakota students by Cyril M. Logar, February, 1970.

<sup>b</sup>Total is not equal to 100 per cent because not all respondents indicated purchases of wearing apparel in each of the months of November, December, and January.

### Analysis of the Results

#### Multiple linear correlation results

The purpose of the multiple linear correlation was to determine if there was a relationship between the total dollar expenditures of U.N.D. students on wearing apparel and the respondent's



monthly income, the age of the respondent, the respondent's parents' yearly income if single or the respondent's yearly income if married, and the amount of income spent on wearing apparel in cities other than Grand Forks.<sup>10</sup> The null hypotheses were:

1. There is no relationship between the expenditure patterns of University of North Dakota students on wearing apparel and the student's monthly income.

2. There is no relationship between the expenditure patterns of University of North Dakota students on wearing apparel and the age of the student.

3. There is no relationship between the expenditure patterns of University of North Dakota students on wearing apparel and the student's parents' yearly income if single or the student's yearly income if married.

4. There is no relationship between the expenditure patterns of University of North Dakota students on wearing apparel and the amount of income that was spent in cities other than Grand Forks.

When the four factors were selected prior to the study they were evaluated for the effect they would have on student expenditures. From this evaluation it was assumed that the four

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<sup>10</sup>See Appendix B for the computation of the multiple correlation analysis.





factors would probably account for a minimum of 50 per cent of the explained variation in the dollar expenditures on wearing apparel (coefficient of multiple determination). (For example, the assumption was that a student that spent \$50 on wearing apparel in the three month time period would probably have a smaller monthly income, have a parent with a smaller yearly income, and spend either more or less income on wearing apparel in cities other than Grand Forks than would a student that spent \$200 during the same time period.)

The actual results obtained from the multiple correlation analysis differed considerably from the assumption that a minimum of 50 per cent of the explained variation in the expenditures could be accounted for by the four factors. The coefficient of multiple determination was 4 per cent. The 4 per cent represents the percentage amount of variation that has been explained in the dependent variable by the four factors. A coefficient of multiple determination of 4 per cent indicates very little relationship existing between the expenditures and the four factors. Only 4 per cent of the variations in dollar expenditures were explained by the respondent's monthly income, the age of the respondent, the respondent's parents' yearly income if single or the respondent's yearly income if married, and the income that was spent on wearing apparel in cities other than Grand Forks. Using the F-test and allowing for a one-tailed 10 per cent significance level, the significance of the 4 per cent ( $r^2$ ) was



determined.<sup>11</sup> Four per cent was not significant, therefore, the null hypotheses were accepted.

There are several possible explanations of why the correlation was only 4 per cent. First, the four factors that were used in the analysis have little effect on the dollar expenditures of U.N.D. students on wearing apparel. Second, the total dollar expenditures of students on wearing apparel in Grand Forks retail institutions from November 1, 1969 to February 1, 1970 may have been affected by factors such as, purchases of wearing apparel that were made previous to the three month time period, purchases that were made by the respondent's parents rather than by the respondent, and gifts of wearing apparel that were received during the period by the respondent. Wearing apparel that was purchased previous to November 1, 1969, or by the parent, or received as a gift would probably decrease the need to purchase wearing apparel during the time period for which the study was conducted, thus offsetting the influence of the selected factors during the brief period chosen for the study.

In addition to determining the net association between the whole set of independent variables and a dependent variable, the

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<sup>11</sup>Dudley J. Cowden and Frederick E. Croxton, Applied General Statistics (2nd ed., Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1955), p. 728.



relationship between a particular independent variable and the dependent variable, while holding the other independent variables constant was also determined. If a correlation exists between a dependent variable and several independent variables the value of  $r^2$  (coefficient of multiple determination) should increase and the standard error of the estimate should decrease with the addition of an appropriate independent variable.<sup>12</sup> However, in the study this did not occur. With the addition of the second ( $X_4$ ) and third ( $X_2$ ) factors the value of  $r^2$  increased by only eleven-hundredth of a per cent. The addition of the fourth ( $X_3$ ) factor decreased  $r^2$  from 9 per cent to 4 per cent. The standard error of the estimate increased from 94.49 to 102.6 with the addition of the second, third and fourth factors. Table 8 presents the values of the coefficients of multiple determination for each of the four factors, changes in the values of the coefficient of multiple determination, and the standard error of the estimate with the addition of each additional factor into the multiple correlation analysis.

The coefficient of multiple determination was 9 per cent when the relationship between the total dollar expenditures on wearing apparel and the amount of income that was spent in communities other than Grand Forks on wearing apparel was analyzed. The

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<sup>12</sup>Ibid., p. 548.



TABLE 8

THE COEFFICIENTS OF MULTIPLE CORRELATION,  
THE COEFFICIENTS OF MULTIPLE  
DETERMINATION, AND THE  
STANDARD ERROR OF THE  
ESTIMATES FOR THE  
FOUR INDEPENDENT  
VARIABLES<sup>a</sup>

Independent Variables <sup>b</sup>	(r) <sup>c</sup>	(r <sup>2</sup> ) <sup>d</sup>	Standard Error of the Estimate
X <sub>5</sub>	.300	.090	94.49
X <sub>4</sub>	.134	.018	94.91
X <sub>2</sub>	.060	.0036	95.40
X <sub>3</sub>	-.010	.0001	102.62
X <sub>2</sub> , X <sub>3</sub> , X <sub>4</sub> , X <sub>5</sub> <sup>e</sup>	.200	.040	102.62

<sup>a</sup>See Appendix B for the computation of the multiple correlation analysis of each factor.

<sup>b</sup>X<sub>5</sub> is the income spent on wearing apparel in cities other than Grand Forks.

X<sub>4</sub> is the respondent's parents' yearly income if single or the respondent's yearly income if married.

X<sub>2</sub> is the respondent's monthly income.

X<sub>3</sub> is the respondent's age.

<sup>c</sup>(r) is the coefficient of multiple correlation.

<sup>d</sup>(r<sup>2</sup>) is the coefficient of multiple determination.

<sup>e</sup>X<sub>2</sub>, X<sub>3</sub>, X<sub>4</sub>, X<sub>5</sub> is the correlation between the expenditures and all four factors.

total dollar expenditures on wearing apparel in cities other than Grand Forks accounted for the greatest amount of variation in the expenditure patterns.

The percentage amount in the explained variation of the expenditures that was accounted for by the respondent's parents' yearly income was 1.8 per cent. A factor that may have altered the results obtained in this analysis was the parents' yearly income which was recorded in question 21 of the questionnaire for respondents that were single and the yearly income that was recorded in question 21 for the students that were married. The yearly income ranged from \$7,000 to above \$14,000 for single students and 88 per cent of the married students had yearly incomes of less than \$7,000 with 59 per cent earning less than \$5,000. This would have an effect on the final results because married students spent more on wearing apparel than did single students. The 1.8 per cent coefficient of multiple determination accounted for a one-tenth per cent increase in the total explained variation in expenditures.

The coefficient of multiple determination was .36 per cent when the relationship between the total dollar expenditures on wearing apparel in Grand Forks and the respondent's monthly income was analyzed while holding the other factors constant. Monthly income accounted for .01 per cent increase in the total explained variation in expenditures.



The fourth factor, the age of the respondent, had a coefficient of multiple determination of .01 per cent. With the addition of the respondent's age, the total explained variation in expenditures was reduced from 9 per cent to 4 per cent.

#### t-test results

The purpose of the t-test analysis was to determine if there was any significant difference between the total dollar expenditures of U.N.D. students on wearing apparel and whether the students were either male or female, married or single, lived on campus or off campus, and a member or not a member of a campus fraternity organization.<sup>13</sup> The null hypotheses were:

1. There is no significant difference in the dollar expenditures of male students as compared with female students.
2. There is no significant difference in the dollar expenditures of married students as compared with single students.
3. There is no significant difference in the dollar expenditures of students that live on campus as compared with students that live off campus.

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<sup>13</sup>See Appendix B for the computation of the t-test analysis.

4. There is no significant difference in the dollar expenditures of students that are members of a campus fraternity as compared with students that are not members of a campus fraternity.

Should the null hypotheses be rejected using a one-tailed 10 per cent level of significance, the alternative null hypotheses that were tested were:

1. The dollar expenditures on wearing apparel are greater for female students than for male students.

2. The dollar expenditures on wearing apparel are greater for married students than for single students.

3. The dollar expenditures on wearing apparel are greater for students living on campus than for students living off campus.

4. The dollar expenditures on wearing apparel are greater for students that are members of a campus fraternity than for students that are not members of a campus fraternity.

The characteristic with the largest t value was the sex of the respondents. This t value was 1.6808. The difference in the mean values of dollar expenditures of wearing apparel of female students and of male students was significant when a one-tailed 10 per cent probability level curve with 99 degrees of freedom was used. Therefore, the null hypothesis was rejected. As there was a sig-



nificant difference between the mean values of female students and male students the alternative null hypothesis that female students spend more on wearing apparel than do male students was tested. The mean value of the dollar expenditures on wearing apparel for female students was 116.1 and the mean value of dollar expenditures on wearing apparel for male students was 78.2 or a difference of 37.9 which was significant. Female students did spend more than male students on wearing apparel in Grand Forks, therefore, the alternative hypothesis was accepted.

The  $t$  value for fraternity affiliation was 1.4664. The difference in the mean values of dollar expenditures on wearing apparel for students who were members of a campus fraternity and students who were not members was significant when a one-tailed 10 per cent significance level with 99 degrees of freedom was used. Therefore, the null hypothesis was rejected. The employed alternative null hypothesis was that students that are members of a campus fraternity spend more on wearing apparel than do students that are not members of a campus fraternity. The mean value of dollar expenditures on wearing apparel of students that were members of a fraternity was 120.5 and the mean value of dollar expenditures on wearing apparel of students that were not members of a fraternity was 81.6 or a difference of 38.9 which was significant.

Students who were members of a fraternity did spend more on wearing apparel than did students that were not members of a fraternity, therefore, the alternative hypothesis was accepted.

The two remaining hypotheses that were tested were there is no significant difference in the dollar expenditures of students that are either married students or single students and there is no significant difference in the dollar expenditures of students that either live on campus or live off campus. The t value for marital status was 1.0728. Applying a one-tailed 10 per cent probability level curve with 99 degrees of freedom, there was no significant difference in the amount of income that was spent on wearing apparel in Grand Forks by students that were either married or single. Place of residence had a t value of .4475. Using a one-tailed 10 per cent significance level with 99 degrees of freedom, there was no significant difference in the amount of income that was spent on wearing apparel in Grand Forks by students that were either living on campus or living off campus. The null hypotheses were, therefore, accepted in both cases.

### Summary

All of the respondents interviewed indicated receiving a monthly income. The monthly income ranged from \$25 to \$950.



The three sources of income that were most frequently indicated by the respondents were parents, personal savings, and loans.

The expenditures by respondents in Grand Forks ranged from \$0 to \$500 with 71 of the respondents spending \$100 or less on clothing. Of the 85 respondents who purchased wearing apparel, 92 per cent indicated that purchases were made during the month of December, 65 per cent purchased in January, and 64 per cent purchased in November. More respondents made purchases in Norby's than in any retail institution where wearing apparel was purchased in Grand Forks. Of the men's specialty stores, more respondents made purchases in Straus than in the other three men's stores mentioned. Of the women's specialty stores Vanity was the most popular of the seven women's stores mentioned.

The expenditures by respondents in communities other than Grand Forks ranged from \$0 to \$450 with 85 of the respondents spending \$100 or less on clothing. Of the 75 students who purchased wearing apparel, 60 per cent reported that purchases were made during the month of December, 29 per cent purchased in January, and 17 per cent purchased in November.

Two methods, the multiple linear correlation and the t-test, were used to analyze the hypotheses. In the multiple correlation analysis, 4 per cent of the total variation in the expenditures was explained by the respondent's monthly income, the age of the

respondent, the respondent's parents' yearly income if single or the respondent's yearly income if married, and the amount of income spent on wearing apparel in cities other than Grand Forks. Using the F-test and allowing for a one-tailed 10 per cent significance level, the significance of the 4 per cent variation was determined. Four per cent was not significant, therefore, the null hypotheses were accepted.

Using a one-tailed 10 per cent significance level, the null hypotheses that were tested using the t-test were rejected for students who were either male or female and for students who were either members or not members of a campus fraternity. Female students did spend significantly more on wearing apparel in Grand Forks than did male students. Students who were members of a campus fraternity did spend significantly more on wearing apparel in Grand Forks than did students who were not members of a campus fraternity. In both cases the alternative hypotheses were accepted. Using a one-tailed 10 per cent significance level, the null hypotheses which were tested by use of the t-test were accepted for students who were either married or single and for students who were either living on campus or off campus. There was no significant difference in the dollar expenditures on wearing apparel for students who were either married or single or for students who were either living on campus or off campus.



## CHAPTER IV

### SUMMARY AND CONCLUSIONS

#### Summary

This study was an analysis of the expenditure patterns of University of North Dakota students on wearing apparel in Grand Forks, North Dakota. The data used in this study were obtained from personal interviews with one hundred students at the University of North Dakota. The study was limited to those students attending the University of North Dakota and living in Grand Forks, North Dakota and East Grand Forks, Minnesota. A structured questionnaire was used to gather the information from the selected students.

The variable that was analyzed in the study was the patterns of dollar expenditures of University of North Dakota students on wearing apparel in Grand Forks. Eight factors were selected that would possibly influence the expenditure patterns of U.N.D. students on wearing apparel. Four of these factors were continuous by nature: the respondent's monthly income; the age of the respondent; the respondent's parents' annual income; and the expenditures on

wearing apparel in communities other than Grand Forks. The remaining factors were discrete by nature. These were sex, marital status, place of residence, and campus fraternity affiliation.

Personal interviews were conducted with each of the one hundred respondents. The selection of the respondents was based on four known demographic characteristics: 1) sex; 2) marital status; 3) place of residence; and 4) campus fraternity affiliation. The time period for which the information for the study was solicited extended from November 1, 1969 to February 1, 1970.

Each of the respondents interviewed received a monthly income. Monthly incomes ranged from \$25 to \$950. Ninety-five respondents indicated receiving a monthly income from two or more sources. The three sources of income that were most frequently mentioned by the respondents were parents, personal savings, and loans. Sixty-three of the respondents indicated receiving a portion of their total monthly income from parents, 54 of the respondents reported personal savings as a source of income, and 44 of the respondents mentioned receiving a portion of their monthly income from loans.

Expenditures by respondents in Grand Forks ranged from \$0 to \$500 with 71 of the respondents spending less than \$100 on clothing. Fifteen of the respondents did not purchase wearing apparel in Grand Forks from November 1, 1969 to February 1, 1970. Of the



85 respondents who did purchase wearing apparel, 92 per cent indicated that purchases were made during the month of December, 65 per cent purchased in January, and 64 per cent purchased in November. During the time period for which the study was conducted, the respondents who spent \$10 or more on wearing apparel purchased in two or more stores. The department stores named by the respondents as institutions where expenditures of wearing apparel were made were Norby's, Penney's, Griffith's, K-Mart, and Sears. More respondents made purchases in Norby's than in the other four department stores. Respondents also indicated that more purchases were made in Norby's than in any retail institution where wearing apparel was purchased in Grand Forks. Of the men's specialty stores, Straus, Ruettell's, Silverman's, and McDonald's, more respondents purchased in Straus' than in the other three men's stores mentioned. Of the seven women's specialty stores mentioned, Vanity was the most popular.

Expenditures by respondents in communities other than Grand Forks ranged from \$0 to \$450 with 85 of the respondents spending less than \$100 on clothing. Twenty-five of the respondents did not purchase wearing apparel in cities other than Grand Forks during the three month time period. Of the 75 respondents who did purchase wearing apparel in other communities, 60 per cent indicated that their purchases were made during the month of

December, 29 per cent purchased in January, and 17 per cent purchased in November.

Multiple linear correlation and analysis was used to test the null hypotheses: 1) There is no relationship between the expenditure patterns of University of North Dakota students on wearing apparel and the student's monthly income; 2) There is no relationship between the expenditure patterns of University of North Dakota students on wearing apparel and the age of the student; 3) There is no relationship between the expenditure patterns of University of North Dakota students on wearing apparel and the student's parents' yearly income if single or the student's yearly income if married; 4) There is no relationship between the expenditure patterns of University of North Dakota students on wearing apparel and the amount of income that was spent in communities other than Grand Forks. Four per cent of the total variation in expenditures was explained by the four factors. The 4 per cent explained variation was not significant at a one-tailed 10 per cent significance level. The null hypotheses were, therefore, accepted.

The t-test was used to examine the null hypotheses:

1) There is no significant difference in the dollar expenditures of students who are either male students or female students; 2) There is no significant difference in the dollar expenditures of students who are either married students or single students; 3) There is no



significant difference in the dollar expenditures of students who either live on campus or live off campus; 4) There is no significant difference in the dollar expenditures of students who are either members of a campus fraternity or are not members of a campus fraternity. Using a one-tailed 10 per cent probability level curve with 99 degrees of freedom, the null hypotheses were rejected for students who were either male or female and for students who were either members or not members of a campus fraternity organization. Female students did spend significantly more on wearing apparel in Grand Forks than did male students. Students who were members of a campus fraternity did spend significantly more on wearing apparel in Grand Forks than did students who were not members of a campus fraternity. In each of the above cases the alternative hypothesis was accepted. Using a one-tailed 10 per cent probability level curve with 99 degrees of freedom, the null hypotheses were accepted for students who were either married or single and for students who were either living on campus or off campus. That is, there were no significant differences in the dollar expenditures on wearing apparel in Grand Forks for students who were married or single, and for students who were either living on campus or off campus.

Conclusions

The initial conclusion that may be drawn from the study is that the expenditure patterns of University of North Dakota students on wearing apparel in Grand Forks are not influenced by the student's monthly income, the age of the student, the student's parents' annual income, and expenditures on wearing apparel in cities other than Grand Forks.

There are several possible explanations for the lack of a significant relationship. First, the four factors that were used in the analysis have little effect on the dollar expenditures of U.N.D. students on wearing apparel, as indicated by the test of the null hypotheses. Second, the total dollar expenditures of students on wearing apparel in Grand Forks retail institutions from November 1, 1969 to February 1, 1970 may have been affected by such factors as purchases of wearing apparel made previous to the three month time period, purchases made for the respondent by the respondent's parents rather than by the respondent, and gifts of wearing apparel that were received during the period by the respondent, thus exhibiting a pattern different from that which might have been observed for a longer period of time. Wearing apparel that was purchased previous to November 1, 1969, or by the parent, or received as a gift would probably decrease the need to purchase wearing apparel



during the time period for which the study was conducted, thus offsetting the influence of the related factors during the brief period chosen for the study.

The second conclusion that may be drawn from the study is that female students spend significantly more on wearing apparel in Grand Forks than male students. This may be an indication that personal appearance is more important to female students than to male students.

The third conclusion that may be drawn from the study is that students who are members of a campus fraternity organization spend significantly more on wearing apparel than do students who are not members of a campus fraternity organization. Possibly, students who are members of a campus fraternity are affected more by group social pressures and the need to conform than are students who are not members of a campus fraternity. The former are members of a group which has imposed a set of standards, such as dress codes, which must be met in order to belong.

The fourth conclusion that may be drawn from the study is that there is no significant difference in dollar expenditures on wearing apparel in Grand Forks because of marital status or place of residence. There appears to be no explanation for the lack of significance in the dollar expenditures on wearing apparel of married

students as compared with single students and for students living on campus as compared with students living off campus.

The fifth conclusion that may be drawn from the study is that U.N.D. students tend to shop in the downtown Grand Forks retail institutions for wearing apparel rather than in the South Forks Shopping Center. U.N.D. students purchased a larger percentage of their clothing from downtown stores than from stores in the South Forks Shopping Center. The available mass transportation to the downtown and the large number of retail institutions located there probably contribute to the popularity of the downtown stores.

The sixth conclusion that may be drawn from the study is that of the three months included in the survey, December was the most popular month for purchases. There are several possible reasons for this pattern. First, students may have waited for Christmas vacation which gave them more time to shop for clothing. Second, students may have purchased wearing apparel for gifts for others in December. Third, students may have spent more on wearing apparel for themselves in December because of the need for new clothing for vacations taken in December.

In summary, the study has attempted to identify and explain student clothing expenditures in a limited time period. There is need for additional research in the area of patterns of U.N.D. student expenditures on wearing apparel. Further studies should be





conducted to search for additional explanations for expenditure patterns and to extend the time period beyond three months. The additional research may provide retailers with a better knowledge of their customers so that they can employ their marketing strategies more effectively.

APPENDIX A

## QUESTIONNAIRE

1. Are you a full-time or part-time student?

01. \_\_\_\_\_ Full-time

02. \_\_\_\_\_ Part-time

2. If male ask:

Do you belong to any of the Social Fraternities on the University of North Dakota campus or are you an Independent?

01. \_\_\_\_\_ Independent

02. \_\_\_\_\_ Fraternity

03. \_\_\_\_\_ Pledge

If female ask:

Do you belong to any of the Social Sororities on the University of North Dakota campus or are you an Independent?

04. \_\_\_\_\_ Independent

05. \_\_\_\_\_ Sorority

06. \_\_\_\_\_ Pledge

3. How many of the following on this card (hand respondent card A) describe the source or means by which you receive your income to pay for your schooling, clothing, food, recreation, etc?

a. Parents	_____ 01	h. G. I. Bill	_____ 08
b. Relatives	_____ 02	i. Savings (personal)	_____ 09
c. Trust Fund	_____ 03	j. Work study on UND campus	_____ 10
d. Grant	_____ 04	k. Part-time job off campus	_____ 11
e. Scholarship	_____ 05	l. Full-time job	_____ 12
f. Loan	_____ 06	m. Other, please explain	_____ 13
g. Allowance	_____ 07		



4. What per cent of this monthly income comes from (ask each of those checked in question 3):

a. Parents	_____ 01	h. G. I. Bill	_____ 08
b. Relatives	_____ 02	i. Savings (personal)	_____ 09
c. Trust Fund	_____ 03	j. Work study on UND campus	_____ 10
d. Grant	_____ 04	k. Part-time job off campus	_____ 11
e. Scholarship	_____ 05	l. Full-time job	_____ 12
f. Loan	_____ 06	m. Other, please explain	_____ 13
g. Allowance	_____ 07		

5. Within the past three (3) months, at which retail stores in Grand Forks did you purchase wearing apparel for both yourself and/or for gifts for others?

a. Griffith's	_____ 01	k. Herberger	_____ 11
b. K-Mart	_____ 02	l. Mandel's	_____ 12
c. Norby's	_____ 03	m. Seeger's	_____ 13
d. Sears	_____ 04	n. Stevensons	_____ 14
e. Penney's	_____ 05	o. Vanity	_____ 15
f. Wards	_____ 06	p. Diana Hughes	_____ 16
g. Straus	_____ 07	q. Mary Elizabeth	_____ 17
h. McDonald	_____ 08	r. Other, explain	_____ 18
i. Ruettell	_____ 09	s. _____	_____ 19
j. Silverman	_____ 10	t. _____	_____ 20

6. What per cent of your total expenditures on wearing apparel were purchased in (those checked in question 5)?

a. Griffith's	_____ 01	k. Herberger	_____ 11
b. K-Mart	_____ 02	l. Mandel's	_____ 12
c. Norby's	_____ 03	m. Seeger's	_____ 13
d. Sears	_____ 04	n. Stevensons	_____ 14
e. Penney's	_____ 05	o. Vanity	_____ 15
f. Wards	_____ 06	p. Diana Hughes	_____ 16
g. Straus	_____ 07	q. Mary Elizabeth	_____ 17
h. McDonald	_____ 08	r. Other, explain	_____ 18
i. Ruettel	_____ 09	s. _____	_____ 19
j. Silverman	_____ 10	t. _____	_____ 20

7. Why did you choose to shop at those particular stores and not at the others? (ask those checked in question 5)

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8. a. How much money would you estimate you spent on wearing apparel in these Grand Forks retail stores from November 1, 1969 to February 1, 1970? \$ \_\_\_\_\_

- 01. \_\_\_\_\_ Don't know
- 02. \_\_\_\_\_ Refused

b. What per cent of this figure was spent in:

- 01. \_\_\_\_\_ January
- 02. \_\_\_\_\_ December
- 03. \_\_\_\_\_ November
- 04. \_\_\_\_\_ Don't Know

9. During this time from November 1, 1969 to February 1, 1970 did you do any shopping for wearing apparel in cities other than Grand Forks, North Dakota? 01. \_\_\_\_\_ yes 02. \_\_\_\_\_ No

If yes, what are the names of those cities?

- |             |         |                        |         |
|-------------|---------|------------------------|---------|
| a. Fargo    | _____03 | e. Minneapolis         | _____07 |
| b. Minot    | _____04 | f. Jamestown           | _____08 |
| c. Winnipeg | _____05 | g. Devils Lake         | _____09 |
| d. Bismarck | _____06 | h. Others, please name | _____10 |
|             | _____11 |                        | _____14 |
|             | _____12 |                        | _____15 |
|             | _____13 |                        | _____16 |

10. Why did you go to (the above names cities) to purchase wearing apparel instead of making the purchase in Grand Forks?

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11. a. How much money would you estimate you spent on wearing apparel in (the above named cities) from November 1, 1969 to February 1, 1970? \$ \_\_\_\_\_

- 01. \_\_\_\_\_ Don't know
- 02. \_\_\_\_\_ Refused

- b. What per cent of this figure was spent in:
01. \_\_\_\_\_ January  
 02. \_\_\_\_\_ December  
 03. \_\_\_\_\_ November  
 04. \_\_\_\_\_ Don't know
12. What per cent of your total expenditures on wearing apparel was spent on gifts for others? \_\_\_\_\_%
01. \_\_\_\_\_ Don't know  
 02. \_\_\_\_\_ Refused
13. What is your school status, that is, are you a:
- |              |    |                         |    |
|--------------|----|-------------------------|----|
| a. Fr. _____ | 01 | e. Grad. _____          | 05 |
| b. So. _____ | 02 | f. Law _____            | 06 |
| c. Jr. _____ | 03 | g. Med. _____           | 07 |
| d. Sr. _____ | 04 | h. Other, explain _____ | 08 |
14. What is your major field of study? \_\_\_\_\_
15. How old are you?
- |                       |    |                      |    |
|-----------------------|----|----------------------|----|
| a. Under 17 yrs _____ | 01 | f. 21 _____          | 06 |
| b. 17 _____           | 02 | g. 22 _____          | 07 |
| c. 18 _____           | 03 | h. 23 _____          | 08 |
| d. 19 _____           | 04 | i. 24 _____          | 09 |
| e. 20 _____           | 05 | j. Over 24 yrs _____ | 10 |
16. Are you married or are you single?
- |                  |    |                    |    |
|------------------|----|--------------------|----|
| a. Married _____ | 01 | d. Divorced _____  | 04 |
| b. Single _____  | 02 | e. Separated _____ | 05 |
| c. Widow _____   | 03 |                    |    |
17. Do you own an automobile? 01. \_\_\_\_\_ Yes 02. \_\_\_\_\_ No
- If yes, what is the make and model year of the car? \_\_\_\_\_
18. Have you spent any time in the armed services: 01. \_\_\_\_\_ yes  
 02. \_\_\_\_\_ No



19. In what city is your permanent home located? \_\_\_\_\_

20. What is your monthly income, counting all sources such as a job, allowances, gifts, etc. \$ \_\_\_\_\_

01. \_\_\_\_\_ Don't know

02. \_\_\_\_\_ Refused

21. And finally I would like to classify people according to family income. Would you look at this card (hand respondent card B) and tell me which letter group you think best describes the annual income range your family is in:

01. _____ a.	Under \$4999	07. _____ g.	\$10,000-10,999
02. _____ b.	5000-5999	08. _____ h.	11,000-11,999
03. _____ c.	6000-6999	09. _____ i.	12,000-12,999
04. _____ d.	7000-7999	10. _____ j.	13,000-13,999
05. _____ e.	8000-8999	11. _____ k.	above \$14,000
06. _____ f.	9000-9999	12. _____ l.	Don't know
		13. _____ m.	Refused

22. To help further classify people according to family income. Look at this card (hand respondent card that responds to the letter checked in question 21) and tell me which of the following dollar intervals best describes the annual income range your family is in:

01. _____ a.	\$5000-5099	06. _____ f.	\$5500-5599
02. _____ b.	5100-5199	07. _____ g.	5600-5699
03. _____ c.	5200-5299	08. _____ h.	5700-5799
04. _____ d.	5300-5399	09. _____ i.	5800-5899
05. _____ e.	5400-5499	10. _____ j.	5900-5999
		11. _____ k.	Don't know
		12. _____ l.	Refused

23. Sex: Male \_\_\_\_\_ 01 Female \_\_\_\_\_ 02

24. 01. \_\_\_\_\_ Dorm 02. \_\_\_\_\_ Fraternity  
03. \_\_\_\_\_ Sorority 04. \_\_\_\_\_ Off Campus

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NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

TELEPHONE NUMBER \_\_\_\_\_

DATE \_\_\_\_\_

COMMENTS: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

APPENDIX B

## DESCRIPTION OF THE STATISTICAL ANALYSIS

### Multiple Linear Correlation

#### Computation Procedure

The multiple linear correlation was used to analyze the relationship between the respondent's dollar expenditures on wearing apparel for the three month time period and the respondent's monthly income, the age of the respondent, the respondent's parents' yearly income if single or the respondent's income if married, and the amount of income that was spent on wearing apparel in communities other than Grand Forks. The respondent's dollar expenditures in Grand Forks on wearing apparel was designated as the dependent variable while the other four were designated as independent variables. To simplify the notations somewhat, instead of using different letters, each of the variables was assigned the letter X with a subscript to differentiate between the variables. The variables were labeled as follows:

Dependent Variable:

Expenditures in Grand Forks.....  $X_1$

## Independent Variables:

Respondent's Monthly Income.....	X <sub>2</sub>
Respondent's Age.....	X <sub>3</sub>
Respondent's Parents' Yearly Income.....	X <sub>4</sub>
Expenditures Made in Cities Other Than Grand Forks.....	X <sub>5</sub>

The first step in the correlation procedure used in this study was the computation of an equation which included the four independent variables as a measure of estimating the expenditure patterns of U.N.D. students on wearing apparel. The estimating equation for four independent variables was:

$$X_{c1.2345} = a_{1.2345} + b_{12.345}X_2 + b_{13.245}X_3 + b_{14.235}X_4 + b_{15.234}X_5$$

The second step was the determination of the total variation of expenditure patterns of U.N.D. students caused by the independent variables. The total variation of the dependent series is the sum of two quantities: 1) The variation in the estimated values of that series from their mean (explained variation,  $\sum X_{c1.2345}^2$ ) and 2) The variation of the actual values from the estimated values (unexplained variation,  $\sum X_{s1.2345}^2$ ), that is  $\sum X_1^2 = \sum X_{c1.2345}^2 + \sum X_{s1.2345}^2$ .<sup>14</sup>

<sup>14</sup>Cowden and Croxton, Applied General Statistics, p. 534.



The third step was the derivation of the standard error of the estimate. The standard error of the estimate is defined as "a measure of the divergence of the actual values of the dependent variable from their estimated or computed values."<sup>15</sup> Because estimated values of  $X_1$  differ from actual values, this measure is used to indicate the degree of accuracy of the estimated figures. The amount of divergence of the actual values of the dependent variable from the estimated or computed values was determined by use of the following formula:

$$s_{1.2345} = \sqrt{\frac{\sum X^2_{s1.2345}}{n}}$$

$s_{1.2345}$  is the standard error of the estimate for the estimating equation of the four independent variables presented in step one. The estimating equation is a straight line describing the nature of the relationship between the variables.

$\sum X^2_{s1.2345}$  is the unexplained variation; the variation of  $X_1$  unexplained respectively, by  $X_2, X_3, X_4,$  and  $X_5$ . It is used to assist in computing  $r$  (coefficient of correlation).

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<sup>15</sup>Ibid., p. 454.

$n$  is the number of items in the sample or the number of sets of observations.

The computed estimate using the data acquired in the study is as follows:

$$s_{1.2345} = \sqrt{\frac{\sum X^2_{s1.2345}}{n}} = \sqrt{\frac{1,052,676}{100}} = \sqrt{10,526.76} = 102.6$$

The standard error of the estimate, 102.6, represents the range around the line of estimation of the four independent variables.

Finally, applying the results of the above three steps, it was possible to determine the coefficient of determination using the following formula:

$$r_{1.2345} = \sqrt{\frac{\sum X^2_{c1:2345}}{\sum X^2_1}} = .20$$

$r_{1.2345}$  is the coefficient of multiple correlation:

$\sum X^2_{c1.2345}$  is the explained variation; the variation of  $X_1$  explained, respectively, by  $X_2, X_3, X_4,$  and  $X_5$ .

$\sum X^2_1$  is the total variation of the  $X_1$  values.

In the multiple correlation analysis the actual measure of the extent of variation in the estimated values relative to the variation in the original values is known as the coefficient of multiple

correlation ( $r$ ). "The coefficient of multiple correlation is an abstract number that does not have a direct meaning related to ordinary experience."<sup>16</sup> Therefore many statisticians prefer to use the coefficient of multiple determination ( $r^2$ ), the coefficient of multiple correlation squared, because it is interpreted as indicating the percentage of variation in the dependent variable that has been caused by the independent variables.

$$r^2_{1.2345} = \frac{\Sigma X^2_{c1.2345}}{\Sigma X^2_1} = .04$$

The coefficient of multiple determination, .04, represents the percentage amount of variation that has been explained in the dependent variable ( $X_1$ ) by the independent variables ( $X_2, X_3, X_4,$  and  $X_5$ ).

The significance of the coefficient of multiple determination was then determined by the F-test.<sup>17</sup>

$$F = \frac{\text{Greater estimate of the variance of the population}}{\text{Lesser estimate of the variance of the population}} = .918$$

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<sup>16</sup> Albert J. Simone, Robert G. Wessel, and Edward R. Wellet, Statistics as Applied to Economics and Business (Rev. ed., New York: Holt, Rinehart and Winston, Inc., 1965), p. 292.

<sup>17</sup> M. J. Moroney, Facts From Figures (Baltimore, Maryland: Penguin Books, 1951), p. 234.



Using a one-tailed 10 per cent significance level, the coefficient of multiple determination of 4 per cent was not significant.

In addition to a determination of the net association between the whole set of independent variables and the dependent variable, the relationship between a particular independent variable and the dependent variable while holding other independent variables constant was also determined. This measure is termed partial correlation.

The computation procedure for determining the percentage amount of variation explained in the dependent variable ( $X_1$ ) by the respondent's monthly income ( $X_2$ ) was:

$$X_{c1.2} = a_{1.2} + b_{1.2} X_2$$

$$\sum X_1^2 = \sum X_{c1.2}^2 + \sum X_{s1.2}^2$$

$$s_{1.2} = \sqrt{\frac{\sum X_{s1.2}^2}{n}}$$

$$r_{1.2} = \sqrt{\frac{\sum X_{c1.2}^2}{\sum X_1^2}} = .06$$

$$r_{1.2}^2 = .0036$$

Approximately .36 per cent of the variation present in  $X_1$  was explained by  $X_2$ .



The computation procedure for determining the percentage amount of variation explained in  $X_1$  by the respondent's age ( $X_3$ ) was:

$$X_{c1.3} = a_{1.3} + b_{1.3} X_3$$

$$\sum X_1^2 = \sum X_{c1.3}^2 + \sum X_{s1.3}^2$$

$$s_{1.3} = \sqrt{\frac{\sum X_{s1.3}^2}{n}}$$

$$r_{1.3} = \sqrt{\frac{\sum X_{c1.3}^2}{\sum X_1^2}} = -.01$$

$$r_{1.3}^2 = .0001$$

Approximately .01 per cent of the variation present in  $X_1$  was explained by  $X_3$ .

The computation procedure for determining the percentage amount of variation explained in  $X_1$  by the respondent's parents' yearly income ( $X_4$ ) was:

$$X_{c1.4} = a_{1.4} + b_{1.4} X_4$$

$$\Sigma X^2_1 = \Sigma X^2_{c1.4} + \Sigma X^2_{s1.4}$$

$$s_{1.4} = \sqrt{\frac{\Sigma X^2_{s1.4}}{n}}$$

$$r_{1.4} = \frac{\sqrt{\Sigma X^2_{c1.4}}}{\sqrt{\Sigma X^2_1}} = .13$$

$$r^2_{1.4} = .018$$

Approximately 1.8 per cent of the variation present in  $X_1$  was explained by  $X_4$ .

The computation procedure for determining the percentage amount of variation explained in  $X_1$  by the expenditures made in communities other than Grand Forks on wearing apparel ( $X_5$ ) was:

$$X_{c1.5} = a_{1.5} + b_{1.5} X_5$$

$$\Sigma X^2_1 = \Sigma X^2_{c1.5} + \Sigma X^2_{s1.5}$$

$$s_{1.5} = \sqrt{\frac{\Sigma X^2_{s1.5}}{n}}$$

$$r_{1.5} = \sqrt{\frac{\sum X_{c1.5}^2}{\sum X^2}} = .30$$

$$r_{1.5}^2 = .09$$

Approximately 9 per cent of the variation present in  $X_1$  was explained by  $X_5$ .

### Use of the T-Test as a Test of Significance

#### Computation Procedure

The t-test was used to determine the significant difference, if any, in expenditure patterns of male students as compared with female students, married students as compared with single students, students living on campus as compared with students living off campus, and students that are members of a campus fraternity as compared with students that are not members of a campus fraternity. To simplify the notations, each of the variables was designated by the letter Y with subscripts to differentiate between the variables and within the variables. The variables were labeled as follows:

Expenditures in Grand Forks.....	$Y_1$	
Sex.....	$Y_2$	
Male.....		$y_{2a}$
Female.....		$y_{2b}$
Marital Status.....	$Y_3$	
Married.....		$y_{3a}$
Single.....		$y_{3b}$
Place of Residence.....	$Y_4$	
On Campus.....		$y_{4a}$
Off Campus.....		$y_{4b}$
Campus Fraternity Affiliation.....	$Y_5$	
Affiliation.....		$y_{5a}$
Non-affiliation.....		$y_{5b}$

The actual indicator of the difference between the variables is known as Student's  $t$ .

The first step in the  $t$ -test analysis as employed in this study was to determine the discrepancy between the sample means of dollar expenditures on wearing apparel ( $\bar{y}_{2a}, \bar{y}_{2b}, \bar{y}_{3a}, \bar{y}_{3b}, \bar{y}_{4a}, \bar{y}_{4b}, \bar{y}_{5a}, \bar{y}_{5b}$ ). The greater the discrepancy between the two sample means  $|\bar{y}_{2a} - \bar{y}_{2b}|$  the greater is the value of  $t$ .



The second step was to apply Bessel's correction to obtain the best estimate of the population standard deviation of discrepancies:<sup>18</sup>

$$\hat{\sigma} = s \sqrt{\frac{n}{n-1}}$$

$\hat{\sigma}$  is Bessel's correction.

$s$  is the standard deviation of the sample.

$n$  is the sample size.

Finally an application of the results of the above two steps, resulted in a determination of Student's  $t$  for each of the independent variables. The following formula was used:

$$t = \frac{|\bar{y} - \bar{y}| \sqrt{n-1}}{s}$$

The resulting Student's  $t$  for the dollar expenditures of male students ( $y_{2a}$ ) and the dollar expenditures of female students ( $y_{2b}$ ) was:

$$t = \frac{|\bar{y}_{2a} - \bar{y}_{2b}| \sqrt{n-1}}{s} = 1.6808$$

A reference to the "Table of  $t$ " values, for a one-tailed 10 per cent probability level curve with 99 degrees of freedom,

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<sup>18</sup>Ibid., p. 229.

indicated that there was a significant difference between  $\bar{y}_{2a}$  and  $\bar{y}_{2b}$ .<sup>19</sup> Therefore, the null hypothesis was rejected.

The result of the determination of the significant difference, if any, between the dollar expenditures of married students ( $y_{3a}$ ) and the dollar expenditures of single students ( $y_{3b}$ ) was:

$$t = \frac{|\bar{y}_{3a} - \bar{y}_{3b}|}{s} \sqrt{n - 1} = 1.0728$$

The "Table of t" values, for a one-tailed 10 per cent probability level curve with 99 degrees of freedom indicated that there was no significant difference between  $\bar{y}_{3a}$  and  $\bar{y}_{3b}$ . Therefore, the null hypothesis was accepted.

The computation of the measure of significant difference, if any, between dollar expenditures of students living on campus ( $y_{4a}$ ) and dollar expenditures of students living off campus ( $y_{4b}$ ) was:

$$t = \frac{|\bar{y}_{4a} - \bar{y}_{4b}|}{s} \sqrt{n - 1} = .4475$$

The reference to the "Table of t" values, for a one-tailed 10 per cent probability level curve with 99 degrees of freedom, indicated that there was no significant difference between  $\bar{y}_{4a}$  and  $\bar{y}_{4b}$ .

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<sup>19</sup>Herbert Arkin and Raymond R. Colton, Tables For Statisticians (2nd ed., New York: Barnes and Nobel, Inc., 1963), p. 121.

Therefore, the null hypothesis was accepted.

The computation procedure for determining the significant difference, if any, between dollar expenditures of students that are members of either a fraternity or a sorority ( $y_{5a}$ ) and dollar expenditures of students that are not members of a fraternity or a sorority ( $y_{5b}$ ) was:

$$t = \frac{|\bar{y}_{5a} - \bar{y}_{5b}|}{s} \sqrt{n - 1} = 1.4664$$

The reference to the "Table of t" values, for a one-tailed 10 per cent probability level curve with 99 degrees of freedom, indicated that there was a significant difference between  $\bar{y}_{5a}$  and  $\bar{y}_{5b}$ . Therefore, the null hypothesis was rejected. Table 9 indicates the results that were obtained in the t-test analysis from respondents that were male students as compared with female students ( $y_{2a}$ - $y_{2b}$ ), married students as compared with single students ( $y_{3a}$ - $y_{3b}$ ), students living on campus as compared with students living off campus ( $y_{4a}$ - $y_{4b}$ ), and students that were members of a campus fraternity as compared with students that were not members of a campus fraternity ( $y_{5a}$ - $y_{5b}$ ).



TABLE 9

T-RATIOS OF THE SAMPLE MEANS OF 100 STUDENTS BY SEX, MARITAL STATUS, PLACE OF RESIDENCE, AND CAMPUS FRATERNITY AFFILIATION

Sample Means Tested <sup>a</sup>	T-Results	Significance (10% Significance Level)
$ \bar{y}_{2a} - \bar{y}_{2b} $	1.6808	SIGNIFICANT
$ \bar{y}_{3a} - \bar{y}_{3b} $	1.0728	NONE
$ \bar{y}_{4a} - \bar{y}_{4b} $	.4475	NONE
$ \bar{y}_{5a} - \bar{y}_{5b} $	1.4664	SIGNIFICANT

<sup>a</sup>The four discrete factors tested were sex ( $y_{2a}-y_{2b}$ ), marital status ( $y_{3a}-y_{3b}$ ), place of residence ( $y_{4a}-y_{4b}$ ), and campus fraternity affiliation ( $y_{5a}-y_{5b}$ ).



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