ABSTRACT


A rural Midwestern sample (N = 383) was measured on stage of change for 4 behaviors linked to chronic disease. A survey that combined staging algorithms and age, gender, education, and occupation questions was developed. Residents over age 21 in 5 communities were approached to complete the survey at public locations during 1 month. Most residents had never smoked (58%) or drunk alcohol (66%) at the limits specified (5 drinks for men and 4 for women per occasion) and were excluded from stage analyses. Maintenance was the largest group for smoking, alcohol, and dietary fat, followed by Precontemplation. The largest group for exercise was Preparation, followed by Maintenance. These distributions were found to be statistically significant. There was an association between dietary fat stage of change and stage for the 3 other subscales. Ss aged 65+ and the retired were in a later stage of change for dietary fat. Farmers, males, and Ss in their 20's were in an earlier stage of change for dietary fat. Ss aged 65+ were in a later stage of change for exercise. Being younger than age 50 was associated with an earlier stage for smoking. No significant differences were noted for alcohol or for education. Health promotion strategies for this population based on the stages of change theory are discussed.
STAGES OF CHANGE FOR SMOKING CESSATION, ALCOHOL MODERATION,
DIETARY FAT REDUCTION, AND EXERCISE ADOPTION
IN A RURAL MINNESOTA COUNTY

A THESIS PRESENTED
TO
THE GRADUATE FACULTY
UNIVERSITY OF WISCONSIN-LA CROSSE

IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE
MASTER OF PUBLIC HEALTH
IN COMMUNITY HEALTH EDUCATION DEGREE

BY
AUDREY M. QUANRUD
DECEMBER 1995
Candidate: Audrey M. Guanrud

We recommend acceptance of this thesis in partial fulfillment of this candidate's requirements for the degree:

Master of Public Health in Community Health Education

The candidate has successfully completed her thesis final oral defense.

Thesis Committee Chairperson Signature: Date: Nov. 7, 1995

Thesis Committee Member Signature: Date: November 10, 1995

Thesis Committee Member Signature: Date: November 9, 1995

This thesis is approved by the College of Health, Physical Education, and Recreation.

Associate Dean, College of Health, Physical Education, and Recreation: Date: 12-6-95

Dean of U-W-L Graduate Studies: Date: 20 December 1995
ACKNOWLEDGMENTS

I wish to thank my committee members, Drs. J. Leslie Oganowski and Betsy Morgan, and my chair, Dr. Gary Gilmore, for their encouragement and helpful suggestions. I particularly thank Dr. Gilmore for presenting me with many opportunities to learn about disease prevention and health promotion strategies.

I am grateful to Andrea Michael, MPH, for suggesting the theoretical framework of this thesis, and for serving as a sounding board as I narrowed the focus of my research. I also thank Fran Rybarik, RN, MPH, for her encouragement. Marjorie Debevec-Marksteiner traveled to Houston County to help with the final phase of my data collection, which I greatly appreciated.

My work was made easier knowing I had the loving support of my patient family: my husband, John; our children, Catherine, Julia, and Jack; and our parents, Audrey Whittley and Rebecca Quanrud.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACKNOWLEDGEMENTS</td>
<td>iii</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>vii</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>viii</td>
</tr>
<tr>
<td>LIST OF APPENDICES</td>
<td>ix</td>
</tr>
<tr>
<td><strong>CHAPTER</strong></td>
<td></td>
</tr>
<tr>
<td>I. INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>Stages of Change Model</td>
<td>5</td>
</tr>
<tr>
<td>Statement of the Problem</td>
<td>7</td>
</tr>
<tr>
<td>Null Hypotheses</td>
<td>7</td>
</tr>
<tr>
<td>Delimitations</td>
<td>10</td>
</tr>
<tr>
<td>Limitations</td>
<td>10</td>
</tr>
<tr>
<td>Definitions of Terms</td>
<td>10</td>
</tr>
<tr>
<td>II. REVIEW OF RELATED LITERATURE</td>
<td>12</td>
</tr>
<tr>
<td>Introduction</td>
<td>12</td>
</tr>
<tr>
<td>Stages of Change in Health Promotion</td>
<td>13</td>
</tr>
<tr>
<td>Measuring Change</td>
<td>14</td>
</tr>
<tr>
<td>Stage-Based or Standard Treatment</td>
<td>16</td>
</tr>
<tr>
<td>The Processes of Change</td>
<td>17</td>
</tr>
<tr>
<td>Intent and Actual Behavior</td>
<td>19</td>
</tr>
<tr>
<td>Importance of the Preparation Stage</td>
<td>22</td>
</tr>
<tr>
<td>Demographics and Stage of Change</td>
<td>25</td>
</tr>
<tr>
<td>Description of the Study County</td>
<td>27</td>
</tr>
<tr>
<td>CHAPTER</td>
<td>PAGE</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>III. METHODS AND PROCEDURES</td>
<td>30</td>
</tr>
<tr>
<td>Introduction</td>
<td>30</td>
</tr>
<tr>
<td>Subject Selection</td>
<td>30</td>
</tr>
<tr>
<td>Instrumentation</td>
<td>32</td>
</tr>
<tr>
<td>Methods and Procedures</td>
<td>35</td>
</tr>
<tr>
<td>Statistical Treatment</td>
<td>35</td>
</tr>
<tr>
<td>IV. RESULTS AND DISCUSSION</td>
<td>38</td>
</tr>
<tr>
<td>Introduction</td>
<td>38</td>
</tr>
<tr>
<td>Results</td>
<td>38</td>
</tr>
<tr>
<td>Sample Distribution</td>
<td>39</td>
</tr>
<tr>
<td>Significance of Distribution</td>
<td>42</td>
</tr>
<tr>
<td>Association Between Health Behaviors</td>
<td>45</td>
</tr>
<tr>
<td>Relationship to Demographic Variables</td>
<td>46</td>
</tr>
<tr>
<td>Discussion</td>
<td>51</td>
</tr>
<tr>
<td>Demographic Influences on Stage of Change</td>
<td>55</td>
</tr>
<tr>
<td>Comments from Participants</td>
<td>56</td>
</tr>
<tr>
<td>Implications</td>
<td>58</td>
</tr>
<tr>
<td>Alcohol and Smoking</td>
<td>58</td>
</tr>
<tr>
<td>Dietary Fat Reduction</td>
<td>61</td>
</tr>
<tr>
<td>Exercise</td>
<td>65</td>
</tr>
<tr>
<td>Practical Application of the Theory</td>
<td>67</td>
</tr>
<tr>
<td>CHAPTER</td>
<td>PAGE</td>
</tr>
<tr>
<td>-----------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>V. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS</td>
<td>69</td>
</tr>
<tr>
<td>Summary</td>
<td>69</td>
</tr>
<tr>
<td>Conclusions</td>
<td>70</td>
</tr>
<tr>
<td>Recommendations</td>
<td>72</td>
</tr>
<tr>
<td>REFERENCES</td>
<td>77</td>
</tr>
<tr>
<td>APPENDICES</td>
<td>81</td>
</tr>
</tbody>
</table>
LIST OF TABLES

<table>
<thead>
<tr>
<th>TABLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Percentages of Houston County participants in stages of change and K-S test of distribution</td>
<td>43</td>
</tr>
<tr>
<td>2. Correlation (rho) between stages for alcohol use, smoking, exercise, and dietary fat reduction in Houston County</td>
<td>46</td>
</tr>
<tr>
<td>3. Houston County stages of change ANOVA for alcohol use, smoking, exercise, and dietary fat reduction by age</td>
<td>47</td>
</tr>
<tr>
<td>4. Houston County stages of change ANOVA for alcohol use, smoking, exercise, and dietary fat reduction by gender</td>
<td>49</td>
</tr>
<tr>
<td>5. Houston County stages of change ANOVA for alcohol use, smoking, exercise, and dietary fat reduction by education</td>
<td>50</td>
</tr>
<tr>
<td>6. Houston County stages of change ANOVA for alcohol use, smoking, exercise, and dietary fat reduction by occupation</td>
<td>52</td>
</tr>
<tr>
<td>FIGURE</td>
<td>Description</td>
</tr>
<tr>
<td>--------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>1.</td>
<td>Smoking stage of change frequencies</td>
</tr>
<tr>
<td>2.</td>
<td>Alcohol stage of change frequencies</td>
</tr>
<tr>
<td>3.</td>
<td>Exercise stage of change frequencies</td>
</tr>
<tr>
<td>4.</td>
<td>Dietary fat stage of change frequencies</td>
</tr>
<tr>
<td>APPENDIX</td>
<td>PAGE</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>------</td>
</tr>
<tr>
<td>A. Staging Algorithms</td>
<td>81</td>
</tr>
<tr>
<td>B. Informed Consent Form</td>
<td>85</td>
</tr>
</tbody>
</table>
CHAPTER I
INTRODUCTION

Health promotion programs are one avenue of reducing health care costs for individuals, businesses, and government. Chronic illnesses such as heart disease and cancer are now the major cause of morbidity and mortality in the U.S. They create much of the demand for medical services. By preventing chronic disease, individuals are less burdened by illness, and demand for expensive treatment is reduced (Fries et al., 1993).

The top four causes of death in the U.S., heart disease, cancer, cerebrovascular disease, and accidents, are caused by a combination of inborn (mostly genetic) and external risk factors. The external risk factors include tobacco use, dietary patterns, decreased physical activity, and alcohol misuse. These risk factors alone were the cause of about half of all the deaths that occurred in 1990. Because they have their basis in behavioral choices, they are potentially amendable through intervention (McGinnis & Foege, 1993).

Even though studies have clearly demonstrated the connection between behavioral choices and chronic disease, public education campaigns have not been very successful:

Despite extensive public education efforts, 48 million Americans continue to smoke, 2/3 of the women at risk
for breast cancer do not receive mammograms, and 50% of the public did not act on established cancer prevention checkup guidelines that could have saved 178,000 lives in 1989. (Cummings & Floyd, 1989, p. 2)

Large-scale trials in recent years, such as the Multiple Risk Factor Intervention Trial (MRFIT), the Stanford Five-City Project, the Minnesota Heart Health Program, and the recent Take Heart and COMMIT trials have tested the ability of public health interventions to change behavior. The results have been disappointing: "Generally, the size of effects has been meager in relation to the effort expended" (Susser, 1995, p. 156).

Fisher (1995) suggests that a lack of measurable results from large, expensive interventions may lead some to conclude that community health promotion interventions are ineffective. This conclusion may make it more difficult to increase the current proportionately low level of health care funding for disease prevention and health promotion programs. While there may be agreement in principle that chronic disease prevention is preferable to investing in expensive tertiary care, low levels of participation by those who could most benefit from health promotion programs have caused some to question the cost-effectiveness of such programs. What may be needed is a change from the current practice of targeting public health interventions for whole communities, to designing them based on the needs of subgroups within the population.

Targeting subgroups could mean identifying groups based on demographic variables such as age, gender, or race, and
developing a program sensitive to the expressed needs and norms of the subgroup. Another approach, the stages of change or Transtheoretical model, would identify population subgroups according to where individuals are in a continuum of change. This model has attracted the interest of many health professionals because it explains the poor participation rates in traditional health promotion programs, and offers hope for reaching those who have not responded in the past.

Traditionally, health promotion programs have asked individuals to make a change in their health habits. According to Prochaska, "behavioral change is the goal that unites professionals in the field of health promotion and disease prevention" (1989, p. 30). Inviting the general public to become involved in a health promotion program usually assumes that all individuals at risk potentially are ready to make a health behavior change. But according to Prochaska, Norcross, and DiClemente:

We have found, in a representative sample across more than 15 high-risk behaviors, that fewer than 20% of a problem population are prepared for action at any given time. And yet, more than 90% of behavior change programs are designed with this 20% in mind. (1994, p. 15)

Five different stages of change are proposed in this model, each characterized by different current behavior, as well as different levels of intent to modify future behavior. Understanding how individuals progress through the stages may provide clues that could be used to better meet the needs of those individuals who are interested in
making positive lifestyle changes. Interventions would be targeted to stage of change and would be based upon the change processes most likely to be utilized by individuals in that stage (Prochaska, Redding, Harlow, Rossi, & Velicer, 1994).

Similar patterns of stage-related behavior change have been found in studies involving addictions such as smoking, alcohol, and cocaine, as well as weight control, high-fat diets, adolescent delinquent behaviors, safer sex, condom use, sunscreen use, radon gas exposure, exercise acquisition, mammography screening, and physicians’ preventive practices with smokers (Prochaska, Velicer, et al., 1994). Because the model has been tested among such diverse behaviors, representing health risks as well as health-enhancing practices, the model could offer a broad approach to public health promotion planning (Prochaska, Redding, et al., 1994).

The present study tested the use of the model in a general population who had not been identified as individuals at risk. The study differs from previous studies on the stages of change because the population is from a rural county with no large urban centers. Also, in this study, the population was recruited with no knowledge of past or current health behaviors. While many stages of change studies have been worksite-based, this study was designed to give as complete a mix as possible of all the demographic characteristics likely to be found in a rural
county. Finally, this study combined four separate health behavior subscales in one instrument.

Public health planners in rural counties usually have a large geographical area, limited resources and staff, and a smaller, more dispersed population to serve. Poor participation rates in health promotion programs represent a poor return on the amount of time and money that goes into planning, promoting, staffing, and supplying a program. A lack of public response may also make it difficult to find continued funding for these programs.

**Stages of Change Model**

The stages of change model may offer rural health program planners a method to better comprehend the needs of rural residents and provide them with the type of assistance they are more likely to utilize. While many individuals do make positive health behavior changes on their own, use of the model may accelerate passage through the stages of change and help reduce relapses.

Five stages of change are conceptualized in the model, ranging from precontemplation (PC), to contemplation (C), to preparation (P), to action (A), and finally, to maintenance (M).

The early stages of change are PC and C. Precontemplators use the processes of change less than any other group. They are often defensive and resistant to change, or may feel demoralized about their ability to change. Precontemplators can be uninformed or underinformed
about their behavior, or they may choose to ignore information provided them. Contemplators are much more open to information and feedback about their behavior, but are still ambivalent about changing.

In these early stages, individuals respond more to the experiential processes. Appropriate strategies for those in PC would be techniques to help them process information more accurately (consciousness raising), to increase emotional awareness (dramatic relief), and to heighten awareness of their behavior's impact on their self-image (self-reevaluation) (Prochaska, Redding, et al., 1994).

Individuals are staged in P according to different criteria for each behavior, but one criterion is whether the individual intends to take action (e.g., quit smoking) within the next 30 days. In A, individuals have consistently practiced the new behavior for a period of up to 6 months. After sustaining a behavior change for at least 6 months, an individual would be in M. Relapse is still a possibility for individuals in M, although less likely.

The behavioral processes become more important to individuals in the later stages. Techniques that reinforce small steps toward behavior change (reinforcement management), suggest healthy alternative behaviors (counterconditioning), and help develop social support (helping relationships) are most likely to be used in these stages (Prochaska, Redding, et al., 1994).
Statement of the Problem

Epidemiologic data indicate a need for health promotion programs that reduce behavioral risks associated with chronic disease. Participation in such programs can be increased by matching interventions with an individual’s stage of change. Stages of change and their correlates have not been described in a rural, Midwestern population. It is not clear whether the stages of change model would provide useful information to public health professionals working with the general population in a rural county.

Null Hypotheses

1. Most subjects at risk for tobacco use will not be found in an earlier stage of change than P.
2. Most subjects at risk for alcohol use will not be found in an earlier stage of change than P.
3. Most subjects at risk for high fat diets will not be found in an earlier stage of change than P.
4. Most subjects at risk for decreased physical activity will not be found in an earlier stage of change than P.
5. Subjects grouped by stage of change for tobacco use will not differ significantly from each other based on age.
6. Subjects grouped by stage of change for tobacco use will not differ significantly from each other based on gender.
7. Subjects grouped by stage of change for tobacco use will not differ significantly from each other based on level of education achieved.
8. Subjects grouped by stage of change for tobacco use will not differ significantly from each other based on occupation.

9. Subjects grouped by stage of change for alcohol use will not differ significantly from each other based on age.

10. Subjects grouped by stage of change for alcohol use will not differ significantly from each other based on gender.

11. Subjects grouped by stage of change for alcohol use will not differ significantly from each other based on level of education achieved.

12. Subjects grouped by stage of change for alcohol use will not differ significantly from each other based on occupation.

13. Subjects grouped by stage of change for dietary fat reduction will not show significant differences based on age.

14. Subjects grouped by stage of change for dietary fat reduction will not show significant differences based on gender.

15. Subjects grouped by stage of change for dietary fat reduction will not show significant differences based on level of education achieved.

16. Subjects grouped by stage of change for dietary fat reduction will not show significant differences based on occupation.
17. Subjects grouped by stage of change for exercise adoption will not show significant differences based on age.

18. Subjects grouped by stage of change for exercise adoption will not differ significantly from each other based on gender.

19. Subjects grouped by stage of change for exercise adoption will not show significant differences based on level of education achieved.

20. Subjects grouped by stage of change for exercise adoption will not show significant differences based on occupation.

21. Alcohol stage of change will not be significantly associated with smoking, exercise, or dietary fat reduction stage of change.

22. Smoking stage of change will not be significantly associated with alcohol, exercise, or dietary fat reduction stage of change.

23. Exercise stage of change will not be significantly associated with alcohol, smoking, or dietary fat reduction stage of change.

24. Dietary fat reduction stage of change will not be significantly associated with alcohol, smoking, or exercise stage of change.
Delimitations

1. Subjects in this study were delimited to Houston County residents aged 21 years or older because it is the legal age for drinking in Minnesota.

2. The city of La Crescent, Minnesota, was not used as a data collection site because of its close proximity to a city of over 50,000 (La Crosse, Wisconsin).

Limitations

1. The sampling method was not random.

2. County residents who agreed to participate in the study may differ from those residents who declined to participate.

3. The study used only self-reported data in classifying individuals as to stage of change.

Definition of Terms

The following terms were used in this study:

Action - the stage of change in which overt behavioral changes have occurred within the past 6 months (Prochaska & Marcus, 1991).

Behavioral risk - personal lifestyle choices that increase the risk of premature death and disability (U.S. Department of Health & Human Services [U.S. DHHS], 1990).

Contemplation - the stage of change when people are seriously intending to change a behavior in the next 6 months (Prochaska & Marcus, 1991).
Decisional Balance - the weighing of the pros' and cons of a behavior change in the decision-making process (Prochaska, Velicer, et al., 1994).

Maintenance - the period from 6 months after the criterion has been reached until the risk of returning to the old behavior is finally terminated (Prochaska & Marcus, 1991).

Precontemplation - the stage of change when individuals are not intending to change their high risk behaviors within the next 6 months (Prochaska & Marcus, 1991).

Preparation - the stage of change when individuals are intending to take action in the near future, usually the next month (Prochaska & Marcus, 1991).

Processes of change - covert or overt activities that individuals use to modify their experiences and/or environments in order to modify a particular behavior (Prochaska & Marcus, 1991).

Protective practices - the promotion and maintenance of health habits that reduce the risk of premature death or disability (U.S. DHHS, 1990).

Self-Efficacy - Confidence in one's ability to change a behavior and to resist situational temptations (Prochaska, Redding, et al., 1994).
CHAPTER II
REVIEW OF RELATED LITERATURE

Introduction

The use of health behavior theory in planning interventions has its supporters and detractors. Practitioners may not see the relevance of the theories to the actual health problems they are expected to address. Theories may also be viewed as too complex or expensive to incorporate into health program planning. Yet, health behavior theories can help predict the consequences of interventions, direct the type of data to be gathered, and help evaluate the success of programs. "To meet these needs, there must be a link between the abstract formulation of the theory and the concrete needs of the professionals, a link that is readily identifiable and can be translated into realistic action implications" (Hochbaum, Sorenson, & Lorig, 1992, p. 298).

The stages of change theory is potentially useful to health professionals because it provides information about the receptiveness of individuals to proposed behavior changes. Before launching a health promotion initiative, program planners could use a theory-based needs assessment to determine what percentage of the population was in the precontemplation (PC) stage. In PC individuals are not
prepared to make a behavior change, and in fact may resist doing so. A stages of change profile would also reveal what percentage of the population was in contemplation (C), when individuals may be thinking about a behavior change but are still ambivalent; preparation (P), when individuals are very close to making a behavior change; action (A), when individuals have initiated a behavior change within the last 6 months; or in maintenance (M), when individuals are trying to sustain a behavior change they made more than 6 months before.

Program planners could then target individuals in each of the five stages by choosing those strategies, or processes of change, that would motivate those in PC and C, provide opportunities to take action for those in P and A, and support those in M.

**Stages of Change in Health Promotion**

Winett (1995) points out that social marketing has long used demographic and other lifestyle variables to segment and target population subgroups. Health behavior interventions based on stages of change improve this targeting and reduce the costs of programs by matching key processes and strategies to what individuals are prepared to accept. Stage-based programs will differ according to cost, promotion, and delivery. If individuals are not ready to take action, there is not yet a need to incur those costs.

The Transtheoretical model posits that individuals do not change chronic behaviors quickly or in a linear fashion.
Change is not a dichotomous event, but a slow progression through stages. The pattern is spiral, with people progressing toward termination or adoption of the new behavior, but relapsing and reentering stages at different points along the way. Helping relapers learn from, and build on, their experiences may be one strategy in a successful intervention. Understanding the spiral pattern of change may mean recycling back to P rather than PC, and perhaps fewer attempts made before reaching M (Prochaska, 1989).

Measuring Change

A spiral pattern of change also suggests that evaluation of behavior change programs should not be based solely on traditional outcome measures, such as the number of people who have quit smoking at the end of a program. Knowing about the processes used in the different stages of change allows program evaluators to measure movement of program participants through the stages. DiClemente and Prochaska argue that, "A program that can get immotives [those in the PC stage] to seriously consider quitting or to engage in self-re-evaluation is a success even if it does not get anyone to quit smoking for the present" (1985, p. 339).

This movement through the stages of change was documented in a study of a community-wide program designed for adult nonexercisers and occasional exercisers. Subjects were classified for stage of change during registration. The 610 participants were predominantly female, with an average age
of 41.8 years. A resource manual and exercise activities were combined with written support materials that were targeted to the participants' stage. This approach did successfully move over half the participants in C ahead one or two stages after 6 weeks, and over half of those in P into A. Most of those in A advanced closer to M (Marcus, Banspach, et al., 1992). With a traditional approach to evaluation, one might pay attention only to the percentage of individuals who went from not exercising to exercising by the end of the program. In this study, the researchers used individual progression through the stages, as well as recycling back through the stages, to gauge the program's success.

Monitoring decisional balance and self-efficacy variables in stage-based interventions may also provide clues about the program's effectiveness, individual participants' progress, and potential relapse situations. Those in PC and C with higher self-efficacy ratings use the processes of change more frequently. In smoking studies, self-efficacy has been shown to increase almost linearly from PC to a high point in M (Prochaska, Redding, et al., 1994). When changes in self-efficacy are observed in individuals, therefore, movement either forward or backwards through the stages is probably occurring. For example, individuals in A who begin to express doubts about their ability to resist smoking in stressful situations may be signaling an imminent relapse to a previous stage. Anticipating that those stressful
situations will most likely occur, and planning other coping strategies in advance may help keep self-efficacy levels high and prevent relapse.

**Stage-Based or Standard Treatment**

In a study designed to test the effectiveness of various staged-based interventions against a standardized self-help treatment for smoking cessation, the most effective treatment after 18 months was found to be an individualized, interactive computer program. The 756 smokers in the study had responded to newspaper advertisements and had smoked for an average of 25 years.

The interactive computer program was designed not just for those individuals prepared to quit, but also for those in the first three stages. It contained a recycling component designed to help smokers who relapse after a quit attempt learn from their experiences. The program offered feedback about what the subjects were currently doing and offered suggestions about what they might do differently. The feedback and suggestions were based on what is known about the stages of change, decisional balance (the pros and cons of a behavior change), the appropriate processes of change for each stage, temptations and confidence in smoking situations (self-efficacy), and techniques for coping with specific situations. It also referred subjects to appropriate sections of a stage-based manual.

In a comparison approach, subjects used only the self-help manuals, which were matched to their stage of change.
A third approach used the manual and telephone counselors who used the computer progress reports and initiated calls to the subjects. The least successful approach was the standardized treatment using manuals developed and tested by the American Lung Association (ALA). At 18 months, the abstinence rates for those subjects using the interactive computer program were more than double that of the subjects using the ALA materials (Prochaska, DiClemente, Velicer, & Rossi, 1993). The effective use of the interactive computer program suggests that a less expensive approach than individual counseling is just as effective, if not more so, for some health behavior changes.

The Processes of Change

The processes of change are the techniques individuals use to accomplish a behavioral change. The processes were identified from a review of psychological literature and confirmed in a study of 872 smokers by Prochaska and DiClemente (1983). The smokers used 10 different processes, or techniques for change, depending their stage of change.

The processes include consciousness raising, seeking new information and accepting feedback; self-reevaluation, reappraising personal values; environmental reevaluation, becoming aware of the behavior’s impact on one’s physical and social environment; and dramatic relief, the affective experiences that sometimes spark change. Other processes are helping relationships, receiving support from others; self-liberation, the belief in one’s ability and the
commitment to change; and reinforcement management, changing the contingencies that are associated with the behavior. People in change also use social liberation, finding healthy alternative lifestyles; counterconditioning, substituting alternative behaviors; and stimulus control, controlling factors that trigger the behavior (Marcus, Banspach, et al., 1992).

**Variance by stage.** Those smokers who were in PC used 8 of the 10 processes significantly less than any other group. Consciousness raising was the process most used by those in the C stage. Self-reevaluation was also important in this stage, as it was for those in A, thus appearing to be a bridge between those two stages.

For those smokers in the A stage, self-liberation, helping relationships, and reinforcement management were important techniques. Another bridge occurred between A and M with the processes of counterconditioning and stimulus control, used frequently by both groups. The implication from these findings would be that different processes of change should be emphasized according to an individual's stage of change, with the experiential processes most important for those in PC and C, and the behavior modification processes more useful for those in A and M (Prochaska & DiClemente, 1983).

Other studies have documented use of most or all of the 10 processes in other types of behavior change, including alcohol abuse, weight control, and psychological distress.
(Prochaska & DiClemente, 1985; Snow, Prochaska, & Rossi, 1994). Use of the processes of change was also demonstrated in a study involving the adoption of exercise, a health protection practice, among 1,172 employees recruited for two worksite health promotion projects (Marcus, Rossi, Selby, Niaura, & Abrams, 1992).

**Intent and Actual Behavior**

Classification of individuals for stage of change is based on past action and future intent to act on a health behavior, with respect to time. Some researchers have examined the validity of this method in correctly predicting how individuals will behave.

Glanz et al. (1994) classified 17,121 employees involved in a worksite health promotion trial on stage of change in adoption of a high-fiber, low-fat diet. As predicted, subjects with a poorer diet were in PC, C, and P. Similar results were obtained in a study of exercise behavior among 235 employees at two separate workplaces, 64% of whom were female. Subjects in A and M exercised significantly more than those in P, and subjects in P exercised significantly more than those in C and PC (Marcus & Simkin, 1993).

Support for stage of change profiles in predicting behavior among problem drinkers in treatment was found by DiClemente and Hughes (1990), who found that 224 outpatients classified in five different stages showed significant group differences on alcohol use, temptation to drink, and self-efficacy subscales.
Accuracy of self-reported diet. The stage of change classification measure for dietary fat reduction used in this study asked participants whether they consistently avoided high fat foods. Consuming 30% or less of one's total calories from fat is a national health objective (U.S. DHHS, 1990). In two studies on dietary fat reduction, many subjects who reported consistently avoiding high fat foods for more than 6 months (the M stage of change) in fact consumed a diet with fat levels greater than 30% (Rossi, 1993; Rossi et al., 1993). The other four stages of change were associated with dietary fat reduction as hypothesized, with dietary fat reduction attempts increasing with each progressive stage of change.

The problem of individuals being staged in A or M when their diet in fact exceeds 30% of energy from fat was addressed in one study by using a second fat-reduction behavior algorithm. In this random sample of 614 adults who returned mailed questionnaires, subjects classified in PC, C, and P were found to have a diet with more than 30% energy from fat, which is consistent with the model. Beginning in A, subjects should meet the 30% of calories criteria, but many did not. When the A and M subjects failed to meet five additional fat-reduction criteria, they were reclassified in P. Those subjects remaining in A and M did meet the 30% of calories criteria (Greene, Rossi, Reed, Willey, & Prochaska, 1994).
Glanz et al. (1994) also found a strong relationship between stage of change and actual fat and fiber intake in a large worksite sample when they used a dietary fat reduction algorithm that was expanded to include some additional diet behavior questions.

Criteria for healthy behavior. In classifying individuals as to stage of change, some criterion must be used to gauge healthy behavior. The criteria used in this study are consistent with the national health objectives for the year 2000 (U.S. DHHS, 1990). These objectives, a collaborative effort of individuals and organizations from the private sector as well as government, strongly support health education and health promotion directed at lifestyle choices known to be associated with chronic disease. The objectives describe quantitatively the health status of the nation in 1990, and from that project measurable goals for the next decade.

Individuals in this study were asked whether they exercised three or more times per week, for 20 minutes each time. One national health objective is to increase the number of individuals aged 18 years and older who engage in this level of vigorous physical activity from 12% to at least 20% of the population (U.S. DHHS, 1990).

Subjects were also asked about quitting smoking. Tobacco use is termed the single most preventable cause of death and disease in the national health objectives. Another national objective is to reduce cigarette smoking from 29% to no more
than 15% of the population aged 20 years and older (U.S. DHHS, 1990).

The alcohol scale used in this study used limits of 5 drinks for men and 4 drinks for women on one or more occasions in a typical week. A 1995 study (Sanchez-Craig, Wilkinson, & Davila) examined recommended upper limits of alcohol consumption for problem drinkers. No more than 4 drinks per day and 17 drinks per week were recommended for men. For women, the recommended upper limits were no more than 3 drinks per day and 12 drinks per week. The researchers concluded these limits would be sufficient to avoid short-term psychosocial problems, but that lower limits would probably be necessary to avoid long-term health problems.

A third national health objective is to reduce consumption for individuals aged 14 years and older from an average of 2.54 gallons of ethanol per person per year to no more than 2 gallons (U.S. DHHS, 1990). This would average slightly less than 5 ounces of ethanol per week.

Importance of the Preparation Stage

A public health intervention such as a smoking cessation or exercise adoption program would be most successful with people in P. Those in P have determined to make the behavior change and are in the process of preparing a plan to accomplish the goal they have set.

Preparation was defined as a separate stage from C in a 1991 study of 691 Texas and 755 Rhode Island smokers.
(DiClemente et al.). The subjects, volunteers who responded to advertisements, were classified in PC (11.3%), C (54.2%), and P (34.5%). Those in P moved into the A stage with greater frequency and success.

**Decisional balance.** Additionally, there is evidence that the reasons for (pros) making a behavior change begin to outweigh the reasons against (cons) making a change in the P stage. As decisional balance tips in favor of the pros for making a change, individuals move into A (Prochaska, Velicer, et al., 1994). Decisional balance measures have shown that as individuals move from PC to A, the pros of the health behavior change increase approximately 1 standard deviation for them. There is a corresponding 1/2 standard deviation decrease in the cons of changing. This provides some indication of how to help move individuals from PC into A. Because of the greater increase in the pros of a behavior change for individuals moving through the stages, it may be more productive for those in the early stages to increase awareness of the benefits of the change, rather than focus on eliminating barriers. Decisional balance measures are also another method of identifying an individual's stage of change (Prochaska, 1994).

**Prevalence of the preparation stage.** If most of the target population for a health behavior intervention was to be found in the two stages preceding P (PC and C), the model would predict low involvement in a traditional action-oriented program. Individuals in PC and C would be
resistant to change or at best, ambivalent about change. The reasons against making the change still outweigh the pros for change in these stages. Prochaska (1989) has suggested that most people engaged in unhealthy behaviors are not prepared to change, and would therefore be found in PC or C.

Marcus, Rossi, et al. (1992) found in their study on exercise adoption among 1,172 employees that the least prevalent stage of change was P (9.5%). The largest group of subjects (33.4%) was in C, followed by PC (24.4%). In another worksite study on exercise adoption, approximately half of the 235 employees were in the two earliest stages of change, with 17.8% in P (Marcus & Simkin, 1993).

Preparation was the stage with the fewest number of subjects in the Glanz et al. (1994) study on diet in a worksite sample. In dietary fat reduction, 4.4% of the 17,121 employees were in P, and 8.7% were in P for adoption of a high fiber diet. However, for both fat and fiber the stage with the greatest number of subjects was A (46 and 33.4%, respectively). About 1/3 of the subjects were in the earliest stages of PC and C for dietary fat reduction.

While these studies support the claim that many people are not prepared to change at any one point in time, an Australian study on exercise behavior found smaller groups in PC (13%) and C (10%), but a large group in P (40%). A random sample of 4,404 adults from the general population was used for the study. This study did differ somewhat on
the classification criteria for the P stage (Booth et al., 1993).

**Demographics and Stage of Change**

The association of demographic variables with stage of change appears to vary according to the health behavior and the study. This study included the independent variables of age, gender, education, and occupation because it would be useful for health program planners to know if there was a tendency for demographic subgroups to be overrepresented in any of the five stages of change for high fat diets, alcohol abuse, smoking, or exercise adoption.

There may be an association between stage of change for exercise adoption, age, and level of education achieved. There was a tendency for older and less well-educated employees in a sample of 1,172 participants involved in a worksite health promotion project to be in the earlier stages of change for exercise adoption (Marcus, Rossi, et al., 1992). Females were more likely to be in C or A, and less likely to be in M. Stage of change was not related to ethnic status, total family income, or occupational category.

Booth et al. (1993) also found an association between intention to exercise more and subjects who were younger and better-educated in their random sample of 4,404 Australian adults. Better-educated subjects also had a greater frequency of exercise. Gender was not a significant variable in this study. In a study of 235 employees and
exercise adoption, Marcus and Simkin (1993) found that age, gender, income, and occupation were not significantly associated with stage of change.

Demographic variables may also be associated with dietary stage of change. In the Glanz et al. (1994) sample of 17,121 employees, being older, female, or better educated was associated with a diet lower in fat and high in fiber, fruits, and vegetables, but only a 1-9% variance was explained by these variables.

Females were found to have significantly lower dietary fat intake than males in a sample of 110 females and 90 males (Rossi, 1993). Stage of change gender differences were also found in another sample of 1,067 subjects, 55% of whom were female. A greater percentage of females than males were in M, and there was a lower percentage of females in PC than males (Rossi et al., 1993).

Gender played a role in drinking and stage of change in a study of 629 college students. On a scale that measured stage of change for reducing alcoholic drinks to less than five for men and less than four for women per occasion, female students were in A and M more often than men. Male students outnumbered females in PC. A significant age difference was also found, with students in M older than those in the other stages (Migneault, Pallonene, & Velicer, 1994).

An association between smoking and alcohol stage of change and demographic variables was not found in a review
of the literature. Subjects in an outpatient alcoholism treatment program showed no significant differences between five stages-of-change groups on gender, ethnicity, marital and employment status, education, and income (DiClemente & Hughes, 1990). DiClemente et al. (1991) did not find any significant differences among smokers in three stages of change on age, education levels, and gender. They also found that smoking history did not affect stage of change. Nationally, the rate of women smokers is falling less rapidly than the rate for men. The rate is also higher for individuals with less education (U.S. DHHS, 1990).

Description of the Study County

Houston County is in the southeastern corner of Minnesota, on the Iowa-Wisconsin borders. It had an estimated population of 18,772 in 1993, distributed among 7,008 households. The 1989 median family income was $30,937 (Minnesota Department of Health [MN DOH], 1994). Minnesota metropolitan counties, on the other hand, ranged from $39,926 to $48,098 in median family income during 1990 (Menanteau-Horta, 1993).

While 10,916 of the residents have a rural residence, only 2,822 live on farms. Of those age 25 years and over, 71% have at least a high school degree, and 14% have a college degree or postgraduate training (U.S. Department of Commerce, 1990). By comparison, 26% of persons age 25 or older have bachelor’s degrees in urban Minnesota counties (Menanteau-Horta, 1993).
The population is 99.3% White. There are slightly more females (9,471) than males (9,301) in Houston County. Thirty-one percent of the population is under age 20, 11.8% are aged 21-29, 28% are aged 30-49, 13.3% are aged 50-64, and 15.8% are aged 65 or greater (MN DOH, 1994). The percentage of elderly in Houston County is above the average for urban Minnesota counties, where 10.3% of the population are age 65 years or older (Menanteau-Horta, 1993).

Health of the residents. The leading cause of death for residents aged 45-64 years (9 deaths) and 65-74 years (10 deaths) in 1993 was malignant neoplasms, followed by heart disease (2 deaths for those aged 45-64 years and 8 deaths for those aged 65-74 years) (MN DOH, 1994).

For the years 1990-1992, prostate (63 cases) and lung (19 cases) cancers were the most prevalent type of malignant neoplasm diagnosed in Houston County men. For Houston County women, the most prevalent cancers were breast (45 cases) and colon (25 cases). Breast cancer caused 9 deaths and lung cancer caused 8 deaths among female residents during this period. For male residents, there were 15 lung cancer deaths and 7 prostate cancer deaths (MN DOH, 1994).

A 1993 Behavioral Risk Factor Survey of Houston County adults found that 24.7% were at risk for hypertension, 27.9% were at risk for being overweight, 21.5% were at risk for smoking, 17.8% were at risk for acute drinking, 3.2% were at risk for chronic drinking, and 2.9% were at risk for drinking and driving (MN DOH, 1994).
The rural environment. In a 1993 comparison of rural and urban Minnesota counties, Menanteau-Horta found that residents of urban counties enjoy significant advantages in many categories. Menanteau-Horta used social, economic, health, and household characteristics in his analysis of social well-being. A major factor to the detriment of rural communities has been the decline in the number of farms, with the resulting migration of younger people to urban areas and a decline in retail and service businesses. Many of the remaining farmers are experiencing serious financial problems.

Rural Minnesotans may also be at an information disadvantage. The greatest amount of state and national news coverage is to be found in the daily papers of urban communities, which have reduced circulation in the more rural areas by more than 50% since 1965. An increase in local television news reporting in the Minneapolis-St. Paul metropolitan market has further contributed to a public affairs knowledge gap between urban and rural Minnesota residents (Olien, Tichenor, & Donohue, 1991). It may be that rural residents are also not as well informed as their urban counterparts about matters affecting their health. Health information and education has long been deemed essential for individuals to improve their health habits.
CHAPTER III

METHODS AND PROCEDURES

Introduction

This study used a convenience sample of county residents recruited from the general population in communities throughout the county. Four Transtheoretical model staging algorithms and four demographic questions were used in a brief questionnaire that was completed by volunteers in the presence of the principal investigator.

Subject Selection

A convenience sample was obtained from customers at business centers throughout the county. Data were collected on four consecutive weekends in four communities. Fridays and Saturdays were chosen because of the increase in commercial activity that occurs in Houston County communities before Sunday, when most businesses, banks, and government offices are closed. Weekends were also chosen in the hope of contacting those who might be working outside of the county during the week.

The communities were selected to provide geographical distribution and a more representative sample of county residents. Only two communities in the county large enough to have a post office were excluded, because of their location on state lines.
The first community, Spring Grove, was selected because it is the commercial center for the southwestern portion of the county. It had a 1990 population of 1,153. Subjects were recruited at a grocery store, and an agricultural cooperative business with restaurant, service station, and retail sales operations.

The second community, Houston, had 1,103 inhabitants in 1990 and is the commercial center of the northern part of the county. Subjects were recruited at a bank and a grocery store. Two small communities, Hokah and Brownsville, were chosen to provide representation for the eastern side of the county. These communities had 1990 populations of 660 and 442, respectively. Convenience stores were chosen as the busiest locations in these towns.

Additional subjects were recruited in the exhibits building at the county fair, held at the geographically central county seat, Caledonia. Caledonia is a community of 2,846 citizens. Subjects were recruited during 3 days of the fair.

The county’s largest community on its eastern border was not used as a data collection site because of its close proximity to a city of over 50,000 in a neighboring county. Subjects had to be at least 21 years of age and a resident of Houston County to participate. This was stipulated because the legal drinking age in Minnesota is 21 years.
Instrumentation

Four algorithms that classified residents on their stage of change for exercise adoption, smoking, reduction of dietary fat, and alcohol use were combined in a questionnaire. Four questions on gender, age, occupation, and years of education were also included (see Appendix A). For each behavior variable, participants chose one of five possible responses that indicated the individual was in PC, C, F, A, or M for that behavior. Female participants completed a separate alcohol staging algorithm because the criteria was four alcoholic drinks rather than the five-drink criteria on the male alcohol staging algorithm.

The algorithms were chosen as the method of measurement because individuals can be classified into distinct categories. For a population profile, it would be most useful to assign individuals to discrete categories. It is possible to obtain interval-level data on stage of change, however, using the University of Rhode Island Change Assessment Scale (URICA). This longer scale also measures attitudes and behaviors relevant to change, providing a more complex profile of within and between stage differences. However, it is harder to classify individuals into one distinct stage (Prochaska & DiClemente, 1992).

Validity and reliability. The stages of change model was first applied in smoking cessation studies where strong evidence of its validity was obtained by documenting the use of the processes of change over 2 years by smokers who quit
without formal treatment programs (DiClemente & Prochaska, 1985). Further evidence of significant differences between the stages was found in a study of 1,466 smokers who volunteered for a minimal intervention smoking cessation research program. The researchers followed up the participants at 1 month and 6 months. They found that the stage classifications made at the beginning of the program were strongly supported by level of activity in the intervention as well as cessation activity and success in smoking cessation (DiClemente et al., 1991).

The exercise algorithm was developed and tested in a sample of 1,063 government employees and 429 hospital employees. The instrument was found to be highly reliable when 20 of the employees completed the instruments 2 weeks apart (Marcus, Selby, Niaura, & Rossi, 1992). Marcus and Simkin (1993) used a physical activity questionnaire to examine the validity of stages of change in exercise behavior. After classifying 235 employees at two separate worksites for stage of change, they found that their scores on an established physical activity instrument significantly differentiated employees among the stages.

The alcohol algorithm was tested in a sample of 629 college students. The stages of change accounted for 36% of the variance on alcohol consumption variables. Significant differences between those in the early stages and those in the later stages were found on number of days drinking in the previous month, amount of alcohol consumed, and amount
of alcohol consumed before intoxicification occurs. The stages of change also accounted for 28% of the variance on three scales of alcohol-related experiences (Migneault et al., 1994).

Rossi et al. (1993) looked at the pattern of stage variation among subjects to assess the validity of the dietary fat reduction algorithm. Four algorithms were tested in two groups of volunteers from a university community, and one sample of 1,067 adults recruited in a random digit dial telephone survey as part of a larger study. The algorithm used in the present study was found to have the best frequency distribution results.

Validity of this algorithm was also assessed by examining dietary fat consumption and changes in decisional balance. Dietary fat consumption did decrease as stage of change progressed from PC to M. Decisional balance, the pros and cons of making a change, also followed a pattern found in stages of change studies for other behaviors. However, as previously discussed, a weakness of this algorithm is the large number of subjects who described themselves in M, when in fact they consumed a diet high in fat. This problem has been addressed with some success in other studies by elaborating on the algorithm (Glanz et al., 1994; Greene et al., 1994). However, because the present study combined the dietary fat reduction algorithm with three other health behavior algorithms, the decision was made to use the shorter algorithm.
The combined algorithms were pretested with six adults, ranging in age from 24 to 88, in a northwestern Minnesota community. The pretest did not indicate any changes should be made to the instrument.

Methods and Procedures

The attention of passersby was elicited by the principal investigator through a table and display, and by asking them if they would agree to complete a brief health survey. The tripanel table-top display advertised that a county health survey was being conducted, and that all county residents age 21 and older were invited to participate.

After verifying age and residence, volunteers were told that their responses would be combined with that of other county residents who completed the survey, and that the information might be used to plan health education services in the county. A written informed consent was obtained (see Appendix B). The participants completed the survey on site, with the principal investigator present to answer questions. In most cases, participants were able to complete the instrument in less than 5 minutes.

Statistical Treatment

The algorithms provided nominal and ordinal level data about stage of change for four health behavior variables. Analysis was performed using the Statistical Package for the Social Sciences (SPSS)/PC + 4.0. Frequency counts were performed to examine distribution of the five stages of change for each of the four health behaviors.
The Kolmogorov-Smirnov (K-S) one-sample test was used to assess the distribution proportionality among the stages of change. This test of significance for ordinal-level data was chosen to determine whether the observed distribution of the sample among the five stages of change was significantly different from a theoretical uniform distribution.

Random sampling, an underlying continuum, and discrete variables are assumptions for using the K-S test (Champion, 1970). The five discrete stages of change can be viewed as a continuum, ranging from no anticipated change in PC to sustained change in M. If the K-S test reveals a statistically significant difference from an equal distribution, the researcher then reviews the raw data to observe in which of the stages the unequal distribution may be found. The K-S test was chosen to test the null hypotheses pertaining to most subjects being found in stages earlier than P.

The Spearman rank-order correlation coefficient (rho) was used to test whether stage of change for one health behavior is significantly associated with stage of change for another health behavior. Stage of change was ranked with PC at 1 and M at 5 for this nonparametric test of correlation for ordinal-level data.

Distinctions within each stage of change were examined through the Kruskal-Wallis one-way analysis of variance of ranks (ANOVA). The stages of change were again ranked. The independent variables used were age, gender, education, and
occupation. The nonparametric Kruskal-Wallis ANOVA was chosen because of the level of measurement, and because some of the cells within each stage of change could be expected to have less than five participants. The Kruskal-Wallis ANOVA yields a chi-square statistic that indicates whether the demographic subgroups within each stage of change differ significantly from each other (Huck, Cormier, & Bounds, 1974).

Where the ANOVA showed significant differences based on gender, age, education, or occupation, the nonparametric Mann-Whitney U test was used as a follow-up test. The Mann-Whitney U can be used to determine which of the groups in the ANOVA are significantly different from each other. A comparison can be made between two groups within each subscale (Huck et al., 1974).
CHAPTER IV
RESULTS AND DISCUSSION

Introduction

A total of 383 useable surveys were analyzed. The distribution of stages for the four health behaviors in the sample was compared to a theoretical uniform distribution. Associations between stage of change for different health behaviors were explored. Each health behavior variable was also examined for possible relationships with gender, age, occupation, and education.

Results

A total of 386 people participated in the survey: 74 in Spring Grove, 71 in Houston, 42 in Hokah, 46 in Brownsville, and 152 at the county fair in Caledonia. Three surveys were so incomplete as to be unusable, leaving 383 for analysis. Some surveys lacked responses on some items, but were included in the analysis where data were available.

The sample was nearly equally split between males and females (50.8% female, 49.2% male). Participants aged 21-29 totalled 10.3% of the sample, with 51.2% aged 30-49, 19.5% aged 50-64, and 18.7% aged 65 or older.

Most participants (39.2%) had a high school degree. The next largest group (33.6%) had attended technical school or some college, followed by those with a college degree
(16.3%), graduate school (7.4%), or less than a high school
degree (3.3%).

There was a fairly even distribution among eight
occupational categories, with the exception of only two
unemployed participants. The other categories were: (a)
service/sales/office, 24.2%; (b) professional, 14.6%; (c)
retired, 13.5%; (d) driver/labor/factory, 13.2%; (e)
farmer, 12.4%; (f) skilled trade, 11.3%; and (g) homemaker,
10.4%.

Sample Distribution

For each health behavior, a frequency count was performed
for each possible response. Nearly 60% of participants had
never smoked (NS). The largest stage of change for smoking
was M, with 22% indicating they had quit smoking more than 6
months before. The next largest group was PC, with nearly
10%. This group was not planning to quit smoking within the
next 6 months. Figure 1 shows the frequency of responses
for the smoking subscale.

For alcohol use, nearly 66% of the participants responded
that they never drank at the limits specified (ND). For
men, that was five alcoholic drinks on any one occasion, and
for women, it was four drinks. The largest stage of change
for alcohol use was again M. The nearly 21% who responded
they were in M had not exceeded the drink limit for more
than 6 months. And, like smoking, the next largest group
was in PC, with nearly 11% who usually exceeded the drinking
limit and planned no change within the next 6 months.
Figure 1. Smoking stage of change frequencies

Figure 2 shows the frequency of responses for the alcohol subscale.

The last two subscales of the instrument dealt not with health risks such as smoking and alcohol, but with the health protective practices of exercise and dietary fat reduction. Participants had five possible responses, rather than six.

Regarding the adoption of regular exercise, most participants (about 45%) indicated they exercised some but not regularly, and were staged in P. The next largest group (about 32%) were in M, and had exercised regularly for more than 6 months. Figure 3 shows the frequency of responses for the adoption of regular exercise.
Figure 2. Alcohol stage of change frequencies

Figure 3. Exercise stage of change frequencies
About 40% of the participants also indicated they had consistently avoided high fat foods for 6 months or more (M). The next largest category in dietary fat reduction was PC, with about 27% responding they did not consistently avoid high fat foods and did not plan to change within the next 6 months. Figure 4 shows the frequency of responses for dietary fat reduction.

Figure 4. Dietary fat stage of change frequencies

Significance of Distribution

It was predicted that most participants would not be found in the two stages preceding P, PC and C. To test these null hypotheses, the stages of change were ranked ranging from PC at 1 and M at 5. The Kolmogorov-Smirnov (K-S) one-sample statistical test was used to compare the
sample's distribution for each of the four health behaviors against a theoretically uniform distribution.

For each health behavior, the sample's distribution was found to be significantly different than what might be expected by chance. For smoking and alcohol use, only those participants in one of the five stages of change were included for analysis. The results are shown in Table 1.

Table 1. Percentages of Houston County participants in stages of change and K-S test of distribution

<table>
<thead>
<tr>
<th>Behavior</th>
<th>N</th>
<th>PC</th>
<th>C</th>
<th>P</th>
<th>A</th>
<th>M</th>
<th>K-S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol</td>
<td>124</td>
<td>30.6</td>
<td>2.4</td>
<td>.8</td>
<td>5.6</td>
<td>60.5</td>
<td>.605*</td>
</tr>
<tr>
<td>Smoking</td>
<td>162</td>
<td>23.5</td>
<td>17.3</td>
<td>4.9</td>
<td>1.9</td>
<td>52.5</td>
<td>.525*</td>
</tr>
<tr>
<td>Exercise</td>
<td>373</td>
<td>9.1</td>
<td>7.8</td>
<td>44.5</td>
<td>6.7</td>
<td>31.9</td>
<td>.231*</td>
</tr>
<tr>
<td>Fat</td>
<td>376</td>
<td>26.9</td>
<td>10.6</td>
<td>8.8</td>
<td>13.6</td>
<td>40.2</td>
<td>.402*</td>
</tr>
</tbody>
</table>

* p < .01

A uniform distribution across all five stages would mean 20% of the sample would be in each stage. To interpret the K-S results, the frequency for each stage within the four health behaviors was examined. It was predicted that most subjects would not be found in an earlier stage than P.
Alcohol. Excluding those participants who never drank at the level specified in the measure, most participants (60.5%) were in M, greatly exceeding the expected 20%. The other stage that stands out for being far below the expected 20% is P, with .8% of the sample. People in P would be planning to lower their alcohol consumption within the next 30 days. The pattern of responses to the alcohol subscale indicated most people were staged on either end of the continuum. Most participants had not consumed alcohol at an immoderate level for 6 months or longer, but the 30.6% in PC were currently doing so and had no plans to change. The null hypothesis for alcohol was accepted because most participants were not in the two stages before P, PC and C.

Smoking. Like alcohol, of those participants who were or had been smokers, most (52.5%) answered that they were in the M stage for smoking, having quit smoking more than 6 months before. The other stage that differed the most from the expected 20% distribution was A, with only 1.9% of the participants having quit smoking within the last 6 months. The distribution pattern for the smoking subscale is similar to that of alcohol, but there were fewer people at opposite ends of the continuum in PC and M, and more in C. The null hypothesis for smoking was accepted because most participants were not in PC and C.

Exercise. Exercise, a health protective practice, had a different distribution pattern than alcohol and smoking. The group that differed most from the expected 20% frequency
was P, with 44.5% at the midpoint of the continuum. The people in P are exercising some already, but not at the regular level specified of at least 20 minutes three times weekly. Another group differing considerably from the expected 20% was A, with 6.7% of the participants responding that they had begun exercising regularly within the last 6 months. The M group for the exercise subscale (31.9%) was closer to the expected 20% than the M groups for alcohol and smoking. The null hypothesis for exercise was accepted because most participants were not in PC and C.

**Dietary fat reduction.** This health protective practice more resembles the alcohol and smoking distributions than that of exercise. The biggest differences between the expected frequency and what was observed was with the M group (40.2%) and the P group (8.8%). Most people, then, had consistently avoided high fat foods for longer than 6 months, and there was only a small group of people actively preparing to change their dietary habits within the next 30 days. Again, the two largest categories were at opposite ends of the continuum, with most in M but 26.9% in PC. The null hypothesis was also accepted for the dietary fat subscale, because most participants were not in PC and C.

**Association Between Health Behaviors**

Stage of change for dietary fat reduction was significantly associated with stage of change for alcohol, smoking, and exercise in this sample. However, the association was weak, accounting for only 2-4% of the
variance. The null hypothesis was rejected. No other significant associations were found between stage of change for alcohol, smoking, and exercise, and those null hypotheses were accepted. The results are shown in Table 2.

Table 2. Correlation (rho) between stages for alcohol use, smoking, exercise, and dietary fat reduction in Houston County

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Alcohol</th>
<th>Smoking</th>
<th>Exercise</th>
<th>Fat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol</td>
<td></td>
<td>.069</td>
<td>.165</td>
<td>.207*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(n = 81)</td>
<td>(n = 121)</td>
<td>(n = 122)</td>
</tr>
<tr>
<td>Smoking</td>
<td></td>
<td></td>
<td>.088</td>
<td>.187*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(n = 157)</td>
<td>(n = 159)</td>
</tr>
<tr>
<td>Exercise</td>
<td></td>
<td></td>
<td></td>
<td>.147**</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(n = 366)</td>
</tr>
</tbody>
</table>

* p < .05 ** p < .01

Relationship to Demographic Variables

It was predicted that participants within each stage of change would not differ significantly from each other on the demographic variables of age, gender, education, and occupation. Responses to each health behavior subscale were examined with an ANOVA. The Mann-Whitney U test was used as a follow-up where the ANOVA revealed significant differences. The stages of change were ranked ranging from PC at 1 and M at 5.
Age. Age was significantly associated with three of the health behavior stages of change: smoking, exercise, and dietary fat reduction. It was not associated with alcohol stage of change. The null hypotheses that participants in different stages of change for smoking, exercise, and dietary fat do not differ significantly from each other on age were rejected. The null hypothesis for alcohol was accepted, however. Table 3 shows the results of an ANOVA for all four behavior variables by age.

Table 3. Houston County stages of change ANOVA for alcohol use, smoking, exercise, and dietary fat reduction by age

<table>
<thead>
<tr>
<th>Behavior</th>
<th>21-29</th>
<th>30-49</th>
<th>50-64</th>
<th>65+</th>
<th>K-W $\chi^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol ($N = 116$)</td>
<td>53.37</td>
<td>59.42</td>
<td>51.82</td>
<td>69.73</td>
<td>3.12</td>
</tr>
<tr>
<td>($n = 15$)</td>
<td>($n = 73$)</td>
<td>($n = 17$)</td>
<td>($n = 11$)</td>
<td>($df = 3$)</td>
<td></td>
</tr>
<tr>
<td>Smoking ($N = 152$)</td>
<td>49.83</td>
<td>70.23</td>
<td>86.27</td>
<td>98.90</td>
<td>18.75*</td>
</tr>
<tr>
<td>($n = 15$)</td>
<td>($n = 79$)</td>
<td>($n = 32$)</td>
<td>($n = 26$)</td>
<td>($df = 3$)</td>
<td></td>
</tr>
<tr>
<td>Exercise ($N = 359$)</td>
<td>164.68</td>
<td>175.11</td>
<td>167.78</td>
<td>216.06</td>
<td>11.49**</td>
</tr>
<tr>
<td>($n = 37$)</td>
<td>($n = 186$)</td>
<td>($n = 71$)</td>
<td>($n = 65$)</td>
<td>($df = 3$)</td>
<td></td>
</tr>
<tr>
<td>Dietary Fat ($N = 361$)</td>
<td>144.71</td>
<td>173.13</td>
<td>189.78</td>
<td>214.39</td>
<td>14.18**</td>
</tr>
<tr>
<td>($n = 38$)</td>
<td>($n = 185$)</td>
<td>($n = 72$)</td>
<td>($n = 66$)</td>
<td>($df = 3$)</td>
<td></td>
</tr>
</tbody>
</table>

Note. Corrected for ties in ranks.
$^* = p < .001$  $^{**} = p < .01$
Significant subgroups by age. The subscales of smoking, exercise, and dietary fat reduction were further analyzed with the Mann-Whitney U test to reveal which of the age groups differed significantly from the rest of the sample.

For smoking stage of change, there were significant differences between those aged 21-29 years ($z = -2.73$, $p < .01$) and aged 30-49 years ($z = -2.01$, $p < .05$), and the older participants. The two younger groups had a lower mean rank stage of change than the rest of the sample.

For exercise stage of change, the group that differed significantly from the others were those aged 65 or older ($z = -3.31$, $p < .001$). Their mean rank stage of change was higher than the rest of the sample.

For dietary fat reduction stage of change, those aged 65 or older also differed significantly from the rest of the sample ($z = -3.01$, $p < .01$). Again, the older group had a higher mean rank stage of change. A group that was significantly lower on the dietary fat scale were those aged 21-29 years ($z = -2.37$, $p < .05$).

Gender. The only health behavior in which participants in different stages of change differed significantly from each other on gender was dietary fat reduction. Females had a higher mean rank stage of change ($M = 211.23$) than males ($M = 156.02$). The null hypothesis was rejected for dietary fat reduction.

Although the proportion of males to females in the total sample was nearly equal, males greatly outnumbered females
in stages of change for alcohol and smoking, indicating that more males than females struggle with these two health risks. However, subjects in different stages of change for alcohol use, smoking, and exercise did not differ significantly from each other on gender, and those null hypotheses were accepted. Table 4 shows the mean rank stage of change for stage of change by gender.

Table 4. Houston County stages of change ANOVA for alcohol use, smoking, exercise, and dietary fat reduction by gender

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Males</th>
<th>Females</th>
<th>K-W $\chi^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol</td>
<td>58.64</td>
<td>64.21</td>
<td>0.92</td>
</tr>
<tr>
<td>(N = 120)</td>
<td>(n = 80)</td>
<td>(n = 40)</td>
<td>(df = 1)</td>
</tr>
<tr>
<td>Smoking</td>
<td>80.74</td>
<td>75.36</td>
<td>0.65</td>
</tr>
<tr>
<td>(N = 156)</td>
<td>(n = 91)</td>
<td>(n = 65)</td>
<td>(df = 1)</td>
</tr>
<tr>
<td>Exercise</td>
<td>174.22</td>
<td>191.54</td>
<td>2.81</td>
</tr>
<tr>
<td>(N = 365)</td>
<td>(n = 180)</td>
<td>(n = 185)</td>
<td>(df = 1)</td>
</tr>
<tr>
<td>Dietary Fat</td>
<td>156.02</td>
<td>211.23</td>
<td>27.27*</td>
</tr>
<tr>
<td>(N = 367)</td>
<td>(n = 181)</td>
<td>(n = 186)</td>
<td>(df = 1)</td>
</tr>
</tbody>
</table>

Note. Corrected for ties in ranks.
* = $p < .001$

Education. No significant differences between participants in the different stages of change were found when they were grouped according to education. The null hypotheses for all four health behaviors were accepted for
educational differences. The ANOVA results for stage of change by education are shown in Table 5.

Table 5. Houston County stages of change ANOVA for alcohol use, smoking, exercise, and dietary fat reduction by education

<table>
<thead>
<tr>
<th>Education</th>
<th>Alcohol (N = 120)</th>
<th>Smoking (N = 152)</th>
<th>Exercise (N = 359)</th>
<th>Fat (N = 361)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; High school</td>
<td>47.67 (n = 3)</td>
<td>102.20 (n = 5)</td>
<td>186.13 (n = 12)</td>
<td>154.83 (n = 12)</td>
</tr>
<tr>
<td>High school</td>
<td>57.61 (n = 52)</td>
<td>74.16 (n = 70)</td>
<td>175.95 (n = 139)</td>
<td>183.82 (n = 141)</td>
</tr>
<tr>
<td>Technical/some college</td>
<td>62.29 (n = 42)</td>
<td>70.76 (n = 49)</td>
<td>175.03 (n = 122)</td>
<td>187.10 (n = 122)</td>
</tr>
<tr>
<td>College</td>
<td>69.44 (n = 16)</td>
<td>89.92 (n = 19)</td>
<td>191.27 (n = 59)</td>
<td>162.86 (n = 60)</td>
</tr>
<tr>
<td>Graduate school</td>
<td>56.36 (n = 7)</td>
<td>83.39 (n = 9)</td>
<td>195.93 (n = 27)</td>
<td>191.02 (n = 26)</td>
</tr>
<tr>
<td>K-W $\chi^2$ (df = 4)</td>
<td>2.74</td>
<td>5.71</td>
<td>2.13</td>
<td>3.65</td>
</tr>
</tbody>
</table>

Note. Corrected for ties in ranks.

Occupation. Only one subscale, dietary fat reduction, showed participants in different stages of change differing significantly from each other when grouped by occupation. The null hypothesis for dietary fat was rejected.
For alcohol use, smoking, and exercise, the null hypotheses were accepted as no significant differences were found between stages when participants were grouped by occupation. Table 6 summarizes the results of the ANOVA by occupation for all four health behaviors.

**Significant subgroups by occupation.** The dietary fat subscale was analyzed further with the Mann-Whitney U test to determine which occupational subgroups differed from the rest of the sample. Those who were retired had a significantly higher mean rank stage of change than the rest of the sample \((z = -2.91, p < .01)\). One group, farmers, had a significantly lower mean rank \((z = -3.02, p < .01)\).

**Discussion**

It was hypothesized that the distribution of this rural population would be characterized by large groups in precontemplation (PC) and contemplation (C), because of less information and fewer public health interventions than might be found in an urban area. While PC was the second largest group for three of the health behaviors (alcohol, smoking, and dietary fat), there were larger groups in maintenance (M) that tended to balance the continuum.

The groups in M do not smoke, practice moderation in alcohol use, and limit dietary fat. They have successfully practiced these behaviors for over 6 months. However, those in PC either do not agree that these behaviors are desirable or necessary, or they may feel unable to change their behavior.
Table 6. Houston County stages of change ANOVA for alcohol use, smoking, exercise, and dietary fat reduction by occupation

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Alcohol (N = 117)</th>
<th>Smoking (N = 150)</th>
<th>Exercise (N = 355)</th>
<th>Fat (N = 357)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n = 9)</td>
<td>(n = 28)</td>
<td>(n = 46)</td>
<td>(n = 47)</td>
</tr>
<tr>
<td>Retired</td>
<td>68.50</td>
<td>91.36</td>
<td>204.66</td>
<td>218.04</td>
</tr>
<tr>
<td></td>
<td>(n = 7)</td>
<td>(n = 9)</td>
<td>(n = 37)</td>
<td>(n = 37)</td>
</tr>
<tr>
<td>Homemakers</td>
<td>64.50</td>
<td>71.11</td>
<td>167.69</td>
<td>207.38</td>
</tr>
<tr>
<td></td>
<td>(n = 13)</td>
<td>(n = 8)</td>
<td>(n = 45)</td>
<td>(n = 45)</td>
</tr>
<tr>
<td>Farmers</td>
<td>55.35</td>
<td>58.44</td>
<td>169.99</td>
<td>137.48</td>
</tr>
<tr>
<td>Professionals</td>
<td>66.75</td>
<td>91.23</td>
<td>191.37</td>
<td>175.65</td>
</tr>
<tr>
<td></td>
<td>(n = 12)</td>
<td>(n = 15)</td>
<td>(n = 53)</td>
<td>(n = 52)</td>
</tr>
<tr>
<td>Service/sales /office</td>
<td>56.42</td>
<td>73.96</td>
<td>177.94</td>
<td>184.48</td>
</tr>
<tr>
<td></td>
<td>(n = 31)</td>
<td>(n = 36)</td>
<td>(n = 86)</td>
<td>(n = 86)</td>
</tr>
<tr>
<td>Skilled trades</td>
<td>54.94</td>
<td>66.60</td>
<td>168.66</td>
<td>167.84</td>
</tr>
<tr>
<td></td>
<td>(n = 16)</td>
<td>(n = 21)</td>
<td>(n = 40)</td>
<td>(n = 41)</td>
</tr>
<tr>
<td>Drivers/labor /factory</td>
<td>59.54</td>
<td>69.40</td>
<td>161.24</td>
<td>164.13</td>
</tr>
<tr>
<td></td>
<td>(n = 28)</td>
<td>(n = 31)</td>
<td>(n = 46)</td>
<td>(n = 47)</td>
</tr>
<tr>
<td>Unemployed</td>
<td>19.50</td>
<td>39.25</td>
<td>156.25</td>
<td>100.50</td>
</tr>
<tr>
<td></td>
<td>(n = 1)</td>
<td>(n = 2)</td>
<td>(n = 2)</td>
<td>(n = 2)</td>
</tr>
<tr>
<td>K-W χ² (df = 7)</td>
<td>4.58</td>
<td>12.20</td>
<td>7.22</td>
<td>21.55*</td>
</tr>
</tbody>
</table>

Note. Corrected for ties in ranks.
* = p < .01
The distribution for exercise was unique because of the large group in preparation (P). The literature indicated that in any cross-section of a population, relatively few people would be changing a behavior, or preparing to do so. This was not true for the adoption of exercise as a regular habit in this study’s rural population. Most were in P, and when combined with those in action (A), constituted about half the sample. Such a large group in P indicates that for the participants in this study, there is genuine interest in the benefits of regular exercise that could potentially be developed into the adoption of regular exercise as a lifelong habit.

The large group in P in this study is similar to the findings from the Australian survey of the general population (Booth et al., 1993). In worksite-based studies, much smaller groups were found in P.

The national health objective for exercise is to increase the percentage exercising regularly from 12% to 20% (U.S. DHHS, 1990). About 39% of the study participants were exercising regularly (A and M).

For the other health behaviors, most of the sample were not in P and A. For example, only one person was preparing to change within the next 30 days on the drinking subscale. Only three people had quit smoking within the last 6 months. The lack of active change with these two behaviors may be related to their addictive nature, and the great difficulty many people experience in quitting smoking or moderating
their alcohol use. There were more participants in C for smoking than alcohol, which represents a group of people who have at least begun to evaluate their smoking habit.

About 20% of the study participants were currently smoking. The national health objective is to reduce the percentage of smokers from 29% to no more than 15% of the population (U.S. DHHS, 1990).

While P was also the low point on the dietary fat reduction continuum, more people were staged in A on this subscale than any other. As previously discussed, the 40% staged in M may not all be actually consuming a diet with fewer than 30% of its calories from fat, although it is their belief that they have followed a low-fat diet for more than 6 months. If this is the case, some of those in M would actually be in P. While not the distribution seen with exercise, more change is happening with dietary fat reduction than alcohol moderation or smoking cessation in this sample.

Dietary fat reduction is also the only behavior linked to other behaviors for stage of change. It was hypothesized that an individual might be expected to show some consistency in stage of change across the behaviors. This was not true for smoking, alcohol use, or exercise. However, in a small percentage of the cases, an individual's stage of change for dietary fat reduction could be explained by stage of change for the other behaviors.
Demographic Influences on Stage of Change

In this study, age did not appear to be a factor in alcohol stage of change. Age did make a difference on stage of change for smoking, exercise, and dietary fat reduction. This was a departure from previous literature on smoking and stages of change. In Houston County, being younger than age 49 is associated with being in one of the earlier stages. The association was even stronger for those younger than age 30.

Unlike the college student drinkers in the Migneault et al. study (1994), no significant differences were found on stage of change for alcohol use between men and women in the Houston County sample. This could be due to the fact that the Houston County sample was older and did not include any fulltime students. Or, males and females might respond differently in a college environment.

The literature on exercise stages of change did not consistently show an association with demographic variables, but being older was associated with an earlier stage of change in some studies. In the Houston County sample, just the opposite was true. Those aged 65 and older were significantly more likely to be in a later stage of change. They were also significantly more likely to be in a later stage of change for dietary fat reduction, which is consistent with one previous study on dietary fat. That dietary fat becomes more important with age is supported by the fact that there was a significant association between
Houston County participants aged 21-29 years and an earlier stage of change.

This study found the same association between dietary fat reduction and gender as previous studies: females are more likely to believe in its importance and act upon it. This, however, was the only health behavior measured in this study where gender played a role.

The Houston County sample differed from the literature in that occupation accounted for significant differences on the dietary fat subscale. In keeping with the positive association between increased age and dietary fat reduction, the retired also were significantly more likely to be in a later stage of change. Another finding from this rural sample was that farmers were significantly more likely to be in an earlier stage of change for dietary fat reduction.

In some previous studies, increased education was positively associated with a later stage of change for exercise. This was not true of the Houston County sample, where education did not play a significant role in any of the subscales.

Comments from Participants

Because four staging algorithms were combined for this study, the attitude of the participants toward completing the survey was noted. The wording on the dietary fat subscale provoked more comments from participants than any other subscale. In particular, the use of the words "consistently avoid" concerned many people. Some indicated
that they usually followed a low-fat diet but allowed themselves occasional high-fat treats. Unlike the exercise subscale, which offered an option, "usually, but not regularly," no middle ground was offered on the dietary fat subscale. When combined with additional questions about diet habits, however, this question may prove less difficult for participants to answer.

Many participants wondered about what constituted moderate exercise. In particular, they wondered if this always meant a formal exercise program, or if it could mean exercise in one's job or daily activities. Because the exercise staging algorithm already includes a brief definition of regular exercise, additional clarification such as "continuous movement at a brisk pace" for at least 20 minutes could help guide participants in their response choice. Using terms such as "target heart rate" assumes knowledge and a level of skill that might not be present.

Some participants also said that the alcohol subscale should have a response option for the nondrinker, similar to the option for nonsmokers. It was also noted that despite written instructions to complete only one alcohol subscale (depending upon gender), some people filled out both or used the wrong scale. More demographic questions might have been completed had they been placed before the alcohol subscales. Separate gender-specific surveys might have solved some of these problems.
Implications

The study describes the attitudes of a rural, Midwestern, and predominately white sample from the general population toward health behavior change. It also measures two current health risks and two health protective practices. Similar populations have not yet been described in the literature on the stages of change. The information is also potentially of benefit to those who plan chronic disease prevention programs in the study county. Some caution must be used in making inferences, however, because of the sampling method used.

Alcohol and Smoking

About 20% of the sample were active smokers (smoked within the last 6 months). This is consistent with the 1993 state Behavioral Risk Factor Survey (BRFS) finding that 21.5% of Houston County’s population was at risk for smoking. The BRFS figure for acute drinking in Houston County was 17.8% of the population, which was higher than the 13% who were active drinkers in this study’s sample. It is possible that participants in the stages study were less likely to admit occasional overconsumption of alcohol, than they were to admit that they were smokers.

At the time this sample was taken, the participants appeared polarized on alcohol and smoking. Most had either successfully moderated their alcohol consumption at least 6 months before, or were drinking heavily and were not about to change. A similar pattern occurred with smoking. Younger people in this sample tended to be smokers that are
not ready to quit. This is consistent with national data on the rising rates of teenage smokers. However, previous stage of change studies have not examined smoking and alcohol use in the general population, so it is not known if this stage of change distribution is true of other populations.

Not enough of this sample appears to be in P or A to justify a recommendation of action-oriented programs for smoking and alcohol (such as smoking cessation programs). The large groups in PC for alcohol and smoking pose a particular challenge. The goal for these groups is to move them into C, where they are more receptive to information and feedback about their substance use. An appropriate strategy would be to assist those in PC in receiving and understanding accurate information about their smoking and alcohol use (consciousness raising). Another PC change process would be to increase social alternatives for nondrinkers and nonsmokers (social liberation). It is likely that a heavy emphasis on quitting will be ignored, however, as people in PC are neither committed nor prepared to change. Public health messages targeted to precontemplators, like product advertisements, should be brief, subtle, and clever, funny, or dramatic.

There were more smokers than heavy drinkers in C, and those smokers will be more receptive to these strategies. Providing health messages that provoke an emotional reaction (dramatic relief) might be most effective with those smokers in C. Another strategy would be to raise their awareness of
how their self-image is shaped by their smoking or drinking (self-reevaluation). However, in this stage the difficulties in changing (cons) are still viewed as more decisive than the pros for quitting. For the smokers in C, it may also help to highlight all the pros of a tobacco-free lifestyle. With smoking strategies, particular attention should be given to designing messages that would appeal to a younger audience because of the association found in this sample between being younger and an earlier stage of change.

The largest groups in alcohol use and smoking were in M, and strategies to prevent relapse would be appropriate. People in M rely heavily on processes such as stimulus control and counterconditioning, that help them understand why and when they are tempted to smoke or drink too much, and to substitute other, healthier behaviors. Increasing awareness of the techniques used by these individuals in reaching M may help keep self-efficacy high, so that future distress does not precipitate a relapse. Because social pressure can be another factor in relapse, strategies that promote a healthy culture, where abstinence is the norm, will help individuals in M to feel less isolated if they are under pressure from people in PC or C.

Education about temporary lapses would also help individuals in M understand that if they do give in to temptation, and smoke or drink too much, they do not have to abandon all the knowledge they have accumulated from their previous hard work. They can use this knowledge to fall
back on the spiral change continuum to P, or even A, rather than PC or C. That is, they can resume their commitment to change right away after a temporary lapse, and will probably have gained valuable knowledge about their problem behavior by the experience. They will already be further ahead on the continuum of change than they were when they first began to modify their behavior. Fear of failure and embarrassment may be one reason why some individuals get stuck in C and fail to make a public commitment to change in P.

**Dietary Fat Reduction**

There was also a large group in PC and an even larger group in M for dietary fat reduction. The same strategies discussed above would be appropriate for moving those in PC on the issue of dietary fat to C, and supporting those in M who have been following a low-fat diet for more than 6 months.

In this study county, however, there is anecdotal evidence that what constitutes a low-fat diet may be puzzling. Furthermore, other studies using this staging algorithm found that even though many people thought they were following a low-fat diet, they in fact were not meeting recommended dietary guidelines. All of this points to the need for more education on nutrition, in a manner which can be readily understood and acted upon by the consumer.

The distribution on the dietary fat subscale was less polarized than that of alcohol and smoking (i.e., more people could be found in C, P, and A). This may be partly
due to the difference between what may be viewed as unhealthy or socially negative behavior (smoking and excessive alcohol use), and what may be perceived as socially desirable behavior (exercising and watching one's diet). If, in fact, some participants answered the dietary fat and exercise questions based on their agreement with these health protection practices, rather than their actual behavior, an indication of the interest of the participants in this behavior is still gained.

It may also be easier to facilitate change when the perception is that one is gaining something rather than giving something up. This could also explain why fewer people were in active change for dietary fat reduction than exercise, because of the perception that reducing dietary fat means giving up the pleasures of eating. This is consistent with what is known about decisional balance in stages of change. As people become more aware of all the pros for making a change, they begin to move forward on the continuum.

Diet does appear to be one health behavior where action-oriented programs might be utilized by the Houston County population. People in A utilize almost all of the processes of change, but in particular, rely upon self-liberation, helping relationships, and reinforcement management. They believe themselves capable of changing and make a public commitment to do so; they begin to imagine themselves in a new lifestyle, and they find people and coping strategies
that reward and support their efforts. This is a more proactive approach, as contrasted with the reaction of those in C to health messages. An example of an action-oriented program would be adult community education classes where consumers learn to shop for and prepare low-fat meals, or cooking contests that feature lowfat recipes.

As older people in Houston County tended to act on dietary fat concerns more than younger people, it is likely that those who would take advantage of such action-oriented programs would be middle-aged or older. The processes likely to be utilized by individuals in PC and C, as previously discussed, should then be emphasized for younger residents. Given their age, it cannot be assumed that the possibility of cardiovascular disease or cancer some years later will be of primary importance to a younger group. However, the fact that many health food stores have both a young staff and young clientele indicate an interest in nutrition among at least some of the young. Since making available healthy options is one PC process (social liberation), working with restaurants and grocery stores to promote good nutritional choices is one technique to consider. Emphasizing the positive benefits of good family nutrition in child development may be one technique to facilitate consciousness-raising among those precontemplators and contemplators who are young parents.

An association between old age and being in M for exercise and dietary fat was not found in the literature. A
preoccupation with the health problems that often accompany aging may be one explanation for the large number of older participants who were in M in this sample. Personal experience with chronic disease may be another explanation. Reducing one's dietary fat may also be associated with eating less in general, either because of diminished appetite and other physiological changes, social isolation, or lack of financial resources. Sometimes a health goal is not to reduce fat intake, but to increase caloric consumption among the elderly. Public education on appropriate fat consumption for different life stages may be useful for both older individuals and their families.

From this study and others, we also know that females will be more receptive to education about dietary fat reduction than males. A possible explanation for this may be a relationship between females' perceptions of dietary fat intake as a means for weight control. For males, who are more likely to be in PC on dietary fat, it may be more appropriate to use strategies such as consciousness raising that stress good nutrition as a means of building lean muscle mass.

The Houston County population was unique in its associations between dietary fat stage of change and occupation. The fact that the retired tended to be in a later stage of change may be due to their age, or that they now have the leisure to devote to personal health. Farmers, who tended to be in an early stage of change for dietary
fat, may feel that this issue is not of importance to them given their active lifestyle. It may also be a negative reaction to the recent publicity about the fat content of beef, pork, and dairy products, which could adversely affect their livelihood. Farmers may benefit from the PC process of consciousness-raising about the role of saturated fat consumption in atherosclerosis.

In this sample, dietary fat stage of change was associated with stages of change for the three other health behaviors. This may indicate that facilitating movement toward reducing dietary fat consumption could positively impact on other health behaviors.

**Exercise**

Exercise offers the best chance of engaging the study population in an action-oriented program. A large group of people were in P, exercising some already, but not at least 20 minutes a week, three times weekly.

For those in P, the goal is to tip the decisional balance scale of the pros and cons of a lifestyle change in favor of the pros. To a lesser extent, some attention should also be paid to eliminating some of the barriers to action, such as lack of time. Another possible obstacle to regular outdoor exercise in Minnesota might be the extreme temperatures that can occur in both summer and winter. Since a characteristic of P is trying out small behavior changes, one strategy might be to encourage individuals to make a "contract" to walk (or perform some other brisk exercise) every other day,
but for only 5 minutes. The time could be increased by 5 minutes once a month, until by 6 months they had reached 30 minutes every other day. Busy individuals may feel more capable of managing 5 minutes a day, but may feel like exercising longer once they get on a regular schedule.

Since a large group in Houston County was in M for regular exercise, it would be appropriate to dedicate some resources to providing and promoting safe and attractive public places for exercise. Consideration should be given to interviewing some of the large number of older people who were in M for exercise, to find out if they have particular concerns about safe methods and places.

Parks with walking and running paths, bike trails, dance clubs, water exercise, martial arts classes, and open gyms for pickup basketball and volleyball games are several ways exercise for all age groups can be publicly supported. Exercise programs such as aerobics classes, which tend to attract mostly females, might be balanced by a performance training program. Investment in these programs not only adds to quality of life in the county, but will pay off in a lower incidence of chronic disease and its attendant health care costs.

Since some participants from the study county had questions about what type of exercise is most beneficial for cardiovascular health, some consideration might be given to education on this topic. Individuals use many techniques that fall under the umbrella of one change process. Even a
single technique, such as walking, can be done many ways: indoors or outdoors, with headphones or without, with a companion or alone. Autonomy in choosing the technique will help facilitate the adoption of regular exercise.

**Practical Application of the Theory**

The methods employed in this study were successful in recruiting adequate numbers of participants for each of the demographic subsets, with the exception of those aged 21-29 years. Future studies in this county might give special attention to better locations for reaching this age group.

The methods of data collection used also served to draw attention to the issues studied. The investigator was often, literally, out on the street in the communities, which provided a visibility not seen with telephone or mail surveys. The approach was proactive, because everyone walking by was offered a chance to participate, rather than depending upon volunteer response to notices of public meetings. Many participants asked questions about chronic disease prevention, or the reasons behind the study. Reporting the results to the lay public offers another opportunity to impart information.

The instrument is a quick way to ascertain current health practices and plans for change. It does not provide information about the beliefs, attitudes, and knowledge of the participants, except for anecdotal information gathered during data collection. Other studies have combined the stages of change model with other theories, such as the
Health Belief model, to learn more about why individuals make their choices. Such information might be useful in marketing subsequent behavior change programs.
CHAPTER V
SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

About 58% of the Houston County sample had never smoked, and another 22% quit smoking more than 6 months before (M). When male participants were asked if they drank more than five drinks, and women more than four drinks on occasion, 66% answered that they had never drunk alcohol at those limits. Another 21% had stopped drinking that much more than 6 months before.

Distribution of the participants in stages of change for alcohol, smoking, exercise, and dietary fat reduction differed significantly from what might be expected by chance. Most of the participants were in M for alcohol, smoking, and dietary fat reduction. The next largest group for these subscales was P, C. The largest group for the exercise subscale was in P, followed by M.

There was a weak but statistically significant association between the participants' stage of change for dietary fat reduction and their stage of change for alcohol, smoking, and exercise. No significant associations for stage of change were found among alcohol, smoking, and exercise.
Age, gender, education, and occupation were not associated with differences between stages on the alcohol subscale. Participants aged 21-49 years were more likely to be in an earlier stage of change for smoking. Those aged 21-29 years were also more likely to be in an earlier stage of change for dietary fat reduction. The oldest participants (65 years or older) were more likely to be in a later stage of change for dietary fat reduction and exercise.

Females were more likely than males to be in a later stage of change for dietary fat reduction, as were the retired. Farmers were more likely to be in an earlier stage of change for dietary fat reduction. No significant educational differences were observed between the stages of change.

Conclusions

1. There were not enough participants in P and A to justify action-oriented programs on smoking and alcohol. The processes that should be emphasized in a public health intervention to change smoking and alcohol habits should be those likely to be utilized by individuals in PC and C. A second approach should emphasize those processes that would support individuals in M, the largest group for both smoking and alcohol.

2. Smoking interventions for those in PC and C should be targeted to younger adults (less than age 50). Because 20% of the sample were smokers, the study county
has probably not yet reached the national health
objective for the year 2000 of no more than 15% of the
population being smokers. Smoking interventions are
important in the study county because lung cancer is a
leading cause of death for both men and women.

3. The number of active drinkers in the study is lower than
a state BRFS finding, and may reflect a negative social
reaction to excessive drinking, or denial, by some of
the study participants. Even if the lower percent of
population found in this sample is used, more than 1 out
of every 10 participants were heavy drinkers - enough to
warrant public health action.

4. The staging distribution for dietary fat reduction was
sufficiently mixed to justify three possible strategies.
Enough participants were in P and A for dietary fat
reduction to justify a program with taking action as its
goal. A second approach should also be planned to raise
awareness of the importance of dietary fat reduction for
those individuals in PC and C, especially farmers,
males, and young adults. A third strategy would provide
support for the large group of individuals in M on
dietary fat reduction, especially the elderly.

5. Individuals staged in A or M on dietary fat reduction
may not be consuming less than 30% of their total
calories from fat, a national health objective, although
they may believe they are eating a low-fat diet.
6. Facilitating dietary fat reduction may influence other positive lifestyle changes, because of the association found between dietary fat reduction stage of change and stage of change for smoking, alcohol use, and exercise.

7. Health promotion programs that would provide opportunities to take action on exercise are likely to be well-received in Houston County, because of the large number of sample participants in P. Because the second largest group was in M, a second approach should emphasize processes appropriate to that stage. In designing a strategy for those in M, consideration should be given to the large number of elderly who reported themselves to be exercising regularly.

**Recommendations**

1. In designing a strategy for heavy drinkers and smokers in PC, the goal should be to move them forward on the continuum of change to C, where they would be more receptive to information and feedback. Instead of urging smokers and drinkers to quit, public health messages should stress awareness and accurate information about these health risks, and about healthy alternatives that are available.

2. For those smokers in C, public health messages that make an emotional appeal, or that stimulate reflection on how one's self-image is shaped by smoking, would be appropriate. Highlighting all the benefits of a smoke-free lifestyle may help tip the decisional balance scale
by helping individuals see that they are indeed gaining, rather than giving something up. However, individuals in C are not yet prepared to accept recommendations to quit. In the study county, particular attention should be paid to shaping messages that would appeal to young adults.

3. Many of those in M on smoking and alcohol use will still experience situational temptations to indulge in their old behaviors, particularly when distressed, or when under social pressure. They need to prepare themselves by becoming aware of those stimulus control and counterconditioning techniques that helped them before. Public health strategies that promote a healthy culture where abstinence and moderation are the norm will also help in supporting those in M. Individuals in M should also be educated on the spiral nature of change, so that lapses do not become relapses.

4. Because there were also large groups in PC and M for dietary fat reduction, the same strategies recommended for smoking and alcohol could also be applied to this health behavior. Individuals may also feel that a dietary change is a restriction, rather than a positive choice, so some attention should be paid to highlighting all the benefits of good nutrition.

5. Other, more detailed instruments on dietary habits are available that would provide useful information about fiber, fruit, and vegetable consumption. This is
especially important in the study county, where colon
cancer is the second most prevalent cancer among women.
Such instruments may also provide more accurate staging
for M, which would enable health program planners to
make comparisons to the national health objective for
dietary fat.

6. Because there is some evidence that people may not
understand how to reduce saturated fat in their diet, or
may be confused about the reasons for doing so, public
health strategies should address this issue. Farmers,
males, and young adults would be the target subgroups
for messages about dietary fat reduction that stress
awareness, accurate information, healthy alternatives,
and personal evaluation. Some sensitivity to the
economic concerns of farmers in the study county will be
necessary when addressing dietary fat. Older adults and
females are more likely to be receptive to approaches
that teach them how to take action on their diet.

7. Directly urging residents to exercise at recommended
levels would be an appropriate strategy in the study
county. There may still be some ambivalence for those
in P, but they are looking ahead to a new lifestyle.
Encouraging them to make some small steps towards
regular exercise, and to make a public commitment, would
be recommended strategies. Because P is the stage where
the pros and cons of behavior change tend to balance
each other, solving some of the barriers to action may help.

8. While the percentage of study participants exercising regularly (39%) was almost twice the goal for the nation by the year 2000, 6 out of 10 participants were still not getting at least an hour of exercise a week. Because exercise can make a dramatic impact on chronic disease, and because so many study participants were poised to take action, exercise represents a very worthwhile target for health programs in the study county.

9. Other staging algorithms have been developed and should be considered for use in the study county (e.g., stage of change for obtaining mammograms and protecting oneself against skin cancer). The latter is especially important because of the number of farmers and outdoor laborers in the county. Mammography stage of change may be especially important in the study county because breast cancer is still the leading cause of death for county women. In other areas of the country, early detection has caused a decline in breast cancer mortality.

10. This study only describes the prevalence of stages of change for four health behaviors in the study county. It did not test the effectiveness of stage-based interventions, although other studies have begun to appear on application of this model. The logical next
step would be to use the information from this study to design interventions, the effectiveness of which could be measured by comparison with a control group not receiving the intervention.

11. Repeating this study in another rural county would add to knowledge about health promotion and behavior change among rural residents. Differences noted in this study for farmers, the retired, the elderly, and young adults may also be found in other rural Midwestern counties.

12. Public health program planners not using the stages of change model may tend to look only for absolute behavior change when, in fact, change may be occurring that is not apparent. Those in C and P may not have quit smoking, for example, but may be moving closer to that action. Those in M cannot always consider themselves to have resolved their problem forever once they have taken action, as is evidenced by the number of individuals trapped in a cycle of weight loss and gain. Looking for change only in that part of the population in A is like looking at the tip of the iceberg. The stage paradigm presents new opportunities to assist individuals in other stages to make positive lifestyle changes, and to better evaluate the effectiveness of public health interventions.
REFERENCES


Rossi, S. (March, 1993). Dietary fat reduction behavior profiles across five categories of high fat food sources for five stages of change. Paper presented at the meeting of the Society for Behavioral Medicine, San Francisco, CA.


APPENDIX A

STAGING ALGORITHMS
I. Exercise

In this question, regular exercise means 3 or more times per week.

Do you exercise 3 or more times per week, for 20 minutes or more at each time?

- I currently DO NOT exercise, and I do not intend to start exercising in the next 6 months.
- I currently DO NOT exercise, but I am thinking about starting to exercise in the next 6 months.
- I currently exercise some, but not regularly.
- I currently exercise regularly, but I have only begun doing so within the last 6 months.
- I currently exercise regularly, and have done so for longer than 6 months.

II. Smoking

Have you quit smoking cigarettes?

- YES, I quit MORE than 6 months ago.
- YES, I quit LESS than 6 months ago.
- NO, but I intend to quit in the next 30 days.
- NO, but I intend to quit in the next 6 months.
- NO, and I do NOT intend to quit in the next 6 months.
- I was NEVER a cigarette smoker.
III. Nutrition

Do you consistently avoid eating high fat foods?

- YES, it has been for MORE than 6 months.
- YES, it has been, but for LESS than 6 months.
- NO, but I intend to make it so in the next 30 days.
- NO, but I intend to make it so in the next 6 months.
- NO, and I do NOT intend to make it so in the next 6 months.

MEN ONLY, PLEASE COMPLETE THE NEXT SECTION.

WOMEN, PLEASE TURN TO THE NEXT PAGE.

IV. Alcohol

MEN ONLY: Presently, in a typical week, do you usually have 5 or more drinks on one or more occasions?

- YES (Go to Question A)
- NO (Go to Question B)

A. (IF YOU ANSWERED YES TO THE FIRST QUESTION) Do you plan to stop typically drinking 5 or more drinks one or more times a week?

- NO
- YES, in the next 6 months.
- YES, in the next 30 days.

B. (IF YOU ANSWERED NO TO THE FIRST QUESTION) When did you stop typically drinking 5 or more drinks one or more times a week?

- I have never typically drunk 5 drinks.
- I stopped less than 6 months ago.
- I stopped more than 6 months ago.
WOMEN ONLY, PLEASE COMPLETE THE NEXT SECTION.

IV. Alcohol

WOMEN ONLY: Presently, in a typical week, do you usually have 4 or more drinks on one or more occasions?

   _ YES (Go to Question A)
   _ NO  (Go to Question B)

A. (IF YOU ANSWERED YES TO THE FIRST QUESTION) Do you plan to stop typically drinking 4 or more drinks one or more times a week?

   _ NO
   _ YES, in the next 6 months.
   _ YES, in the next 30 days.

B. (IF YOU ANSWERED NO TO THE FIRST QUESTION) When did you stop typically drinking 4 or more drinks one or more times a week?

   _ I have never typically drunk 4 drinks.
   _ I stopped less than 6 months ago.
   _ I stopped more than 6 months ago.
APPENDIX B

INFORMED CONSENT FORM
HOUSTON COUNTY HEALTH SURVEY
CONSENT FORM

To participate in this project, you should be a resident of Houston County, and at least 21 years of age.

The survey you will complete consists of four questions about exercise, smoking, nutrition, and alcohol use. For each of the four questions you should mark just one answer that best describes your opinion. The last part of the survey consists of four questions about yourself. Again, choose just one answer for each of the four questions about yourself.

Do not write your name on the survey. Your answers will be combined with that of others to obtain group results from the entire county. This signed consent form will be kept separate from the survey you complete.

The Principal Investigator will answer any questions you may have about completing the survey.

You may choose to withdraw from the project at any time.

_________________________________  ________________________
Your Signature                      Date