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Quantitative Methods for Assessing Change: Application to Condom Use

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QUANTITATIVE METHODS FOR ASSESSING CHANGE:

APPLICATION TO CONDOM USE

BY

KERRY E. EVERS

A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE

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Abstract

This study attempts to understand more about how to quantitatively assess longitudinal change within the Transtheoretical Model applied to the area of condom use among college students. A total of 215 sexually active male and female undergraduate students completed both assessments one month apart. Measurement development was conducted on the Condom Use URICA scale, which was then used in a cluster analysis. A four cluster solution was reliably replicated across two random samples ($R^2=.99$), and the clusters were then examined in terms of their external validity using MANOVAs. The four clusters showed significant differences on variables associated with the Transtheoretical Model, psycho-attitudinal variables and a behavioral measure of condom use. In addition, the four cluster solution was compared to the Stages of Condom Use that were assessed using an algorithm approach. Latent Transition Analysis was used to assess an appropriate model of natural movement through the Stages of Condom Use for men and women. Precontemplation was found to be the most stable stage for the entire sample, as well as for the sample of women only. However, the model for men only found Preparation to be the most stable. All three of the resulting models found relapse to be an important aspect of the model. Longitudinal predictors of stage movement were examined using logistic regression. Models on the entire sample indicated that high endorsement of Eroticizing Condoms predicted progression. Models specific to both men and women found that high Self-Esteem was associated with greater regression. Lastly, Longitudinal Structural Modeling was used to further understand the relationship between Stages of Condom Use and other variables associated with both the TTM and the

Multifaceted Model of HIV Risk in Women. The only predictors of Stage one month later were the Pros and Cons of condom use. This also served as an application of longitudinal “step-modeling” to a limited real world data set. Each of the separate types of analyses provide insight into different questions surrounding the analysis of change within the context of condom use. These results can help guide the development of interventions focusing on increasing condom use among undergraduate students.

Acknowledgment

This project is a culmination of four years of learning and research at the Cancer Prevention Research Center and within the Psychology department. I would like to thank all of those individuals who have influenced this project. However, it would be impossible to thank all those who have provided inspiration and support during this process. I would, however, like to acknowledge a few individuals.

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Table of Contents

ACKNOWLEDGMENT	iv
TABLE OF CONTENTS	vi
LIST OF TABLES FOR STUDY 1	xi
LIST OF TABLES FOR STUDY 2	xii
LIST OF TABLES FOR STUDY 3	xiii
LIST OF TABLES FOR STUDY 4	xv
LIST OF FIGURES FOR STUDY 1	xvi
LIST OF FIGURES FOR STUDY 2	xvii
LIST OF FIGURES FOR STUDY 4	xviii
LIST OF APPENDICES	xix
STATEMENT OF THE PROBLEM	1
JUSTIFICATION OF THE STUDY.....	2
THE TRANSTHEORETICAL MODEL	3
MULTIFACETED MODEL OF HIV RISK.....	6
PREDICTORS OF CONDOM USE	7
<i>Decisional Balance</i>	<i>7</i>
<i>Self-Efficacy.....</i>	<i>10</i>
<i>Traditional Processes of Change.....</i>	<i>11</i>
Counterconditioning	11
Consciousness Raising.....	11

Dramatic Relief	12
Environmental Reevaluation.....	12
Helping Relationships.....	12
Interpersonal Systems Control	12
Reinforcement Management	12
Self-Liberation	13
Self-Reevaluation.....	13
Social Liberation.....	13
Stimulus Control	13
<i>Additional Processes of Change</i>	13
Assertiveness.....	13
Eroticizing Condoms	14
Partner Communication	14
Partner Support.....	14
<i>Sexual Self Acceptance</i>	14
<i>Self-Esteem</i>	15
MOVEMENT THROUGH THE STAGES OF CHANGE.....	15
ASSESSMENT OF STAGE OF CHANGE.....	16
RESEARCH HYPOTHESES	17
METHODS.....	19
PARTICIPANTS	19
MEASURES	21
<i>Stage of Change</i>	21
<i>Condom Use URICA</i>	21
<i>Condom Pros</i>	22
<i>Condom Cons</i>	22
<i>Self-Efficacy</i>	22

<i>Processes of Change</i>	23
<i>Sexual Self Acceptance</i>	23
<i>Self-Esteem</i>	23
ANALYSES	24
ANALYSIS OF MISSING DATA	24
STUDY 1: CONDOM USE URICA CLUSTER ANALYSIS	24
STUDY 2: LATENT TRANSITION ANALYSIS.....	25
STUDY 3: LOGISTIC REGRESSION ANALYSIS	25
STUDY 4: STRUCTURAL EQUATION MODEL	26
STUDY 1: CONDOM USE URICA CLUSTER ANALYSIS	26
RESULTS.....	26
<i>Measurement Development for the Condom Use URICA</i>	26
Principle Components Analyses	26
Confirmatory Factor Analysis.....	28
<i>Cluster Analysis</i>	29
Precontemplation Cluster.....	31
Decision Making Cluster	31
Condom Users Cluster	31
Disengaged Cluster	32
<i>External Validity for the Clusters</i>	32
Sample 1	32
Sample 2	34
<i>Staging and Cluster Solution Comparison</i>	35
DISCUSSION.....	36
STUDY 2: LATENT TRANSITION ANALYSIS	39
RESULTS.....	40

<i>Entire Sample Model</i>	40
Delta Parameters	40
Tau Parameters.....	41
<i>Women Only Latent Transition Analysis Model</i>	43
Delta Parameter.....	43
Tau Parameters.....	43
<i>Men Only Latent Transition Analysis Model</i>	44
Delta Parameters	44
Tau Parameters.....	44
DISCUSSION.....	45
STUDY 3: LOGISTIC REGRESSION ANALYSIS	47
RESULTS.....	48
<i>Entire Sample Models</i>	48
Progression versus stability.....	48
Regression versus stability.....	49
<i>Women Only Model</i>	50
Progression versus Stability.....	51
Regression versus stability.....	52
<i>Male Only Model</i>	53
Progression versus stability.....	53
Regression versus Stability	54
DISCUSSION.....	55
STUDY 4: LONGITUDINAL STUCTURAL EQUATION MODEL	58
RESULTS.....	59
DISCUSSION.....	60
GENERAL DISCUSSION	62

STUDY LIMITATIONS64

CONTRIBUTIONS65

IMPLICATIONS67

TABLES68

FIGURES108

APPENDICES.....119

BIBLIOGRAPHY.....139

List of Tables for Study 1

TABLE 1- 1: DESCRIPTIVE STATISTICS THE SEXUALLY ACTIVE PORTION OF THE SAMPLE	68
TABLE 1- 2: DESCRIPTIVE STATISTICS FOR PREDICTORS VARIABLES AT BASELINE	69
TABLE 1- 3: FACTOR LOADINGS AND INTER-CORRELATIONS FOR THE FINAL 12 RETAINED ITEMS OF THE CONDOM USE URICA.	70
TABLE 1- 4: DESCRIPTIVE STATISTICS AND INTER-CORRELATIONS OF THE SCALES FOR THE CONDOM USE URICA.	71
TABLE 1- 5: MEAN STANDARDIZED SCALE SCORES FOR EACH CLUSTER IN SAMPLE 1.....	72
TABLE 1- 6: MEAN STANDARDIZED SCALE SCORES FOR EACH CLUSTER IN SAMPLE 2.....	73
TABLE 1- 7: RESULTS OF ONE-WAY ANOVA AND TUKEY COMPARISONS BY CLUSTER FOR SAMPLE 1	74
TABLE 1- 8: RESULTS OF ONE-WAY ANOVA AND TUKEY COMPARISONS BY CLUSTER FOR SAMPLE 2	75
TABLE 1- 9: CROSS CLASSIFICATION TABLE OF CLUSTER ANALYSIS BY STAGING ALGORITHM SAMPLE 1..	76
TABLE 1- 10: CROSS CLASSIFICATION TABLE OF CLUSTER ANALYSIS BY STAGING ALGORITHM SAMPLE 2	77

List of Tables for Study 2

TABLE 2- 1: OVERALL FIT FOR ALL 6 LATENT TRANSITION MODELS TESTED FOR ALL PARTICIPANTS	78
TABLE 2- 2: DELTA PARAMETER ESTIMATES (PROBABILITY OF LATENT STATUS MEMBERSHIP) FOR MODEL 6 ON ALL PARTICIPANTS	79
TABLE 2- 3: TAU PARAMETER ESTIMATES (TRANSITION PROBABILITIES) FOR MODEL 6 ON ALL PARTICIPANTS	80
TABLE 2- 4: OVERALL FIT FOR ALL 6 LATENT TRANSITION MODELS TESTED FOR WOMEN ONLY.....	81
TABLE 2- 5: DELTA PARAMETER ESTIMATES (PROBABILITY OF LATENT STATUS MEMBERSHIP) FOR MODEL 6 FOR WOMEN ONLY	82
TABLE 2- 6: TAU PARAMETER ESTIMATES (TRANSITION PROBABILITIES) FOR MODEL 6 FOR WOMEN ONLY	83
TABLE 2- 7: OVERALL FIT FOR ALL 6 LATENT TRANSITION MODELS TESTED FOR MEN ONLY	84
TABLE 2- 8: DELTA PARAMETER ESTIMATES (PROBABILITY OF LATENT STATUS MEMBERSHIP) FOR MODEL 4 FOR MEN ONLY	85
TABLE 2- 9: TAU PARAMETER ESTIMATES (TRANSITION PROBABILITIES) FOR MODEL 4 FOR MEN ONLY....	86

List of Tables for Study 3

TABLE 3- 1: BREAKDOWN OF MOVEMENT CLASSIFICATION BY GENDER	87
TABLE 3- 2: WALD STATISTIC AND ESTIMATED COEFFICIENT RESULTS FROM THE UNIVARIATE LOGISTIC REGRESSION ANALYSES ON PROGRESSION VS. STABILITY FOR ALL PARTICIPANTS (N=175).....	88
TABLE 3- 3: WALD STATISTIC AND ESTIMATED COEFFICIENT RESULTS FROM THE MAIN EFFECTS MODEL ON PROGRESSION VS. STABILITY FOR ALL PARTICIPANTS (N=175).....	89
TABLE 3- 4: WALD STATISTIC AND ESTIMATED COEFFICIENT RESULTS FROM FINAL MODEL ON PROGRESSION VS. STABILITY FOR ALL PARTICIPANTS (N=175).....	90
TABLE 3- 5: WALD STATISTIC AND ESTIMATED COEFFICIENT RESULTS FROM THE UNIVARIATE LOGISTIC REGRESSION ANALYSES ON REGRESSION VS. STABILITY FOR ALL PARTICIPANTS (N=176)	91
TABLE 3- 6: WALD STATISTIC AND ESTIMATED COEFFICIENT RESULTS FROM MAIN EFFECTS MODEL REGRESSION VS. STABILITY FOR ALL PARTICIPANTS (N=176).....	92
TABLE 3- 7: WALD STATISTIC AND ESTIMATED COEFFICIENT RESULTS FROM THE FINAL MODEL REGRESSION VS. STABILITY FOR ALL PARTICIPANTS (N=176).....	93
TABLE 3- 8: WALD STATISTIC AND ESTIMATED COEFFICIENT RESULTS FROM THE UNIVARIATE LOGISTIC REGRESSION ANALYSES ON PROGRESSION VS. STABILITY FOR WOMEN (N=121).....	94
TABLE 3- 9: WALD STATISTIC AND ESTIMATED COEFFICIENT RESULTS FOR MAIN EFFECTS MODEL FOR PROGRESSION VS. STABILITY FOR WOMEN (N=121).....	95
TABLE 3- 10: WALD STATISTIC AND ESTIMATED COEFFICIENT RESULTS FOR FINAL MODEL ON PROGRESSION VS. STABILITY FOR WOMEN (N=121).....	96
TABLE 3- 11: WALD STATISTIC AND ESTIMATED COEFFICIENT RESULTS FROM THE UNIVARIATE LOGISTIC REGRESSION ANALYSES ON REGRESSION VS. STABILITY FOR WOMEN (N=122).....	97
TABLE 3- 12: WALD STATISTIC AND ESTIMATED COEFFICIENT RESULTS FROM MAIN EFFECTS MODEL ON REGRESSION VS. STABILITY FOR WOMEN (N=122)	98
TABLE 3- 13: WALD STATISTIC AND ESTIMATED COEFFICIENT RESULTS FROM THE FINAL MODEL ON REGRESSION VS. STABILITY FOR WOMEN (N=122).....	99

TABLE 3- 14: WALD STATISTIC AND ESTIMATED COEFFICIENT RESULTS FROM THE UNIVARIATE LOGISTIC REGRESSION ANALYSES ON PROGRESSION VS. STABILITY FOR MEN (N=54)	100
TABLE 3- 15: WALD STATISTIC AND ESTIMATED COEFFICIENT RESULTS FROM THE MAIN EFFECTS MODEL FOR PROGRESSION VS. STABILITY FOR MEN (N=54)	101
TABLE 3- 16: WALD STATISTIC AND ESTIMATED COEFFICIENT RESULTS FOR THE FINAL MODEL ON PROGRESSION VS. STABILITY FOR MEN (N=54)	102
TABLE 3- 17: WALD STATISTIC AND ESTIMATED COEFFICIENT RESULTS FROM THE UNIVARIATE LOGISTIC REGRESSION ANALYSES ON REGRESSION VS. STABILITY FOR MEN (N=54)	103
TABLE 3- 18: WALD STATISTIC AND ESTIMATED COEFFICIENT RESULTS FROM THE MAIN EFFECTS MODEL ON REGRESSION VS. STABILITY FOR MEN (N=54)	104
TABLE 3- 19: WALD STATISTIC AND ESTIMATED COEFFICIENT RESULTS FROM THE FINAL MODEL REGRESSION VS. STABILITY FOR MEN (N=54)	105

List of Tables for Study 4

TABLE 4- 1: FACTOR LOADINGS FROM FINAL MODEL FOR ALL CONSTRUCTS AT BASELINE..... 106

TABLE 4- 2: FACTOR LOADINGS FROM FINAL MODEL FOR ALL CONSTRUCTS AT FOLLOW-UP..... 107

List of Figures for Study 1

FIGURE 1- 1: CONFIRMATORY FACTOR ANALYSIS ON SAMPLE 2.....	108
FIGURE 1- 2: PROFILES OF THE 4 CLUSTER SOLUTION ON SAMPLE 1 (N-167)	109
FIGURE 1- 3: PROFILES OF THE 4 CLUSTER SOLUTION ON SAMPLE 2 (N-153)	110

List of Figures for Study 2

FIGURE 2- 1: LATENT TRANSITION MODELS OF STAGE TRANSITIONS	111
FIGURE 2- 2: LATENT TRANSITION MODELS OF STAGES OF CONDOM USE ON ALL PARTICIPANTS	112
FIGURE 2- 3: LATENT TRANSITION MODELS OF STAGES OF CONDOM USE FOR WOMEN ONLY	113
FIGURE 2- 4: LATENT TRANSITION MODELS OF STAGES OF CONDOM USE FOR MEN ONLY	114

List of Figures for Study 4

FIGURE 4- 1: SEM MODEL OF ALL CONSTRUCTS WITHIN EACH TIMEPOINT.....115

FIGURE 4- 2: SEM SINGLE CONSTRUCT LONGITUDINAL MODELS.....116

FIGURE 4- 3: SAMPLE SEM SUBSET LONGITUDINAL CROSS-LAG MODEL.....117

FIGURE 4- 4: FINAL STRUCTURAL EQUATION MODEL118

List of Appendices

APPENDIX 1: CONSENT FORM	119
APPENDIX 2: BASELINE NAME FORM.....	120
APPENDIX 3: FOLLOW-UP NAME FORM.....	121
APPENDIX 4: LIST OF RESOURCES PROVIDED TO PARTICIPANTS	122
APPENDIX 5: BASELINE AND FOLLOW-UP SURVEY	123

Statement of the Problem

Condom use has become an important behavior for the protection against the growing incidence of Sexually Transmitted Diseases (STDs) in college students who are sexually active. The Transtheoretical Model of behavior change (TTM: e.g., Prochaska, Norcross, & DiClemente, 1994) is a systematic approach to changing health related behaviors. By using this model to identify how individuals naturally move through the stages of change, researchers and clinicians can set reasonable expectations for individuals with whom they are working. In addition, by identifying predictors of progression and regression within the stages, interventions can be developed that focus on these variables in an effort to increase condom use among college students.

The overriding goal of this study was to understand more about how to quantitatively assess longitudinal change within the TTM applied to the area of condom use among college students. Several quantitative methods were used to assess various aspects of change. First, cluster analysis was used to assess the nature of the Stages of Condom Use using a continuous University of Rhode Island Change Assessment (URICA) tool. Second, Latent Transition Analysis (LTA) assessed an appropriate model of natural movement through the Stages of Change for condom use over a one month period. Third, the longitudinal predictors of progression and regression within the stages were evaluated using Logistic Regression Analysis. Lastly, a four step method of Longitudinal Structural Equation modeling was used to further understand the relationship between Stages of Condom Use, and other variables associated with both the TTM and the Multifaceted Model of HIV Risk in Women over time.

Justification of the Study

Compared to older adults, adolescents and young adults are at a higher risk for the acquisition of STDs (Division of STD Prevention, 1996). Although some research, such as the National Survey for Family Growth, has shown a positive change in the area of sexual behavior (Cambell & Baldwin, 1991), these results have not been supported by the expected decline in disease prevalence. Clinic visits for what is perhaps the most common STD in the college environment, genital warts, were six times higher in 1989 than they were in 1966 (Vail-Smith & White, 1992). Rates of other diseases such as gonorrhea, syphilis and chlamydia have remained stable or increased in the past decades among college students (Sawyer & Moss, 1993). These trends led the US Department of Health and Human Services to focus on the reduction in unintended pregnancy and transmission of STDs and HIV in the college-age population as one of its National Health Objectives for the year 2000 (US Department of Health and Human Services, 1992). The primary method for reducing the risk of transmission of STDs for those individuals who are sexually active is the use of a barrier method, mainly a latex condom.

The task of developing effective interventions and prevention programs aimed at increasing condom use has been given to both social and public health scientists (Kelly, Murphy, Sikkema, & Kalichman, 1993). One difficulty that social scientists have had in designing interventions to increase condom use has been the longitudinal identification of variables that influence a person's condom use (Fishbein & Guinan, 1996). A number of different health behavior models have been applied to this problem. Among

these models are the Health Belief Model (e.g., Brown, DiClemente, & Reynolds, 1991; Petosa, & Jackson, 1991; Petosa, & Wessinger, 1990; Rosenstock, Strecher, & Becker, 1994; Rosenthal, Hall, & Moore, 1992), the AIDS Risk Reduction Model (e.g., Catania, Kegeles, & Coates, 1990; Kline & VanLandingham, 1994), the Multifaceted Model (Burkholder & Harlow, 1996; Harlow, Quina, Morokoff, Rose, & Grimley, 1993; Quina, Harlow, Morokoff, Deiter, & Saxon, 1997), and the TTM (e.g., Grimley, Riley, Bellis, & Prochaska, 1993; Grimley, Prochaska, Velicer, & Riley, in press; Prochaska, Redding, Harlow, Rossi, & Velicer, 1994; Prochaska, Norcross et al., 1994; Redding, Rossi, Velicer, & Prochaska, 1989; Riley et al., 1993). Of these, the TTM has often been viewed as the most comprehensive, encompassing many of the best features of the other major health models.

The Transtheoretical Model

The Transtheoretical Model (e.g., Prochaska, & DiClemente, 1983) is a model that explains the process of how people attempt to modify health risk behaviors. It is based on fifteen years of research, and theorizes that individuals move through a series of stages in the adoption of a healthy behavior. Research has successfully applied this model to a variety of health behavior areas, including smoking cessation, weight control, sunscreen use, high-fat diets, exercise acquisition, quitting cocaine, mammography screening, and condom use (e.g., Prochaska, Velicer et al., 1994).

Within this model there are a set of common principles that explain why people succeed and fail in these attempts. The stages of change are a developmental succession of a person's readiness to change a problem behavior. Movement through the series of five stages of change is a continual, gradual process. This movement is rarely linear,

rather, individuals cycle through the stages of change in a spiral pattern, which means that people may recycle back through earlier stages as they work through the change process (e.g., Prochaska, DiClemente, & Norcross, 1992). In order to progress into another stage, an individual must have met the behavioral and/or intentional criteria for that stage or have been in the previous stage for a certain interval of time (e.g., Grimley, et al., in press; Prochaska, & DiClemente, 1983; Prochaska, Norcross, et al. 1994; Prochaska, Redding et al., 1994; Prochaska, Velicer et al., 1994).

Research on the different problem behaviors mentioned above has shown that there are certain predictors of progression through the stages of change (e.g., Prochaska, & DiClemente, 1983; Prochaska, Norcross, et al., 1994). Predictors that have already been examined include: decisional balance between the Pros and Cons of behavior change (e.g., Velicer, DiClemente, Prochaska, & Brandenburg, 1985), self-efficacy (e.g., DiClemente, Prochaska, & Gibertini, 1985), and the processes of change (DiClemente & Prochaska, 1982; Prochaska & DiClemente, 1983; Prochaska, Velicer, DiClemente & Fava, 1988; Marcus, et al. 1992). Appropriate use of experiential and behavioral processes of change can facilitate movement within the stages of change. In addition, decisional balance and self-efficacy are variables that can intervene on an individual's stage of change. Identification of longitudinal predictors of stages of change will aid in the development of interventions in an effort to move individuals along through the Stages of Change for condom use (Fishbein & Guinan, 1996). Though the TTM has been applied to a number of areas, little research has examined longitudinal change in condom use. The current study investigated this.

Precontemplation is the first of the five stages of change. This stage is characteristic of people who are not seriously considering changing their behavior in the foreseeable future, usually measured as the next six months. Often, people within this stage are defensive and resistant to felt pressures to change. They are usually individuals who are uninformed about the consequences of their behavior, or people who have become demoralized by previous unsuccessful attempts to change their behavior. In the area of condom use, this may include individuals who are not aware of the risk of unprotected sex, or do not feel that they are at enough risk to be planning to change their behavior (Prochaska, Redding, Harlow, Rossi, & Velicer, 1994).

In the second stage of change, *Contemplation*, an individual is not yet ready to make a commitment to change, though they may be aware of the consequences of the behavior. The time frame traditionally used for this stage is an intention to change behavior in the next six months. Individuals in this stage are aware of the benefits of using condoms, but are very aware of the costs as well, such as discomfort and inconvenience.

In the *Preparation* stage, an individual is intending to take action within the immediate future. The time frame used for this intention is usually one month. They have also already taken some form of action in the past year. Individuals in this stage typically have a plan of how they are going to change their behavior. In the area of STD risk reduction, people in this stage may occasionally use condoms, but do not yet use them consistently during intercourse. For the purpose of this study, individuals in the Preparation stage had to indicate they used condoms almost every time and intended to begin using them all of the time within the next 30 days.

The *Action* stage is when an individual has made specific changes in their lifestyle within the past six months. A certain criteria must be reached in order for a person to be considered in the Action stage. In the area of smoking cessation, the criterion that has been agreed upon by researchers is total abstinence. When looking at the research that has been done specific to AIDS risk sexual behavior, no clear criterion has yet been established (Prochaska, Redding et al., 1994). However, in most research, consistent condom use during intercourse has been used as the criterion. This criterion often depends upon which population is being examined, as well as the specific risk behavior that is being assessed. Within a college population, individuals with new or casual partners would be expected to engage in consistent condom use during intercourse to adequately prevent the risk of STDs.

Maintenance is the stage in which a person has successfully made the change in their lifestyle for a period of six months or more. For the purpose of this study, an individual in the Maintenance stage would have been using condoms every time they had intercourse for six months or more. Relapse prevention is an important part of this stage (see Rose et al., 1997, for a relapse prevention model for exercise behavior).

Multifaceted Model of HIV Risk

The Multifaceted Model of HIV Risk (MMOHR) is a predictive model of HIV risk in women developed by Harlow, Quina, Morokoff, Rose, and Grimley (1993). Three multifaceted sets of variables are used to predict a women's risk for HIV through sexual behavior. Collectively, the three sets of variables have been found to predict 41% to 70% of the variance in HIV risk in women. The first set of variables, behavioral risk, includes sexual experience and substance use variables. It was found

that greater sexual experience, in addition to higher level of substance use, were significant predictors of HIV risk. The second set of variables, labeled interpersonal, includes variables such as victimization, sexual assertiveness, and anticipated partner reaction. Low levels of sexual assertiveness were found to be associated with a high level of risk for HIV. Psychoattitudinal risk, the third set of variables, includes Sexual Self Acceptance, Psychosocial Functioning, and Self-Efficacy. Strong predictors of HIV risk in women from this set of variables included low levels of Sexual Self Acceptance and Self-Efficacy, as well as high Psychosocial Functioning. The behavioral and interpersonal factors were found to be the most central to the overall model. However, it appeared to be necessary for all three factors to be included in order to explain a majority of the unique variance within the model.

Predictors of Condom Use

Decisional Balance

Two variables that have been found to be related to a person's decision to use a condom are an individual's consideration of the Pros and Cons of condom use, or decisional balance (Grimley et al., 1993; Grimley et al., in press; Prochaska, Redding et al., 1994; Prochaska, Velicer et al., 1994). Persons in the early stages of change perceived more Cons than Pros of behavior change. The point where the Pros start outweighing the Cons is when an individual is taking action to make behavior changes. A similar construct is incorporated into the Health Belief Model (e.g., Janz & Becker, 1984) in terms of the perceived benefits and perceived barriers of a health behavior change. In this model, the perceived benefits refer to a person's belief about the effectiveness of the possible actions available to reduce the disease threat. If a person

believes the action to be an effective one, they are more likely to take effective action. The potential negative perceived barriers are the potential negative aspects or obstacles of making a particular health change (Brown et al., 1991; Janz & Becker, 1984; Rosenstock, 1974; Rosenstock et al., 1994). It is the individual's perception of the benefits, minus the barriers that provide a preferred path to action (Rosenstock, 1974).

Another model that uses a variable similar to decisional balance is the AIDS Risk Reduction Model (ARRM). During the second stage of the ARRM, commitment to change, a person must come to a decision whether to make a change and make a commitment to that change (Bertrand, Brown, Kinzonzi, Mansilu, & Djunghu, 1992; Catania et al., 1990; Kline & VanLandingham, 1994). The costs and benefits are factors that are included in making this decision (Catania et al., 1990; Kline & VanLandingham, 1994). The costs and benefits are thought of including two factors: response efficacy and enjoyment. Response efficacy refers to a person's feelings that the action they plan to take is going to be effective. This may be seen as the Pros of condom use. Enjoyment, the second portion of cost and benefits, may be viewed in the context of condom use as the cons. In the area of sexual behaviors, enjoyment is a crucial factor to consider (Catania et al., 1990). Many of the changes that a person must consider making in order to decrease their risk of contracting HIV may be perceived as being less enjoyable than the high risk behaviors in which they are currently engaging. Women who believe that condoms decrease their sexual pleasure do not use them as consistently as women who have more positive attitudes about their use (Kline & VanLandingham, 1994). In addition, it has also been found that those individuals who use condoms feel that condoms decreased pleasure less than those

individuals who do not use condoms (Malow, Corrigan, Cunningham, West, & Pena, 1993).

Based on the TTM, decisional balance mediates transitions among the five stages of change. This refers to the weighing of the advantages (Pros) of changing a behavior, as well as the disadvantages (Cons) of changing a behavior (e.g., Grimley et al., 1993; Grimley et al., in press; Prochaska, Redding et al., 1994; Prochaska, Velicer et al., 1994; Redding et al., 1989; Velicer et al., 1985). The construct was originally discussed in the decision making model by Janis and Mann (1977) as including eight different categories. Within the context of the TTM, only two of these constructs are used. This change is based on the results of a principal components analysis that was conducted on 960 smokers (Velicer et al., 1985). The two separate variables each show a distinctive pattern across the stage of change when applied to a variety of behaviors: the Pros of a change have been found to increase across the stages; in contrast, the Cons have been found to decrease along the stage continuum. This pattern across the stages has been deemed the cross-over pattern of decisional balance (Prochaska & Goldstein, 1991; Prochaska, Velicer, et al., 1994). These constructs have also been found to be relatively independent of one another.

In studies looking at the application of the TTM to condom use, AIDS risk reduction and contraceptive behaviors, the Pros have been found to account for more variance in the *forward movement* through the stages (Grimley et al., 1993; Grimley et al., in press; Prochaska, Redding et al., 1994; Prochaska, Velicer et al., 1994). This means that whereas the Cons outweighed the Pros in the Precontemplation stage, the Pros outweighed the Cons for those in the Maintenance stage. In a study looking at

women longitudinally, those women with low Condom Pros at baseline were more likely to remain in the same Stage of Condom Use over one year than to show movement either forward or backward (Evers, 1996).

Self-Efficacy

Self-Efficacy is another variable that has been found to be associated with whether or not an individual uses condoms during intercourse (e.g., Bandura, 1986; 1994; Goldman & Harlow, 1993; Harlow et al., 1993). A person's Self-Efficacy refers to their beliefs about their ability to perform a particular activity (e.g., Bandura, 1982; Bandura, 1986; Bandura, 1994; Catania et al., 1990; Kline & VanLandingham, 1994). In order for a person to be able to make a change in their lifestyle, they must believe that they are capable of either reducing the high risk behaviors or increasing their low risk behaviors. Research has found that those individuals who use condoms have more feelings of Self-Efficacy than those who do not use condoms (e.g., Malow et al. 1993). In addition, a study looking at HIV positive women found that Self-Efficacy for influencing a partner's sexual behavior was the most significant correlate of condom use (Kline & VanLandingham, 1994).

Within the TTM, Self-Efficacy is considered a mediator of movement through the Stages of Change (e.g., DiClemente, et al. 1985; Grimley et al., in press; Prochaska, Redding et al., 1994; Riley et al., 1993; Velicer, DiClemente, Rossi, & Prochaska, 1990). It has been conceptualized as two related constructs. The primary construct is the situational confidence an individual has that they will be able to engage in the behavior in a high risk situation. The second construct involves temptations to engage in the problem behavior in difficult situations (Prochaska, Redding, et al.,

1994). These aspects of Self-Efficacy vary depending on the Stage of Change and have been found to be highly correlated and inversely related. Self-Efficacy, as defined by situational confidence, increases through the stages until the Maintenance stage, where it plateaus (e.g., Riley et al., 1993). In a longitudinal study looking at the predictors of naturalistic movement through the Stages of Condom Use, Condom Use Efficacy was found to have an inverse relationship to backward movement. Those women who had a high amount of condom use efficacy at baseline were more likely to regress over one year (Evers, 1996). One possible explanation for these results could be that the women were unrealistic about their efficacy.

Traditional Processes of Change

The processes of change are a set of intentional and unintentional activities that individuals use to move through the stages of change. These processes of change are what interventions can focus on in an effort to move individuals towards more effective action. There are eleven processes of change that have been researched extensively in a variety of behavior areas.

Counterconditioning (CC). The process of Counterconditioning is finding and learning new behaviors that can be substituted for the unhealthy behavior. In the area of condom use, this has often been conceptualized as replacing risky sexual behaviors with safer forms of sexual behavior.

Consciousness Raising (CR). The cognitive process of Consciousness Raising involves increasing one's awareness of information and problems associated with the problem behavior. Reading and recalling advertisements and condom promotion programs is one way in which this process can be used.

Dramatic Relief (DR). This process entails experiencing and expressing feelings about the health problem and awareness of personal risk. The use of this process in the area of condom use entails calling to mind stories about people who have AIDS or STDs that are emotionally disturbing.

Environmental Reevaluation (ER). The process of Environmental Reevaluation includes both affective and cognitive assessments of how the behavior affects the social environment. A prime example of this can be seen in the case of smoking, where a person might evaluate how their smoking affects others around them, such as their family. For condom use, this is seen as being involved in stopping the spread of disease and setting a good example for friends.

Helping Relationships (HR). Helping relationships are ones that are open and trusting, with which the health problem can be discussed. This process could also be called support for condom use. This entails having someone to talk to about sexual concerns and condom use.

Interpersonal Systems Control (IS). This process involves an individual searching out sexual partners who will support their condom use and avoiding partners who may pressure them to engage in unsafe sexual activities.

Reinforcement Management (RM). This process involves managing the consequences for the healthful and unhealthful behaviors, both from others and from oneself. For the best results, it has been found that self-changers use rewards more than punishment. Rewards for condom use can come from the individual themselves or from others.

Self-Liberation (SL). This is making a commitment to the change process. By making a commitment to using condoms every time and to avoid risky sexual situations, an individual is engaging in this change process.

Self-Reevaluation (SR). By engaging in this process, individuals assess how they feel and think about themselves in respect to the problem behavior. This process is assessed by items stating that the person views themselves in a positive light when they use condoms.

Social Liberation (SO). Social Liberation is the process of increasing the alternatives that are available in society for non-problem behaviors. Social liberation for condom use involves being aware of how condom use is becoming more acceptable and being discussed more openly now.

Stimulus Control (SC). This process entails avoiding certain stimuli that lead to the problem behavior or increasing cues for the more healthful alternative. By keeping a supply of condoms available and in locations where they may be needed, a person will increase their chances of using them consistently.

Additional Processes of Change

Based on previous research looking at the processes of change for condom use in adolescent females, four processes of change emerged that are not included in the traditional set of eleven (Redding, Rossi, Armstrong, Coviello, Barron, Evers, & Prochaska, 1996). The majority of these processes are centered around the dyadic nature of condom use as a behavior.

Assertiveness (AS). The process of assertiveness is included in a number of different behaviors associated with condom use (e.g., Morokoff et al., 1997). These

include not having intercourse with someone who will not use a condom and insisting on using condoms with partners.

Eroticizing Condoms (EC). This process involves making condom use more fun and exciting. In addition, it entails incorporating condom use into sexual behaviors.

Partner Communication (PC). This includes talking to a partner about condom use, as well as feeling that the partner listens and is responsive to the discussion.

Partner Support (PS). This process includes both showing support for using condoms as well as showing a sexual partner signs of caring because of using condoms.

Sexual Self Acceptance

Within the MMOHR, an individual's comfort with their own sexual behavior and attitudes about their sexuality is referred to as Sexual Self Acceptance or Psychosexual Attitudes (Harlow et al., 1993; Morokoff et al., 1997). Risky sexual behavior and substance use have been found to be significantly associated with negative Sexual Self Acceptance. These results suggest that women who feel good about their sex lives may be less likely to engage in potentially riskier forms of sexual behavior (Harlow, Stein & Rose, under review). In addition, Harlow et al. (1993) found that college women who had negative beliefs and attitudes about their sexuality were more likely to engage in HIV-risky sexual behavior. Women who expressed poor Sexual Self Acceptance are expected to exhibit more sexual risk behavior than those women with better psychosexual functioning (Harlow, Rose, Morokoff, & Quina, under review).

A study looking at the longitudinal relationship between Sexual Self Acceptance and Stage of Condom Use found that those women who remained in the same Stage of Condom Use over one year had higher positive Sexual Self Acceptance at baseline than

did those who moved forward. In addition, those women with high negative and low positive Sexual Self Acceptance were more likely to move backward through the stages than to remain stable (Evers, 1996).

Self-Esteem

There is currently a body of literature that suggests that individuals who have a higher level of Self-Esteem are able to maintain optimistic biases regarding their health risks. In a study looking at women's feelings of vulnerability to sexually transmitted diseases, those women with high Self-Esteem had lower feelings of vulnerability than those women with low Self-Esteem, regardless of levels of risk behavior (Smith, Gerrard, & Gibbons, 1997). Researchers have found that people with high levels of Self-Esteem often discount health information that disagrees with their own perceptions that they are engaging in effective precautionary behaviors (Gerrard, Kurylo, & Reis, 1991).

Movement Through the Stages of Change

Within the HIV prevention literature, there have been few longitudinal studies which have used sophisticated methods for studying change over time. Examining how individuals progress or regress naturalistically can provide important information about how to develop intervention programs, and what rates of change are reasonable to expect. A few studies have examined how individuals naturally progress over time through the stages of change for smoking (e.g., Martin, Velicer & Fava, 1996). In addition, a recent study examined the transitions among the Stages of Condom Use for women over one year (Evers, Harlow, Redding, & LaForge, in press). Both of these studies found that the Precontemplation and Maintenance stages to be the most stable,

with Preparation and Action showing the least stability. In addition, they found that the probabilities of forward and backward movement varied dramatically depending on the initial Stage of Change. However, in both areas movement occurred for 10% or more of all the individuals regardless of initial Stage of Change. Individuals were more likely to transition to the nearest stage, with movement of two stages being much less likely. In the smoking area, baseline stage membership was found to be associated with outcomes one month and six months later (Martin, et al., 1996). In the long term study of condom use, the proportions of movement to Action approximately double across the baseline stages (Evers, et al., 1998). Finally, the rates of relapse and stage regression for condom use found in the naturalistic sample of women exceed those found in a comparison naturalistic sample of smokers.

Assessment of Stage of Change

The stages of change can be assessed using a variety of methods. The method most frequently used is a discrete staging algorithm. Based on a single or series of categorical questions, this method places people into appropriate stages (Prochaska & DiClemente, 1992). This method of assessing stage has been used in a variety of different behavior areas and has been shown to be robust (e.g., Prochaska, DiClemente, Velicer, & Rossi, 1993; Rossi, et al., 1993), including in the area of condom use (Galavotti et al., 1995; Grimley, et. al., 1992, Prochaska et al., 1990). A second method of assessing stage of change involves the use of the continuous measure University of Rhode Island Change Assessment Scale (URICA). This type of measure includes items representing an individuals' attitudes and behaviors with respect to the

stages, presented with a 5 point Likert Scale assessing an individuals level of agreement with each item. This measure can then be examined using cluster analysis to identify individuals with particular profiles, which have often been found to be related to stage constructs (Prochaska & DiClemente, 1992). This form of measurement has been developed and examined in different behavioral areas, such as medication compliance (e.g., Johnson, et al., 1995); exercise (Reed, in press); psychotherapy (McConaughy, DiClemente, Prochaska, & Velicer, 1989); and sun exposure, alcoholism treatment, and adolescent cigarette smoking acquisition (Blais & Rossi, 1992).

Research Hypotheses

Several hypotheses were investigated in this research.

1. Five clusters will emerge from the URICA measure representing the five stages of change.
2. The continuous measure of stage (URICA for Condom Use) will have a high degree of agreement with the discrete measure of Stage of Condom Use.
3. Movement of at least one Stage of Condom Use will occur for approximately 10% of the college students.
4. More movement will occur to adjacent stages than to non-adjacent stages.
5. The second most frequent pattern will be a movement of two stages.
6. Regression will be an important factor in the development of a model of stage transitions.
7. Greater condom Pros at baseline will be associated with forward movement through the Stages of Condom Use over a one month period.

8. Greater condom Cons at baseline will be associated with regression through the Stages of Condom Use over a one month period.
9. Greater condom efficacy at baseline will be associated with progression through the Stages of Condom Use over a one month period.
10. More positive Sexual Self Acceptance at baseline will be associated with remaining in the same Stage of Condom Use over a one month period.
11. Use of the cognitive and behavioral processes of change will be predictors of forward movement through the Stages of Change.

Methods

Participants

Participants for this study were recruited through a variety of undergraduate courses at the University of Rhode Island, including classes from the nutrition, physical education, psychology, sociology, and university college departments. Students were asked to participate in a longitudinal study of sexual behavior. Both men and women were eligible for this study. All students who were willing to participate after hearing a brief overview of the study were asked to meet in a large room at a preset time or were provided information and materials at that time. Consent forms (see Appendix 1) were handed out and participants were asked if they had any questions after they read them. Students were then asked to fill out a sheet of paper indicating their name and phone number for the purpose of contacting them for the second session of the study (Appendix 2 and 3). The survey remained separate from this identification at all times. On the survey, participants were asked to provide a six digit identification code that consisted of a set of letters and numbers (the first initial of their last name, the first initial of their first name, and the last four digits of their social security number). This identification code was used to track an individual's data from time one to time two. The researcher had no way of matching the identification number to the participant's name and phone number. Participants were then asked to fill out a series of questions concerning their sexual activities, condom use and Psychosocial attitudes. All students were eligible to complete the entire questionnaire regardless of their sexual experience. However, only those participants who had engaged in sexual intercourse were included in the predictive or model-testing analyses. When participants had finished completing

the questionnaire, they were asked to place the sheet with their name on it in one box, and the questionnaire in another. Participants were provided with a sheet containing a list of resources in the event that any questions arose from filling out the questionnaire (Appendix 4). Approximately three weeks after the baseline encounter, participants were contacted to set up the one month questionnaire. The same procedure was followed for the follow-up data collection as in the baseline data collection. All participants who completed the baseline survey were included in a lottery for four \$25 cash awards, and those who completed the follow-up administration were eligible for one of four \$50 awards.

Four hundred and sixty-seven individuals participated in the baseline data collection for this study. Sixty-six percent of the sample was women, and the ethnic distribution of the sample included 85% Caucasian, 2% African American, 4% Native American, 4% Asian, and 5% other. Twenty-seven percent of the sample had never been sexually active at the time of the baseline survey. For the purposes of this study, only those individuals who were sexually active were included in the analyses. Descriptive statistics for this sample are included in Table 1-1. Of the retained 333 sexually active individuals, 68% were female and the ethnic distribution remained primarily Caucasian (88%). The average age of the participants was 19 (std. dev. = 2.66) and the majority were in their Freshman year in college (55%). The majority of these individuals self-classified themselves as primarily heterosexual (97.9%) and only 6% indicated that their present sex partner currently lived with them. Ninety-six percent of the participants were not married. Although tracking of participants for the purpose of follow-up showed a retention rate of 71% (N=314 at follow-up), problems

were found with the identification number that participants used. Many of the participants did not remember, or changed their identification number at follow-up. For this reason, an additional 90 individuals were lost to follow-up.

Measures

The entire questionnaire used in this study is included in Appendix 5. The measures used in this study are described below. Descriptive statistics for these measures are provided in Table 1-2.

Stage of Change

Stage of Condom use was assessed using an algorithm approach which included a variety of items. Included in these were questions of intentions to use condoms, past and present condom use behavior. In addition, the number of times a condom was used was compared to the number of times the participant had sexual intercourse in order to validate the report of condom use frequency. This questionnaire is adapted from Redding et al. (1996).

Condom Use URICA

The condom use URICA (University of Rhode Island Change Assessment) is a continuous measure of Stage of Condom Use (Lee, 1998). It contains 30 items representing the five Stages of Condom Use. Participants rated each of the items on a one to five Likert type scale. These results were then standardized and used in cluster analysis.

Condom Pros

A 10-item subscale (Evers et al., 1996; Prochaska, et al., 1990) was used to assess the Pros of condom use (coefficient $\alpha = .85$). Items such as “I would feel more responsible” were assessed using a five-point response scale. Higher scores on these items indicated that greater importance was placed on this statement when thinking about using a condom.

Condom Cons

The measure that was used to assess the perceived Cons of condom use was a 10-item scale with a coefficient α of .78 (Evers et al., 1996; Prochaska, et al., 1990). This scale used a five-point response and included items such as “Sex would be less enjoyable”, with higher scores reflecting greater importance when considering condom use.

Self-Efficacy

Self-efficacy for condom use (confidence) was assessed using a ten-item scale: Confidence in condom use (Evers et al., 1996; Prochaska, et al., 1990; Redding et al., 1996). A five-point response scale asked how sure participants were to use a condom in certain situations, such as when: they were really turned on, depressed, drinking or doing drugs, or angry. Higher scores on the Confidence scale indicate higher efficacy. The coefficient alpha for this scale was found to be .94 based on data from the current study.

Processes of Change

Fifteen individual scales of processes of change were each assessed using a three item subscale from Evers et al. (1996) and Redding et al. (1996). Respondents were asked how often they have felt, done or thought various statements in the past month. The coefficient alphas for these scales range from .61 to .91. The processes of change that were assessed included: Assertiveness, Consciousness Raising, Counterconditioning, Dramatic Relief, Environmental Reevaluation, Eroticizing, Condoms, Helping Relationships, Interpersonal Systems Control, Partner Communication, Partner Support, Reinforcement Management, Self-liberation, Self-Reevaluation, Social Liberation, and Stimulus Control.

Sexual Self Acceptance

Two three-item scales were used to assess an individual's positive and negative attitudes towards their sexuality (Harlow, et al., 1993). These items used a five point Likert response scale. The positive subscale (PSSA) included items such as "Sex is a positive part of my life" and the negative subscale (NSSA) included "I do not like some parts of my sex life". Coefficient alphas were .67 and .69, respectively.

Self-Esteem

Self-Esteem was measured using the Rosenberg Self-Esteem Scale (Rosenberg, 1965). This ten-item scale was designed to measure adolescents' global feelings of self-worth or self-acceptance. These items ask the respondent how much they agree or disagree with the statements on a four-point Likert response scale. Sample items include: "On the whole, I am satisfied with myself" and "I wish I could have more respect for myself." The current study indicated a Cronbach alpha of .88.

Analyses

This project has been divided into four separate studies, which are described below following a brief description of the methods used to address missing data. Due to the variety of methods and samples used in this project, sample sizes and descriptions are included in each of the separate study sections.

Analysis of Missing Data

Once all of the data had been collected and entered, an assessment of missing data was conducted. Appropriate procedures were followed to assess and make decisions on how to handle any missing data. Possible procedures are outlined by Tabachnick and Fidell (1989). Due to the size of the data set, deletion of any case with missing data was not feasible, although it was considered as an option. Individual scales were examined for the percent of missing data, and individuals with more than 10% of a scale missing were eliminated from the appropriate analyses. For individuals with less than 10% missing data on an individual scale, missing values were replaced with group means calculated from the available data. Preliminary analyses were conducted including descriptive statistics for the sample, and the calculation of internal consistencies for all of the scales.

Study 1: Condom Use URICA Cluster Analysis

This study involves the development and use of a continuous measure, originally entitled the URICA. In this type of measure, items examining an individual's attitudes and behaviors with respect to the Stages of Condom Use are presented and participants are asked to endorse their degree of agreement with each item. After exploring and confirming the factor structure of the URICA items, a cluster analysis can then be

conducted to identify individuals with particular profiles, which may be closely related to stage constructs (Prochaska & DiClemente, 1992). This type of measure may be a more subtle measure of an individuals' stage of change than a one or two-item staging algorithm.

Study 2: Latent Transition Analysis

Latent Transition Analysis (LTA: Collins, & Wugalter, 1992) provides a unique way of looking at the data. It allows the researcher to test detailed stage-sequential models. This is a very flexible method to employ for longitudinal studies because it allows the researcher to look at individual movement paths rather than just classifications, such as forward, backward, or stable movement. In this way, smaller and different types of movements can be detected. The current study extends previous research on stages of change for smokers (Martin, Velicer, & Fava, 1996) and the long-term study of condom use in women (Evers, Harlow, Redding, & LaForge, in press) to the short term study of condom use in both men and women.

Study 3: Logistic Regression Analysis

This set of analyses assessed the best fitting model to describe the relationship between a dichotomous variable and a set of predictors. Two separate analyses were conducted for both men and women. The first looked at the dichotomous variable that compared those people who remained in the same stage of change over the two time points with those who moved forward. The second looked at those who remained stable compared to those who regressed. The set of predictors in both of these sets of analyses were the Pros and Cons of condom use, Confidence, Self-Esteem, Sexual Self Acceptance, and the individual processes of change.

Study 4: Structural Equation Model (SEM)

This set of analyses built a longitudinal structural model in an effort to examine the relationship between Stage of Condom Use and other variables associated with the TTM and the Multifaceted Model of HIV Risk in Women (MMOHR: Harlow, Quina, Morokoff, Rose, & Grimley, 1993) over two time points. It also explored the process of “step-modeling” a longitudinal structural model (Evers & Harlow, 1997; Harlow, et al., in preparation) in an attempt to apply this complex longitudinal procedure to a limited real world data set.

Study 1: Condom Use URICA Cluster Analysis

Results

Measurement Development for the Condom Use URICA

The items included in the Condom Use URICA were originally developed in a separate project conducted by Lee (1997). Prior to conducting a cluster analysis for the Condom Use URICA measure, measurement development procedures were conducted on all individuals who completed the baseline survey administration (N=320) for this measure. This sample was randomly split into two separate samples that are referred to as Sample 1 (N=167) and Sample 2 (N=153). Principal components analysis was conducted on Sample 1 and Confirmatory Factor Analysis on Sample 2.

Principle Components Analyses. Exploratory principal component analyses (PCA) were conducted on Sample 1 using Component Analysis Extended Program (CAX) (Velicer, Fava, Zwick, & Harrop, 1988). Orthogonal (VARIMAX) and oblique (PROMAX) rotation were conducted on the matrix of inter-item correlations. Decisions regarding how many factors to retain were based on factor loadings, the

Minimum Average Partial (MAP) procedure (Velicer, 1976), Parallel Analysis (Horn, 1965), and the theoretical interpretability of the factors. Minimum Average Partial and Parallel Analysis have been described as the two most accurate decision rules across a variety of situations (Zwick & Velicer, 1986). All items with a factor loading less than .40 or with a .40 or higher loading on more than one factor were discarded after running the PCA.

Prior to conducting any analyses, the initial item pool, consisting of the 30 condom use URICA items, was analyzed for extreme means (less than or equal to 1.0 or greater than 4.0 on a 1-5 scale). However, no items were deleted for this reason. The exploratory component analysis on the 30x30 matrix of inter-item correlations revealed that Parallel Analysis suggested a two factor solution, whereas MAP indicated a three-factor solution. The three-factor solution was retained because it clearly represented the following theoretically coherent groupings of the stages of change: Precontemplation, Contemplation/Preparation, Action/Maintenance. The item pool was reduced to 20 items by deleting complex and low loading items ($< .40$). Based on these results the Precontemplation (P) scale was comprised of three items, the Contemplation/Preparation scale (C/PR) included five items and the Action/Maintenance scale (A/M) retained 12 items. The A/M items were examined for any similar items and the impact of items on the coefficient alpha. Seven items were deleted from this scale, and the final A/M scale included five items. A second PCA on the remaining items replicated the clear three factor solution. However, one item was omitted from the final solution from the Precontemplation scale due to complex loadings. The internal consistencies for the final scales were acceptable ($P = .61$, C/PR

= .91, A/M=.94). This final solution accounted for 75% of the explained variance in the retained set of 12 items. Since the scales were highly correlated, the oblique solution was used for interpretation. The final factor loadings produced by oblique rotation, which ranged from .66 to .91, are presented in Table 1-3.

Confirmatory Factor Analysis. A Confirmatory factor analysis (CFA) was conducted on Sample 2 (N=153) using EQS (Bentler, 1993). A basic correlated three-factor model was tested using Maximum Likelihood as the estimation procedure. The CFA indicated that the model fit the data well, $\chi^2(51)=175.731$, Comparative Fit Index (CFI)=.91, and Average Absolute Standardized Residual (AASR)=0.06. In addition, according to the Likelihood Ratio Chi Square difference tests, the correlated three factor model fit the data significantly better than both an uncorrelated three factor model χ^2 -difference (3)=167.75, $p < .001$, and the independence model χ^2 -difference (15)=1261.57, $p < .001$. The correlated three-factor model was retained and is depicted in Figure 1-1. The means, standard deviations, Cronbach's alpha, and correlations of the sub-scales are presented in Table 1-4.

Cluster Analysis

A cluster analysis was conducted on each of the standardized, scale scores for the three subscales on the Condom Use URICA measure. This type of clustering methods was first introduced in the 1963 publication of Principles of Numerical Taxonomy by Sokal and Sneath. Although this technique has been used mostly in the biological sciences, it has become more recognized in the Social Sciences (Blashfield & Aldenderfer, 1978). This method attempts to classify participants into groups based on the degree of similarity on the measures.

Based on the recommendation of Everitt (1980), scale scores for each of the three subscales were summed and standardized. Ward's method, which is hierarchical and agglomerative, was used to perform the cluster analysis. This method begins by viewing each case as its own cluster. Then, cases are combined based on the lowest increase in the error sums of squares (Aldenderfer & Blashfield, 1984). This method, which minimizes the variance that exists within the clusters, has been demonstrated to provide the best cluster recovery (e.g., Milligan & Cooper, 1987). The decision of how many clusters to retain was made based on a variety of methods, including: Pseudo F statistic (Calinski & Harabasz, 1974), the pseudo t^2 statistic (Duda & Hart, 1973), the Cubic Clustering Criteria (CCC: SAS; Sarle, 1983), the replicability of the cluster solution (Harlow, & Rose, 1994a; Harlow, & Rose, 1994b), and the interpretability of the profiles (Aldenderfer & Blashfield, 1984).

As a measure of external validity, external measures were used to validate the obtained clusters (Aldenderfer & Blashfield, 1984; Milligan & Cooper, 1987). A series of multivariate analyses of variance (MANOVAs) were conducted using cluster

membership as the grouping variable. Individual MANOVAs were conducted using the dependent variables of the summed standardized scores from: Pros and Cons of condom use, Confidence of condom use, and each of the 15 processes of condom use scales. In addition, a behavioral measure (i.e., percentage of condom use) was used as a validating measure. Follow-up analyses of variance (ANOVAs) were used when there were significant overall differences found between the groups.

The final analysis that was conducted using the clusters was a comparison of the staging based on the algorithm approach and the clusters based on the Condom Use URICA measure. A cross-classification table between these two methods was examined to determine the extent of agreement between the various methods (Johnson, 1997).

The cluster analysis was conducted on the three sub-scales (Precontemplation (P), Contemplation/Preparation (C/PR), Action/Maintenance (A/M)) using both SPSS (Norusis, 1990) and SAS (SAS Institute, 1985). Previous research examining this type of analysis in regards to the Stages of Change have indicated the number of clusters ranging from three to nine (Blais & Rossi, 1992, DiClemente & Hughes, 1990). The cluster analysis was conducted separately on the two random samples described previously (Sample 1: N=167 and Sample 2: N=153) in order to replicate the results and to provide an indication of internal validity.

The cluster analysis of sample 1 indicated a four, five or six cluster solution (pseudo F peak at 5; pseudo t^2 small value at 5 and 6; CCC peak at 4 and 6). The solutions for three to six clusters were examined for interpretability with the four cluster solution appearing most interpretable. The procedure outlined above was

repeated on Sample 2 to examine the internal validity of the solution obtained in Sample

1. The results from the four-cluster solution replicated the best across samples

($R^2_{1,2} = .99$). The four clusters (with frequency from each sample in parentheses) were named Precontemplation ($n_1 = 64$; $n_2 = 71$); Decision Making ($n_1 = 48$; $n_2 = 39$); Condom Users ($n_1 = 35$; $n_2 = 32$); and Disengaged ($n_1 = 20$; $n_2 = 11$). The mean scores for each cluster by sample are listed in Table 1-5 and 1-6 and the solutions for each sample are presented in Figures 1-2 and 1-3. Descriptions of each of the resulting profiles are given below.

Precontemplation Cluster. The individuals within this cluster have extremely high scores on the P scale, average scores on the C/PR scale and below average scores on the A/M scale. This profile has an average level and its shape resembles a decreasing linear function. These individuals seem to place a high amount of weight on the time problems associated with condom use and do not seem to be thinking about the possibility of using them in the future.

Decision Making Cluster. This cluster is characterized with a below average score on the P scale, and above average scores on the C/PR and A/M scales. It has an above average level, moderate amount of scatter. These individuals did not seem to endorse the problems associated with condom use highly, and seem to be considering condom use and possibly may be using condoms at times.

Condom Users Cluster. The individuals in this cluster had above average scores on the A/M scale, and below average scores on the other two scales. These individuals are using condoms consistently and have adopted this health behavior.

Disengaged Cluster. This cluster was represented by below average scores on all three of the scales. It has a below average level, low degree of scatter, and its shape was a relatively flat line. These individuals do not seem to be interested in condom use behavior at all.

External Validity for the Clusters

The resulting four clusters were compared on variables associated with the TTM and other relevant variables to determine if there were significant differences among the clusters.

Sample 1. Three separate Multivariate Analyses of Variance (MANOVAs) were conducted using the clusters as an independent grouping variable and the following groups of dependent measures: TTM variables (Pros, Cons, Confidence); 15 individual Processes of Change; and Psycho-attitudinal variables (Self-Esteem, Positive and Negative Sexual Self Acceptance). In addition, the percent of times an individual used condoms during sexual intercourse was examined for differences between the clusters. These results are presented in Table 1-7.

A significant overall Wilks' Lambda of .61 was found on the TTM variables, $F(18,21716) = 3.65, p < .001$. Follow-up ANOVAs were then conducted on the Pros, Cons and Confidence. Significant differences between the clusters were found on both the Pros of condom use, $F(2,162) = 13.04, p < .001$, and Confidence to use condoms, $F(3,161) = 20.25, p < .001$. Tukey comparisons revealed that the Decision Making cluster had significantly lower Pros than the rest of the clusters, and that the Precontemplation cluster also had significantly lower Pros than the Condom Users and Disengaged groups. In terms of Confidence, both the Decision Making and

Precontemplation clusters had significantly lower Confidence than the Condom Users and Disengaged groups.

A second MANOVA was conducted using the 15 individual processes of change as dependent variables which also found significant differences, $F(360, 16867)=1.57$, $p<.001$; $\Lambda=.26$. Follow-up ANOVAs on all 15 individual processes of change were found to be significant. Results from these analyses are shown in Table 1-7. Tukey comparisons showed that the Disengaged Cluster had significantly lower Assertiveness, Counterconditioning, Consciousness Raising, Dramatic Relief, Self-Liberation, Self-Reevaluation and Stimulus Control than the other three clusters. In addition, on these seven scales the Precontemplation Cluster scored significantly lower than did those from the Decision Making and Condom Users Cluster. Comparisons looking at the Communication, Environmental Evaluation, Interpersonal Systems Control, Eroticizing Condoms, Reinforcement Management, Social Liberation and Partner Support scales revealed that those in the Precontemplation and Disengaged Clusters showed significantly lower endorsement than those from the Decision Making and Condom User Clusters.

The third MANOVA, which examined the Psycho-attitudinal variables Self-Esteem, and positive and negative Sexual Self Acceptance, was found to be significant $F(18, 24613)=1.96$, $p<.01$; $\Lambda=.92$. However, none of the follow-up ANOVAs were found to be significant.

The final analysis of external validity on Sample 1 examined difference on the proportion of behavioral condom use during sexual intercourse across the four clusters.

A one-way ANOVA was found to be significant $F(3,163)=21.49, p < .001$. Follow-up Tukey tests revealed that those from the Precontemplation and Disengaged Clusters used condoms significantly less than those individuals in the Decision Making and Condom User Clusters.

Sample 2. The same three MANOVAs were conducted on Sample 2. Results are shown in Table 1-8. The first MANOVA examining Pros, Cons and Confidence found significant overall results, $F(18,5249)=1.80, p < .05; \Lambda = .67$. Significant follow-up ANOVAs were found for Pros $\{F(3,149)=6.01, p < .001\}$, Cons $\{F(3,149)=11.94, p < .001\}$, and Confidence $\{F(3,147)=13.27, p < .001\}$. Tukey tests showed that individuals in the Precontemplation and Disengaged Clusters scored significantly lower on the Pros and Confidence scales than those in the Decision Making and Condom User clusters. In addition, scores from the Precontemplation Cluster were significantly higher on the Cons of condom use than in the other three clusters.

The second MANOVA on Sample 2 examined the individual processes of change. Significant overall results were found, $F(15,10308)=3.73, p < .001$, and 14 of the 15 follow-up ANOVAs were found to be significant. Social Liberation was the only process that did not show significant follow-up results. The results from these analyses are shown in Table 1-8. Individuals in the Precontemplation and Disengaged clusters showed significantly lower endorsement of Counterconditioning, Consciousness Raising, Interpersonal Systems Control, Eroticizing Condoms, Self-liberation, Partner Support, and Stimulus Control scales than did the Decision Making and Condom Users

clusters. On the scales of Assertiveness, Environmental Reevaluation, and Self-Reevaluation, scores from the Disengaged group were significantly lower than those from the other three clusters, and scores from the Precontemplation cluster were significantly lower than those from the Decision Making and Condom User Clusters. Individuals in the Disengaged cluster scored significantly lower than the Decision Makers and Condom Users on Communication and Reinforcement Management.

The third MANOVA examining Self-Esteem, and positive and negative Sexual Self Acceptance also found significant overall results, $F(18,6669)=1.77$, $p < .05$. The only significant follow-up ANOVA was for positive Sexual Self Acceptance, $F(3,148)=3.73$, $p < .05$. Individuals in the Precontemplation cluster reported significantly lower feeling of positive Sexual Self Acceptance than individuals in the Disengaged group.

The final examination of external validity analyzed difference on the behavioral proportion of condom use during sexual intercourse across the four clusters. A one-way ANOVA found significant results $F(3,149)=16.02$, $p < .001$. Tukey tests revealed that the individuals in the Precontemplation and Disengaged clusters reported using condoms significantly less than those in the Decision Making and Condom User Clusters.

Staging and Cluster Solution Comparison

The cluster analysis presented above placed individuals into one of four clusters based on their responses to the three URICA subscales developed earlier in the study. In addition, these individuals were placed into one of five Stages of Condom Use based on their responses to a series of questions on condom use behavior and intentions.

Cross classification tables were used to compare the frequency of individuals in each of the two categorical classification systems. Results for Sample 1 are shown in Table 1-9. From the cross classification table, it appears that the cluster solution maps well onto the stages of change. The majority of the individuals classified into the PC cluster appear to be in the Precontemplation stage of change. However, 12% of the individuals in this cluster were placed into post-action Stages of Condom Use which does not match well. Individuals placed into the Decision Making Cluster tended to be in either the Preparation or Maintenance stages of change. It was expected that this cluster would have the majority of individuals in the Preparation stage. As expected, the Condom User Cluster placed the majority of individuals (91%) into post-action stages. The cross-classification table also provides further evidence that the Disengaged cluster consists of individuals who are not using condoms and who do not intend to. Eighty-nine percent of this cluster was in the Precontemplation stage.

The cross classification table for Sample 2 (Table 1-10) did not visually fit as well as that from Sample 1. The Disengaged Cluster again consisted of 91% Precontemplators. However, the other 9% were placed in the Preparation stage. The Condom User Cluster overlapped with the majority of individuals (78%) in post-action (Action and Maintenance) stages as expected. However, 9% were placed into the Precontemplation stage.

Study 1 Discussion

The first portion of this study was dedicated to the development of the Condom Use URICA measure. The best fitting model for this measure was a correlated three factor model including PC, C/PR, A/M subscales. Two of the subscales were

represented by at least three salient items, which is the minimum requirement for the definition of a factor (Fava, Velicer, & Rossi). However, the PC subscale included only two items. In addition, the coefficient alphas for the C/PR and A/M subscales were good, whereas that for the PC subscale was only adequate. It is important to remember that this is the first version of this type of measure appropriate for condom use, and future research should attempt to improve the PC subscale and improve the development of the entire measure.

The cluster analysis portion of this study was also the first done using this measure and focusing on the area of condom use. The profiles that emerged, Precontemplation, Decision Making, Condom User, and Disengaged, mapped well across the traditional stages of change. Analyses of internal validity were conducted by examining the replication of the cluster solutions across two random samples. The correlation between the four-cluster solution in Sample 1 and Sample 2 was remarkably similar.

Analyses of external validity found that the Disengaged Cluster was more similar to the Precontemplation Cluster than any others. The individual processes of change, the Pros of condom use and the proportion of condom use consistently distinguished between the clusters across the samples. Very few of the dependent variables distinguished between the Decision Making cluster and the Condom User cluster.

The Precontemplation Cluster was the largest cluster in both of the samples. These individuals tended to score significantly lower on all of the processes and psycho-attitudinal variables than those from the other clusters. They did, however,

score higher on the Cons of condom use than individuals from other clusters in Sample

1. When examining the overlap between this cluster and the stages of change algorithm, those in the PC cluster tended to be placed in either the Precontemplation stage of change, or in the Preparation stage. This provides some evidence to question the intention portion of the measure. In terms of behavior, it is clear that these individuals are not using condoms consistently. However, it is not clear if they intend to start using them in the near future or not. This problem may be related to the behavioral nature of the two items on the PC scale of the Condom Use URICA measure.

The smallest number of individuals were placed in the Disengaged Cluster for both samples. At first it appeared that these individuals were possibly long term condom users who did not endorse any of the items highly. However, through the external validation and the cross classification table it became clear that this cluster is more similar to Precontemplators than to any other stage of change. The only area in which they were found to be different from the Precontemplation Cluster were in terms of positive Sexual Self Acceptance and condom Cons in Sample 1. Further research should examine these individuals more closely in terms of demographics and other variables for possible explanations. It is possible that these are individuals who are in long-term relationships or who are married who do not endorse any items relating to condoms highly.

The profiles of the Decision Making and Condom User clusters were very different. Condom Users endorsed all but the A/M scale below average, while the Decision Making Cluster endorsed both the C/D and A/M scale highly. However, on

examination of the external validity for these two clusters, very few differences were found. It will be important in the future to determine how similar these clusters are and if there are further ways to distinguish them.

The development and validation of a continuous measure of condom use (Condom Use URICA) is an important area to focus development on in the future. Current studies examining the Stages of Condom Use have to rely on either a one or two item algorithm or a lengthy series on specific behaviors and intentions such as the one used in this study. In many situations this may not be an appropriate measure or may not be practical for particular interventions or studies. The development of a continuous measure may provide more options for researchers and for interventionists in this area. In addition, examining the cluster solutions obtained from these measures will provide more insight into the different types of individuals and future validation of the Stages of Condom Use. For example, the continuous measure detected a disengaged cluster of individuals, whereas an algorithm approach has not previously tapped into this population of individuals.

Study 2: Latent Transition Analysis

Latent Transition Analysis (LTA) was applied to the Stages of Condom Use in an effort to evaluate the distribution at both occasions by latent status (Stage of Condom Use). This analysis was conducted using a FORTRAN program developed by Collins, Wugalter, and Rousculp (1991). This analysis provided two different parameters: Delta parameters, or estimates of the proportion of the sample in each latent status or stage at time t ; and Tau parameters, or the conditional probabilities of membership in stage B at time two conditional on membership in Stage A at time 1 (Graham, Collins,

Wugalter, Chung, & Hansen, 1991). Six different models were tested, and based on the goodness-of-fit statistic (G^2 : approximately distributed as a χ^2) the best fitting model was retained (see Figure 2-1). The Delta parameters provide the proportion of the sample in each stage at each time point. Tau parameters estimated the probability of an individual being in stage B at time 2, conditional upon their membership in a stage A at time 1. These also provide the probability of a person remaining in a particular stage of change over the one month time period (stable). Participants who completed the Stage of Condom Use portion of the survey at both time points were eligible to be included in the LTA portion of this study ($N=215$). Three sets of analyses were conducted, one for the entire sample, and then one each for males and females.

Results

Entire Sample Model

The overall model fit of the six models depicted in Figure 2-1 was assessed using a comparison of the G^2 values shown in Table 2-1. All of the tested models were nested, (e.g., Model 1 could be seen as a special case of Model 2 with specific parameters fixed to zero) and were, therefore, compared using a G^2 difference test. The G^2 difference between Model 5 and Model 6 was $G^2(1) = 188.370$, indicating that the addition of a backward movement path from Maintenance to Precontemplation was a necessary aspect of the model. Model 6 provides a significantly better fit than do the other models.

Delta Parameters/Probability of Latent Status Membership. Delta parameters represent the probability of membership in each latent status (stage) at each time point,

unconditional upon any previous status. Table 2-2 indicates the proportion of subjects in each stage at both times 1 and 2. The proportion of subjects in the Precontemplation stage remained high across both time points. The proportion of subjects in the Maintenance stage at time 1 was also high, while at time 2 it showed a dramatic drop. The proportion of individuals in the Contemplation and Action stages were relatively low across both time points.

Tau Parameters/Transition probabilities. The estimated transition probabilities for model 6 are provided in Table 2-3 and Figure 2-2. The values along the diagonal in Table 2-3 and within each circle in Figure 2-2 represent the percent of participants who remained in the same stage of change at both time points. All types of forward movement are represented by the paths above the stage circles in Figure 2-2, and by the probabilities to the right of the diagonal in the matrix in Table 2-3. Due to the one month time period used in this study, movement paths from pre-action stages to Maintenance at follow-up were restricted due to the six month requirement in this stage.

It was hypothesized that movement of at least one stage would occur for approximately 10% of the participants. The Tau parameters indicate that this is true, however not uniformly across the baseline stages. For participants in the Contemplation, Action, and Maintenance stages at time 1, forward or backward movement of at least one stage occurred for more than 50% of these individuals. Those individuals in Preparation at baseline, 52%, remained in Preparation at time 2. Precontemplation was found to be the most stable stage, with 56.9% of those individuals initially in Precontemplation remaining in that stage over the one month

time period. Contemplation was the least stable of the baseline stages, with only 26.2% remaining in the stage for one month.

A second hypothesis was that more movement would occur to adjacent than non adjacent stages and that the second most frequent path would be a movement of two stages. This was true for those individuals in Contemplation at baseline. The highest proportion of individuals who moved out of this stage at follow-up transitioned either forward to Preparation or backward to Precontemplation. In addition, individuals in Preparation at baseline were more likely to transition to Contemplation or Action than to Precontemplation. For those in Precontemplation at baseline, a higher proportion moved forward to Preparation than to either Contemplation or Action. Of those individuals who were already taking Action at baseline, the most likely movement path was backward movement to Preparation. However the movement paths to Precontemplation, Contemplation and Maintenance were equally likely. Forty-five percent of those in Maintenance at baseline remained in that stage for one month. The highest proportion of individuals who regressed out of Maintenance moved to the Preparation stage.

A final hypothesis was that regression would be an important factor in the development of a transition model. This was found to be true with this population. For individuals in the Action or Maintenance stages at baseline, a higher proportion regressed than moved forward or remained stable. For those in the Precontemplation and Preparation stage, it was more likely that individuals would remain stable. However, those in Preparation who did show stage movement over one month showed a higher proportion of regression than forward movement. The only stage transition to

show the highest proportion of individuals moving forward was for those in the Contemplation stage at baseline.

Women Only Latent Transition Analysis Model

A separate analysis was conducted on only the women in the sample ($N=155$). The overall model fit of the six models was assessed and based on a comparison of the G^2 values shown in Table 2-4, the best fitting model was retained. The G^2 difference between Model 5 and Model 6 was $G^2(1) = 196.634$, indicating that the addition of a backward movement path from Maintenance to Precontemplation was a necessary aspect of the model. Model 6 provides a significantly better fit than do the other models and was therefore retained for the continued analyses.

Delta Parameters/Probability of Latent status membership. Table 2-5 provides the proportion of women in each stage at both times 1 and 2. The proportion of women in the Precontemplation and Preparation stages remained high across both time points. The proportion of subjects in the Maintenance stage at time 1 was also high, while at time 2 it showed a dramatic drop. Finally, the proportion of women in the Contemplation and Action stages were relatively low across both time points.

Tau Parameters/Transition probabilities. The estimated transition probabilities for Model 6 are provided in Table 2-6 and Figure 2-3. The Tau parameters indicate that for participants in the Contemplation, Action, and Maintenance stages at time 1, movement of at least one stage occurred for more than 50% of the women. Precontemplation was found to be the most stable stage, with 62% remaining in that stage for one month. The least stable stage was Contemplation, with only 25% remaining in that stage.

For individuals in the Contemplation stage at baseline, the highest probability of movement was to either Preparation or Precontemplation. Women in the Precontemplation stage were more likely to transition to the Preparation stage than to any other. Of the women who were already taking Action at baseline, transitions to the Preparation stage were most likely, with movement to the other three stages being equally likely. Close to half (46%) of those in Maintenance at baseline remained there for one month. For those women who did transition, Preparation and Action were equally likely movement paths.

Men Only Latent Transition Analysis Model

The final set of LTA included only the men in the sample (N=67). The number of males in the sample was not substantial, and results could be influenced by this. However, a model was able to be developed and the results are presented here. Overall model fit of the six models tested are presented in Table 2-7. From these results it appeared that Model 4 provided the best fitting model for the men and was therefore retained for further analyses.

Delta Parameters/Probability of Latent status membership. Table 2-8 indicates the Delta parameters for this sample. The proportion of men in the Preparation stage remained high across both time points, while the proportion of men in the Maintenance stage at time 1 was high, but showed a dramatic drop at time 2. The proportion of individuals in the Precontemplation, Contemplation and Action stages were relatively low across both time points.

Tau Parameters/Transition probabilities. The estimated transition probabilities for Model 4 are provided in Table 2-9 and Figure 2-4. The Tau parameters indicate that

Maintenance was the most stable stage for men to be in (56%), with Contemplation being the least stable (28%). Movement of at least one stage of change occurred for 50% or more of the men in Contemplation and Action at baseline.

For men in the Precontemplation stage at baseline, the movement path to Contemplation had the highest probability, with 25% of the men transitioning. Backward movement of one stage was the most likely for those in the Contemplation baseline stage, with 28% of the men initially in that stage moving to Precontemplation. Those in the Preparation stage showed almost equal movement to Precontemplation, Contemplation, and Action. Backward movement of two stages was the most probable movement path for those men in Maintenance at baseline.

Study 2 Discussion

One of the overriding goals of this study was to assess how individuals naturally move through the stages of change for condom use over a one month time period. Preliminary analyses using frequencies found that over 60% of the individuals in this study were in the same Stage of Condom Use at baseline and follow-up, with the remaining 33% split almost equally between forward and backward movement (Table 3-1). This same pattern of movement classification was also found when participants were separated out by gender. In addition, a previous study focusing on the long term (one year) movement of women through the Stages of Condom Use found the same pattern. Latent Transition Analysis was used to provide a more in-depth look at the nature of these changes. An appropriate model of movement among the Stages of Condom Use in a naturalistic sample over one year was identified, which included both forward and backward movement. Theoretical restrictions upon stage movements were

made when testing the models due to the short period of time between assessments and the six month time criterion involved with most of the stages.

This study was ideal for establishing the stability of the Stages of Condom Use in a naturalistic sample. Based on previous research in other behaviors as well as in the area of condom use with women, Precontemplation and Maintenance should be the most stable, with Preparation and Action showing the least stability (Velicer, Martin, & Collins, 1996; Evers, 1996). The analysis of the entire sample showed that Precontemplation was the most stable. However, the second most stable stage was Preparation with Maintenance coming close behind. A model examining women only found the same results in terms of stability. However, the model that analyzed only the men found that the most stable stage was Maintenance, with Contemplation being the least stable. However, this model has limited interpretability based on its small sample size (N=67) and should be evaluated with that in mind.

In addition to examining the stability of the stages over time, this method has allowed us to examine the probability of individual movement paths over a short term period of time. Backward movement was found to be an important part of all three sets of analyses. However, for the model examining only the men in the sample, the backward path from Maintenance to Precontemplation was not found to be significant, and was, therefore, left out of the final model. In the other two analyses, and in analyses examined in previous studies of condom use using this method (Evers, Harlow, Redding, & LaForge, 1998), the regression path across five stages was found to be important. The differential in regression probabilities between the genders has important implications for future interventions and research if it is replicated. This

study found much less relapse from condom use behavior in college men than with females. One interpretation of this finding is that women's condom use behavior is more dependent on situations and individual relationship variables than men's. Interventions for women may should then be focused more on assertiveness, communication, role-playing and other situation specific skills, while interventions focusing on men may need to spend more time on influencing individuals to decide that condom use is an important part of their sexual activities. Future research should further examine these differences with larger samples to determine if these differences do in fact exist.

Study 3: Logistic Regression Analysis

This set of analyses assessed the best fitting model to describe the relationship between a dichotomous variable and a set of predictors. Six separate logistic regression models were built to identify predictors of positive and negative change. All models were built using the same procedures in an effort to provide the best fitting model to describe the relationship between a dichotomous variable (progression/regression vs. no change in stage) and a set of predictors. The first step in this model building process included the univariate analysis of each variable selected for possible inclusion in the model. Those variables with a p -value less than .20 were considered for inclusion in the multivariate model unless otherwise noted (Hosmer & Lemeshow, 1989).

Evaluation of the fit of the multivariate model included the examination of the Hosmer-Lemeshow goodness-of-fit test, as well as the examination of the individual Wald statistics and the estimated coefficients. Variables that did not contribute to the multivariate model ($p > .05$) were then eliminated, and the fit of the new model was

evaluated (Hosmer, & Lemeshow, 1989). The new model was then compared to the old model using a likelihood ratio test. Overall fit statistics and evaluation of predictors included in the final model were then examined.

The potential predictors for this set of analyses included the Pros and Cons of condom use, Confidence, Self-Esteem, Sexual Self Acceptance, and the 15 individual processes of change. A model examining those individuals who progressed versus those who remained stable was examined for three sub-populations: the entire sample, women, and men. The remaining three models examined individuals who regressed versus those who remained stable for the entire sample, women, and men.

Results

Individuals who completed both time points of the survey and whose data were complete were eligible to be included in these analyses (N=210). A breakdown of these samples by movement classifications (regressed, progressed, stable) and gender are shown in Table 3-1.

Entire Sample Models

The first section of model building was conducted on the entire sample of individuals who had complete data at both time points (N=210). Of these individuals, 70% were female, and 67% remained in the same stage over the one month assessment period. Two separate models were analyzed, one examining progression versus stability, and the second looking at those who regressed versus those who remained stable. Twenty-one continuous predictors were included in initial analyses.

Progression versus stability. The first model looked at individuals who moved forward (progressed) at least one Stage of Condom Use over the one month assessment

period versus those who remained in the same stage (stable). The results of the univariate logistic regression models are given in Table 3-2. Confidence, and five process scales (Assertiveness, Eroticizing Condoms, Environmental Re-evaluation, Interpersonal Systems Control, and Reinforcement Management) were selected for inclusion in the main effects model based on their Wald statistics.

The results of the full multivariate model are shown in Table 3-3. None of the variables included in this model had a Wald statistic with $p < .05$. However, the variable Eroticizing Condoms had a Wald statistic with $p < .1$, and so was cautiously included. A new model which included only this variable was still significantly different than the constant only model ($\chi^2(1) = 7.559, p < .01$). Based on this, the only variable included in the final model was Eroticizing Condoms.

The results of the final model are given in Table 3-4. The Hosmer-Lemeshow goodness-of-fit test showed that the overall fit of the model was good ($\chi^2(8) = 4.03, p = .85$). This model correctly predicted 80% of the total population examined. Individuals with high endorsement of Eroticizing Condoms were more likely to remain stable.

Regression versus stability. A second model was established that looked at all individuals who moved backward at least one stage versus those who remained stable over the one month period. A univariate logistic regression was conducted on each of 21 variables, and the results are given in Table 3-5. Self-Esteem and nine process scales (Assertiveness, Counter Conditioning, Consciousness Raising, Dramatic Relief, Helping Relationships, Partner Support, Self-Liberation, Social-Liberation, and Self-

Reevaluation) were shown to have a Wald statistic with $p < .2$, and were therefore chosen for inclusion in the main effects model.

Based on the main effects model, only the variables Self-Esteem and Helping Relationships had a significant Wald statistic ($p < .05$), and therefore show importance in the multivariate model (Table 3-6). A new model that did not include the eight non-significant variables was then compared to the full model. The likelihood ratio test for the difference between the two models ($\chi^2(8) = 15.3$, $p > .05$) showed that the eight variables did not add any significance to the model. Based on this, the variables Assertiveness, Counter-Conditioning, Consciousness Raising, Dramatic Relief, Partner Support, Self-Liberation, Social-Liberation, and Self-Reevaluation were removed from the full model.

The results based on this final model are shown in Table 3-7. The overall fit of the model was shown to be significant when tested against the constant only model ($\chi^2(2) = 9.292$, $p < .01$). However, the Hosmer-Lemeshow goodness-of-fit test did not demonstrate a good fitting model ($\chi^2(8) = 3562.85$, $p < .0001$). The model correctly predicted 81% of the participants. Individuals with high levels of Self-Esteem were 2.3 times more likely to regress than to remain stable

Women Only Model

The second set of logistic regression models was built using data from women only. Of the 155 women who were eligible to be included in this portion of the study, 63% ($N = 96$) remained in the same Stage of Condom Use over the one month period, 21% ($N = 32$) regressed, and 16% ($N = 26$) progressed at least one stage. These two

models assessed stability versus progression, and stability versus regression respectively. The 21 continuous predictor variables are the same as described previously.

Progression versus stability. The current model looked at women who progressed versus those who remained stable over one month. Univariate logistic regression model results are given in Table 3-8. Only Self-Esteem, and the process scale Eroticizing Condoms had Wald statistics significant at the .20 level. Based on these two variables, a multivariate model was analyzed. However, the two variables did not show significance in this model. For this reason, variables with Wald statistics significant at the .30 level were cautiously selected for inclusion in the main effects model. These variables included Self-Esteem, Assertiveness, Eroticizing Condoms, Helping Relationships, and Self-Reevaluation.

The results of the main effects model are shown in Table 3-9. No variables were significant at the $p < .05$ level. The only variables in this model that had an exploratory level Wald statistic with $p < .1$ were Assertiveness and Self-Reevaluation. A new model which included only these variables was then compared to the full model using a likelihood ratio test which showed that the omitted variables did not add any significance to the model ($\chi^2(3) = 4.953, p > .05$). However, the reduced model was still significantly different than the constant only model ($\chi^2(2) = 10.68, p < .01$). Based on this, the only variables included in the final model were Assertiveness and Self-Reevaluation.

The results of the final model are given in Table 3-10. The Hosmer-Lemeshow goodness-of-fit test showed that the overall fit of the model was good ($\chi^2(8) = 18.23$, $p = .20$). This model correctly predicted 78.5% of the total population. Women scoring high on Self Reevaluation were 2.3 times more likely to progress than to remain stable. In addition, women with higher Assertiveness at baseline were more likely to progress.

Regression versus stability. The current model examined women who moved backward at least one stage versus those who remained stable over the one month period. The results of the univariate logistic regression conducted on each of 21 variables are given in Table 3-11. Twelve variables were selected for inclusion in the multivariate model (Confidence, Positive Sexual Self Acceptance, Self-Esteem, Assertiveness, Counterconditioning, Consciousness Raising, Dramatic Relief, Environmental Reevaluation, Partner Support, Stimulus Control, Self-Liberation, and Self-Reevaluation). The results of this main effects model are shown in Table 3-12. Based on these results, only Self-Esteem was significant at the .05 level. A final model was analyzed using only Self-Esteem as a predictor. The remaining 11 variables did not add any significance to the model, based on the likelihood ratio test for the difference between the two models ($\chi^2(11) = 11.98$, $p > .05$) and were therefore not included in the final model. Results for the final model are shown in Table 3-13. The overall fit of this model was found to be significant when tested against the constant only model ($\chi^2(1) = 4.916$, $p < .05$). However, the Hosmer-Lemeshow goodness-of-fit test did not demonstrate that the model had a good fit ($\chi^2(8) = 3434$, $p < .001$). The

model had an overall correct prediction of 79.5%. Women with high levels of Self-Esteem were found to be 2.25 times more likely to regress than to remain stable.

Male Only Model

The final set of Logistic Regression Models examine only the men in the sample (N=63). Seventy-one percent of these individuals remained in the same Stage of Condom Use over one month. The remaining 29% were divided equally between forward and backward movement of at least one stage.

Progression versus stability. The first of these two models examined progression vs. stability. The results of the univariate logistic regression model identified six variables to be included in the multivariate model (Condom Cons, Confidence, Self-Esteem, Helping Relationships, Interpersonal Systems Control, and Stimulus Control). The results of these models are given in Table 3-14.

Based on this model, all of the variables except condom Pros, Assertiveness, Counterconditioning, Eroticizing Condoms, Helping Relationships, and Reinforcement Management had a significant Wald statistic ($p < .2$), and were included in the multivariate model (Table 3-15). A new model that did not include these six non-significant variables was then compared to the full model. The likelihood ratio test for the difference between the two models ($\chi^2(6) = 2.42, p > .05$) showed that the six variables did not add any significance to the model, and were therefore removed from the full model.

The results based on this final model are shown in Table 3-16. The overall fit of the model was shown to be significant when tested against the constant only model

($\chi^2(5) = 17.921$, $p < .01$). In addition, the Hosmer-Lemeshow goodness-of-fit test demonstrated that the model had a good fit ($\chi^2(8) = 594$, $p = .65$). The model had an overall correct prediction of 85%. Men with high positive Sexual Self Acceptance were 2.7 times more likely to progress, and those with low Partner Support were 4.2 times more likely to progress. High levels of Confidence to use condoms, endorsement of Eroticizing Condoms and Interpersonal Systems Control were more likely to predict men remaining stable over one month.

Regression versus stability. The final model examined stage regression versus stability with the sub-sample of men. Based on the results of the univariate logistic regression conducted on each of 21 predictors, six were selected for inclusion in the multivariate model (Cons, Confidence, Self-Esteem, Helping Relationships, Interpersonal Systems Control, and Stimulus Control). These results are shown in Table 3-17. Results from the main effects model including these six variables are shown in Table 3-18. Condom Cons, Self-Esteem, and Stimulus Control were found to be significant at the .2 level and were, therefore, selected for inclusion in the final model. The remaining three variables were found not to add significantly to the final model using a likelihood ratio test for the difference between the two models ($\chi^2(3) = 1.67$, $p > .05$). The results of the final model are shown in Table 3-19. The overall fit of this model was found to be significant when tested against the constant only model ($\chi^2(3) = 8.741$, $p < .05$). However, the Hosmer-Lemeshow goodness-of-fit test did not demonstrate that the model had a good fit ($\chi^2(8) = 1123$, $p < .001$). The model had an overall correct prediction of 83%. Men with higher levels of Self-Esteem were 3.3

times more likely to regress and those with higher condom Cons were 2.9 times more likely to regress. In addition, those men with high levels of Stimulus Control were more likely to remain stable.

Study 3 Discussion

One of the overriding goals of this study was to evaluate the longitudinal predictors of changes in Stages of Condom Use. The Logistic Regression Analyses provide an analysis of predictors of movement classifications rather than individual movement paths. Further, these types of analyses are able to be done on smaller real-world data sets and provide important insight into variables that may be addressed by interventions.

Longitudinal analyses looking at individuals who progress as compared to those who remained stable showed a few similarities. For the model looking at the entire population, the only significant predictor of forward movement was high endorsement of Eroticizing Condoms. It was expected that more of the variables associated with the TTM and the MMOHR would have been found to be significant predictors. Previous longitudinal and cross-sectional studies have found that the Pros of condom use predict stage of change and stage movement (Evers, 1994; Grimley et al., 1993). This is an important finding for the development of interventions and programs. It indicates that interventions that are designed to help move individuals forward through the Stages of Condom Use should include concrete portions on how to eroticize condoms. In this way, individuals may be able to overcome some of the negativity normally associated with condom use and begin to view them in a more erotic way.

In an effort to understand more about the predictors and assess the impact of gender on the identification of predictors of stage movement, gender specific models were evaluated. For the model developed including only the women, higher levels of Assertiveness and Self-Reevaluation were found to be predictors of progression. Previous longitudinal studies assessing the predictors of positive stage movement among women did not find Assertiveness to be a significant predictor (Evers, 1996). However, the scales used in the two studies are different and may have an effect on the outcomes. In addition, the Assertiveness scale used in the current study was a more general form, while in the previous study the Assertiveness was broken down into different aspects, including communication and birth control. Assertiveness training is an important aspect of condom use interventions, and these results serve to underscore their importance, specifically with women. In addition, Self-Reevaluation, or the realization that condom use reflects one's self-image was found to be important in this model. Women who feel good about themselves when they use condoms were more likely to move forward.

The Logistic Regression Model examining progression and stability among the men found five significant predictors of forward movement. The finding that men with high positive Sexual Self Acceptance were more likely to progress differs from previous longitudinal research showing stability in a sample of women (Evers, 1996). Research examining the Multifaceted Model of HIV risk found that negative attitudes and beliefs about sexuality were related to increases in the risk of HIV among women (Harlow et al., 1993). This finding may point to an important difference between men and women in terms of their feelings about their sexuality. In addition, the findings that Partner

Support, Confidence, Interpersonal Systems Control and endorsement of Eroticizing Condoms were negatively related to progress were counter to hypothesized results. Explanation for these results are unclear based solely on the current study. It is important to note the small sample size in this analysis ($n=63$), which may explain the inconsistency of some of the results.

Separate analyses examining predictors of relapse also showed interesting results. The model that examined the entire population found only one significant predictor, Self-Esteem. Individuals with high levels of Self-Esteem at baseline were more likely to regress over the course of the month. This is consistent with previous research looking at health behavior. It is believed that individuals with higher levels of Self-Esteem are able to maintain an optimistic bias regarding their health risk behaviors (Smith, Gerrard, & Gibbons, 1997; Gerrard, Kurylo, & Reis, 1991). The identification of individuals who may have high levels of Self-Esteem during condom use interventions would be important so that the program may accurately address the issue of individual levels of risk.

Unlike the analyses of progression, gender-specific models of regression showed some similar results to the overall models. Both the male and female specific models found Self-Esteem to be an important predictor of regression. In fact, this was the only significant predictor found for women. The male-only model found Stimulus Control to be important in addition to Self-Esteem. Men who indicated that they keep condoms around were less likely to regress. Programs that are concerned with possible relapse and regression among the males that they work with may be able to incorporate this finding into their designs. By simply getting men to keep condoms with them or in

locations where they may be needed, men may be able to decrease their chances of regressing.

When evaluating the results of this study, there are some limitations that should be kept in mind. The first of these is the liberal p values that were used in several of the models. Due to a lack of variables found to be significant at typical levels used in this form of model building, the significance levels were raised to include more variables. This was done in the progression models for the entire population and for women only. Results from these analyses should be examined cautiously. Secondly, this level of analysis groups all initial stage of change together, and may therefore mask some predictors of certain types of movement. For example, the models of progression included individuals who were in Maintenance at baseline who could show any forward movement. This may be one explanation for the lack of significant results in many of the models. Future research should examine other methods of combining stage transitions models with prediction models. This would provide a more precise analysis of predictors of specific movement rather than movement classifications.

Study 4: Longitudinal Structural Equation Model

The goal of this study was to examine various longitudinal relationships between Stage of Condom Use and other variables associated with the TTM and the Multifaceted Model of HIV Risk in Women (MMOHR) (Harlow, Quina, Morokoff, Rose, & Grimley, 1993). Other variables eligible for inclusion in the model were the Pros and Cons of condom use, Confidence to use condoms, Self-Esteem, and positive and negative Sexual Self Acceptance. Due to the amount of items and factors involved in building this longitudinal model, individual items associated with a construct were

parceled into couplets in an attempt to conserve degrees of freedom. In order to build the longitudinal latent construct model, several steps were completed, which are outlined below.

Results

The first step attempted to model all constructs within a single time point. This analysis assessed the covariance between all constructs and required analyses within two separate time models: baseline and one month. Figure 4-1 represents this type of analysis. Based on these results, covariances significant at the $p < .01$ level were included in the final model. However, for the sake of parsimony, covariances between constructs in a single time point were only included at baseline in the final model.

The second step in this process entails modeling each construct longitudinally. The model included a path from the first to the second time point. Examples of these models are shown in Figure 4-2.

In the third step, models were analyzed that included construct subsets with longitudinal cross-lags between two constructs at a time. As an example, a cross-lag model including the TTM constructs Pros and Cons across both time points was analyzed (Figure 4-3). Twenty-one of these models were analyzed, representing all combinations of construct cross-lags. Based on these results from individual models, non-significant paths were removed and the model was analyzed again. Chi-square difference tests, in addition to an examination of other fit indices were then conducted to determine whether a specific path was important to the overall model.

The fourth step analyzed the final model based on all of the information gathered in the previous three steps. This model included all of the paths that were

found to be important to the final model. Results of the final model are shown in Figure 4-4. The overall fit of the final model [$\chi^2 (1331) = 2706.57$] was adequate, though somewhat marginal, with a ratio of chi-square to degrees of freedom of 2.0; an Average Absolute Standardized Residual (AASR) value of .088; and a CFI of .78.

Factor loadings (Tables 4-1 and 4-2) for indicators of all six of the scales at baseline and follow-up were significant at $p < .05$, and averaged: .44 for Pros; .54 for Cons; .77 for Confidence; .63 for positive Sexual Self Acceptance; .65 for negative Sexual Self Acceptance; and .76 for Self-Esteem at baseline. The averages at follow-up were: .44 for Pros; .64 for Cons; .81 for Confidence; .64 for Positive Sexual Self Acceptance; .62 for negative Sexual Self Acceptance; and .76 for Self-Esteem. All of the regression paths were significant at the .05 level and the amount of explained variance for the dependent variables was substantial ($R^2 = .55$ for Self-Esteem; $R^2 = .31$ for Pros; $R^2 = .41$ for Cons; $R^2 = .44$ for Confidence; $R^2 = .59$ for Positive Sexual Self Acceptance; $R^2 = .43$ for Negative Sexual Self Acceptance; and $R^2 = .83$ for Stage). Two constructs at baseline, Pros and Cons, directly affect Stage one month later. In addition, two constructs at baseline were found to directly affect Confidence at one month; Self-Esteem and Pros. Negative Sexual Self Acceptance was a predictor of both positive and negative Sexual Self Acceptance at follow-up. Lastly, Pros at follow-up was directly predicted by Confidence at baseline.

Study 4 Discussion

The results of this study serve as one of the first investigations at the longitudinal relationships between Stage of Condom Use and six other constructs from

the TTM and the MMOHR. The only direct predictors of Stage of Condom Use at one month were the Pros and Cons of condom use. The positive and negative Sexual Self Acceptance scales were found to be important in predicting each other across time. However, they were not found to be important in terms of prediction of any of the other variables. These results will help to develop interventions aimed at moving women through the Stages of Condom Use by identifying variables that should be targeted within the intervention.

These analyses also serve as an application of longitudinal “step-modeling” to a limited real world data set. One of the limitations of the type of analysis are the restrictions placed on sample size by the size of the model. In order to build a model of this size it is important to have a large sample size. In this study, the individual processes of change were not included due to the size of the sample. It would not have been possible to complete such a large model including all 22 constructs. In addition, constructing different models for males and females would have provided added insight into this dynamic behavior. However, due to the size of the longitudinal sample, and the low numbers of male participants this was not possible. Future research should attempt to include both the processes of change and gender specific models in this type of study. Further clarification of the relationship between the processes of change and stage of change will be an important area to focus on to inform future interventions in this area.

The overall fit of the final model in this study was adequate, but it did not fit extremely well. Previous studies with this analysis have found CFIs of .90 or above on the final model. It is unclear if the fit of this model is due to the smaller data set or a

possible problem with the process. Future research will be necessary to further examine the appropriateness of this type of modeling in the area of condom use. However, this examination of some of the steps that may be taken in building a longitudinal model may serve as guidelines for future research looking at complex relationships that exist between multiple constructs across time.

General Discussion

The overriding goal of this study was to understand more about how to quantitatively assess longitudinal change within the TTM applied to the area of condom use among college students. The development of the Condom Use URICA measure, and the cluster analysis performed using this measure, helps to assess the nature of the Stages of Condom Use. This measure showed some promise and may be a valuable tool in certain environments. Future research looking at this measure and the resulting clusters will help in the identification of different methods of assessing Stage of Condom Use and the utility of continuous measures in this area.

The assessment of appropriate models of natural movement through the stages of change for condom use and the resulting transition probabilities will provide researchers and interventionists guidelines for naturalistic movement and may provide more realistic goal setting and expectations for interventions. In addition, if the gender differences replicate in other samples this will provide new insight into the different processes that men and women go through towards long term adoption of condoms. Predictions of stage movement provided some unexpected results.

Analysis of the predictors of both progression and regression within the Stages of Condom Use provided insight into possible variables that should be targeted in future

interventions. For example, high Self-Esteem was found to be an important predictor of relapse across genders. Future research and programs should include this construct in the development of programs relating to stages and relapse prevention. This may provide some insight into possible ways to decrease the amount of relapse in this behavior.

Finally, the relationship between the Stages of Condom Use and other variables was assessed using a four step method of Longitudinal Structural Equation Modeling. Future research examining the step-modeling approach to Structural Equation Modeling should examine the use of more than seven variables and also the use of larger samples. In the current study it was not possible to include the individual processes of change, although they would have provided needed information for this area, due to the small sample size and large size of the potential model. Although the step modeling method of longitudinal analysis appears more manageable than a fully cross-lagged design, it still is difficult to proceed with either or both large models or small samples. Future work is needed to further improve the applicability of longitudinal SEM methods to real life data sets.

This study examined a variety of methods for assessing longitudinal data in the area of condom use. These methods were used to answer different questions and to assess different issues surrounding condom use behavior. Cluster Analysis was a useful method for the analysis of a newly developed continuous measure of Stage of Condom Use. The resulting clusters provided insight into possible sub-classifications within the Stages of Condom Use. Assessments of the transition probabilities through the stages, which was conducted using LTA, provides important information for the development of

future interventions. By having a sense of how individuals cycle through the stages naturalistically, interventions can target possible problem areas and set realistic goals for interventionists as well as participants. Future interventions will also benefit from the information obtained from the logistic regression analyses and the SEM. These analyses provide the relationships among a set of variables and allow the intervention to target certain process variables that predict change. Each of these methods provide insight into a different area pertaining to behavior change associated with condom use.

Study Limitations

When discussing the results of this study, there are some general limitations that must be acknowledged. The first of these is the small sample size relative to the types of analyses that were conducted. This is especially a problem when discussing gender differences and conducting analyses on specific genders, specifically with the small number of men in the sample. When building large models, small sample sizes can often affect the results of the model. In addition, the distribution of individuals across the stages may have been affected by the sample size. The baseline stage membership in Action was relatively low. This is, however, to be expected, as individuals tend not to remain in the stage for a long period of time.

This study may also be limited in terms of its generalizability. The participants in this study were undergraduates from a variety of classes who volunteered to be part of a research study. Although some researchers may question the utility of examining this population in certain studies, for the examination of condom use behavior this is an appropriate population. College students are increasingly at risk for the contraction of

STDs and HIV, and, therefore, should be included in research pertaining to the use of condoms and the development of appropriate interventions.

One other limitation that should be mentioned is the use of certain measures that have had limited measurement development work done on them, specifically the Condom Use URICA. This is the first study to examine the structure of this scale and use it in a cluster analysis. Although the measurement development procedures reported in Study 1 were adequate, future research is needed on this continuous measure.

Finally, this study relied on the use of self-report data, which is limited to the truthfulness and memory of the respondents. This is a consideration that all researchers in the area of sexual behavior must deal with. However, since there was no way in which to validate the information that the participants provided, self-report data was used. Future research will examine the test-retest reliabilities of these constructs in an effort to address this issue.

Contributions

The project contributes to both the areas of quantitative methods and to the area of health behavior change, specifically condom use behavior. In the area of quantitative methods, several contributions are outlined. This series of studies serves as an example of applications of different methods of assessing longitudinal change to a real world data set. Latent Transition Analysis is a method that researchers in the area of health behavior change have only recently begun to apply. It supplies the research with a unique view of the data and the longitudinal process of change. Although this study was limited by the

small size of the gender specific samples, it provided insight into the limits of this method with small studies. Based on this project, future research should examine the utility of developing a statistical method that would combine modeling of transition probabilities and prediction of those specific movement paths. Although this form of method can currently be done on very large samples by isolating individuals with specific movement paths, a method that could be conducted on more realistic, real world data sets would be an asset to the field of behavior change. In addition, the application of step-modeling to longitudinal structural equation modeling is also one of only a few applications to this type of data set.

Contributions to the area of condom use behavior research include the application of the continuous Condom Use URICA measure to the college population. This form of assessment and analysis identified unique profiles, including the disengaged cluster which is not currently explained by the Stages of Condom Use. In addition, the difference in the amount of relapse between the males and females in the sample indicates that the process of adopting condom use may be unique to the genders. College men appear to relapse less than the women. This indicates that the female college students may be more influenced by situations and relationships when deciding to use or not use condoms. This interpretation is supported by the identification of Assertiveness as one of the predictors of forward movement for women, and not for men. Self-esteem was also found to be an important variable to examine with relationship to relapse from condom use. Although it is unclear how this finding could be incorporated into interventions, future research should examine the relationship between Self-esteem and risk perception.

Implications

The aim of this study was to understand more about the quantitative assessment of longitudinal changes associated with condom use. By understanding more about how to assess Stage of Condom Use, and how individuals change their condom use on their own, future interventions can be developed for the long term adoption of condom use. Through the understanding of predictors of stage movement, and relapse, researchers can have a better understanding of how to address this issue within interventions on college campuses. Although longitudinal data such as in this study can often be difficult to obtain as well as analyze, it provides a much richer view of the process than does cross-sectional data. The variety of methods used in this study provide some insight as to the strengths and limitations of these methods for studying condom use adoption. These different methods have each provided a different piece to the puzzle surrounding condom use behavior.

Table 1- 1: Descriptive Statistics the Sexually Active Portion of the Sample

Gender

68% Female

32% Male

Race

88.5% White

2.4% African-American

.3% Native American

2.9% Asian-American

5.3% Other

Marital Status

96% Single, never married

Year in College

55% Freshman

23% Sophomore

12% Junior

7% Senior

3% Other

Age: M=19.3 (sd = 2.66)

Table 1- 2: Descriptive Statistics for Predictors Variables at Baseline

Variable	Mean	Std Deviation	Range	α
Condom Pros	3.99	.79	1-5	.85
Condom Cons	2.07	.67	1-5	.78
Confidence	3.82	1.05	1-5	.94
Assertiveness	3.31	1.36	1-5	.88
Counterconditioning	3.51	1.17	1-5	.77
Consciousness Raising	3.78	1.05	1-5	.81
Dramatic Relief	4.07	1.03	1-5	.85
Eroticizing Condoms.	2.39	1.22	1-5	.91
Environmental Reevaluation	2.84	1.24	1-5	.82
Helping Relationships	3.77	1.07	1-5	.72
Interpersonal Systems Control	3.66	1.14	1-5	.77
Reinforcement Management	1.95	1.00	1-5	.72
Partner Communication	3.68	1.06	1-5	.79
Partner Support	3.78	1.22	1-5	.87
Self-Liberation	3.59	1.05	1-5	.61
Self-Reevaluation	3.59	1.24	1-5	.86
Social Liberation	3.74	.91	1-5	.64
Stimulus Control	2.70	1.35	1-5	.89
Positive Sexual Self Acceptance	3.89	.86	1-5	.67
Negative Sexual Self Acceptance	1.85	.77	1-5	.69
Self-Esteem	1.75	.57	1-4	.88

N=320

Table 1- 3: Factor Loadings and Inter-correlations for the Final 12 Retained Items of the Condom Use URICA.

Item	PC	C/D	A/M
1. I don't have time to think about using a condom every time I have sex.	<u>.848</u>	-.003	-.391
2. I get too "turned on" to stop to use a condom.	<u>.835</u>	.245	-.296
3. I haven't been able to use condoms all the time, but I am planning to soon.	.053	<u>.887</u>	.169
4. I don't always use condoms, but I plan to work on this.	.231	<u>.888</u>	.110
5. I don't always use condoms, and I really think I should work on this.	.182	<u>.870</u>	.058
6. I use condoms sometimes and plan to do better soon.	-.008	<u>.838</u>	.387
7. In the past I didn't always use a condom, but I'm thinking about doing better in the future.	-.009	<u>.773</u>	.043
8. Consistently using condoms has been an important part of my routine for quite awhile.	-.361	.145	<u>.914</u>
9. I have been using condoms whenever I have sex for over 6 months.	-.345	.094	<u>.901</u>
10. I make an effort to always use condoms.	-.337	.261	<u>.902</u>
11. I never have sex without a condom.	-.375	-.096	<u>.861</u>
12. Using condoms all the time is beginning to become part of my life.	-.357	.386	<u>.874</u>

Table 1- 4: Descriptive Statistics and Inter-correlations of the Scales for the Condom Use URICA.

	Mean	Std. Dev.	Cronbach's Alpha	P	C/D	A/M
Precontemplation (P: 2 Items)	1.25	.66	.61	1.00	.15	-.41
Contemplation/Preparation (C/D: 5 items)	3.12	1.36	.91		1.00	.17
Action/Maintenance (A/M: 5 items)	3.14	1.48	.94			1.00

Table 1- 5: Mean standardized Scale Scores for Each Cluster in Sample 1

4 Clusters	P Subscale		C/D Subscale		A/M Subscale	
	Mean	SD	Mean	SD	Mean	SD
Precontemplation	60.6152	7.3815	51.6181	8.9569	43.7407	6.6123
Decision Making	43.7191	4.4224	59.0313	4.8978	56.2884	5.1366
Condom Users	43.0694	2.7638	41.2809	4.3668	60.7947	2.3925
Disengaged	43.2137	3.8097	38.4032	4.2159	36.0426	1.2748

Table 1- 6: Mean standardized Scale Scores for Each Cluster in Sample 2

4 Clusters	P Subscale		C/D Subscale		A/M Subscale	
	Mean	SD	Mean	SD	Mean	SD
Precontemplation	60.4795	6.4093	52.7196	8.0256	45.1624	8.5282
Decision Making	43.2656	3.2205	59.0902	5.2634	53.4726	7.5914
Condom Users	43.2453	3.8202	42.2905	5.4585	60.1579	3.3992
Disengaged	42.1113	2.0441	40.1810	3.8598	36.9793	2.4594

Table 1- 7: Results of One-Way ANOVA and Tukey comparisons by Cluster for Sample 1

	F-Value	Tukey Test Comparisons
Pros	13.04**	4 < 1,2,3 and 1 < 2,3
Confidence	20.25**	1,4 < 2,3
Assertiveness	68.59**	4 < 1,2,3 and 1 < 3,2
Counterconditioning	42.90**	4 < 1,2,3 and 1 < 3,2
Communication	15.29**	1,4 < 2,3
Consciousness Raising	29.47	4 < 1,2,3 and 1 < 3,2
Dramatic Relief	12.56**	4 < 1,2,3 and 1 < 3,2
Environmental Evaluation	24.97**	1,4 < 2,3
Helping Relationships	4.70*	1 < 2
Interpersonal Systems Control	10.42**	1,4 < 2,3
Eroticizing Condoms	15.02**	1,4 < 2,3
Reinforcement Management	10.09**	1,4 < 2,3
Self-Liberation	36.45**	4 < 1,2,3 and 1 < 3,2
Social Liberation	11.02**	1,4 < 2,3
Self-Reevaluation	47.25**	4 < 1,2,3 and 1 < 3,2
Partner Support	24.44**	1,4 < 2,3
Stimulus Control	21.63**	4 < 1,2,3 and 1 < 3,2
Proportion of Condom Use	21.49**	1,4 < 2,3

Note: * denotes significant at the $p < .05$ level; ** denotes significance at the $p < .01$ level

Note¹: 1=Precontemplation Cluster; 2=Decision Making Cluster; 3=Condom Users Cluster; 4=Disengaged Cluster

Table 1- 8: Results of One-Way ANOVA and Tukey comparisons by Cluster for Sample 2

	F-Value	Tukey Test Comparisons ¹
Pros	6.01**	1,4 < 2,3
Cons	11.94**	2,3,4 < 1
Confidence	13.28**	1,4 < 2,3
Assertiveness	29.45**	4 < 1,2,3 and 1 < 3,2
Counterconditioning	27.94	1,4 < 2,3
Communication	7.65**	4 < 2,3
Consciousness Raising	11.70**	1,4 < 2,3
Dramatic Relief	3.03*	
Environmental Evaluation	7.76**	4 < 1,2,3 and 1 < 3
Helping Relationships	3.84*	4,1 < 2
Interpersonal Systems Control	17.94**	1,4 < 2,3
Eroticizing Condoms	14.56	1,4 < 2,3
Reinforcement Management	4.28**	4 < 2,3
Self-Liberation	18.06**	1,4 < 2,3
Self-Reevaluation	22.20**	4 < 1,2,3 and 1 < 3,2
Partner Support	17.33	1,4 < 2,3
Stimulus Control	10.47	1,4 < 2,3
Positive Sexual Self Acceptance	3.74*	1 < 4
Proportion of Condom Use	16.02**	1,4 < 2,3

Note: * denotes significant at the $p < .05$ level; ** denotes significance at the $p < .01$ level

Note¹: 1=Precontemplation Cluster; 2=Decision Making Cluster; 3=Condom Users Cluster; 4=Disengaged Cluster

Table 1- 9: Cross Classification Table of Cluster Analysis by Staging Algorithm Sample 1

		Clusters				
Frequency		Disengaged	PC	Decision making	Condom Users	Row Total
Column Percent						
Row Percent						
Staging Algorithm	PC	17	27	1		45
		89.5	42.9	2.2		27.8
		37.8	60.0	2.2		
	C	2	9	1		12
		10.5	14.3	2.2		7.4
		16.7	75.0	8.3		
	PR		19	21	3	43
			30.2	45.7	8.8	26.5
			44.2	48.8	7.0	
	A		2	5	8	15
			3.2	10.9	23.5	9.3
			13.3	33.3	53.3	
	M		6	18	23	47
			9.5	39.1	67.6	29.0
			12.8	38.3	48.9	
Column Total		19	63	46	34	162
		11.7	38.9	28.4	21.0	

Table 1- 10: Cross Classification Table of Cluster Analysis by Staging Algorithm
Sample 2

		Clusters				
Frequency		Disengaged	PC	Decision making	Condom Users	Row Total
Column Percent						
Row Percent						
Staging Algorithm	PC	10	25	7	3	45
		90.9	35.7	17.9	9.4	29.6
		22.2	55.6	15.6	6.7	
	C		11	2		13
			15.7	5.1		8.6
			84.6	15.4		
	PR	1	25	11	4	41
		9.1	35.7	28.2	12.5	27.0
		2.4	61.0	26.8	9.8	
	A		1	4	2	7
			1.4	10.3	6.3	4.6
			14.3	57.1	28.6	
	M		8	15	23	46
			11.4	38.5	71.9	30.3
			17.4	32.6	50.0	
Column Total		11	70	39	32	152
		7.2	46.1	25.7	21.1	

Table 2- 1: Overall Fit for all 6 Latent Transition Models Tested for All Participants

MODEL #	
1	$G^2(16) = 3483.105$
2	$G^2(13) = 2330.524$
3	$G^2(12) = 2341.711$
4	$G^2(7) = 1054.120$
5	$G^2(4) = 1025.181$
6	$G^2(3) = 836.811$

Note: G^2 can be interpreted like a χ^2 value, with smaller values relative to the degrees of freedom preferred.

Table 2- 2: Delta Parameter Estimates (Probability of latent status membership) For Model 6 On All Participants

Stage	Occasion	
	1	2
Precontemplation	.241	.260
Contemplation	.153	.161
Preparation	.219	.283
Action	.143	.162
Maintenance	.243	.133

Table 2- 3: Tau Parameter Estimates (Transition probabilities) for Model 6 on All Participants

Stage at Time 1	Stage at Time 2				
	PC	C	D	A	M
Precontemplation	.569	.128	.193	.110	
Contemplation	.246	.262	.308	.185	
Preparation	.143	.184	.520	.153	
Action	.167	.167	.222	.278	.167
Maintenance	.123	.107	.180	.139	.451

Table 2- 4: Overall Fit for all 6 Latent Transition Models Tested for Women Only

MODEL #	
1	$G^2(16) = 2553.633$
2	$G^2(13) = 1637.663$
3	$G^2(12) = 1576.261$
4	$G^2(7) = 652.514$
5	$G^2(4) = 610.882$
6	$G^2(3) = 414.248$

Note: G^2 can be interpreted like a χ^2 value, with smaller values relative to the degrees of freedom preferred.

Table 2- 5: Delta Parameter Estimates (Probability of latent status membership) For Model 6 for Women Only

Stage	Occasion	
	1	2
Precontemplation	.276	.283
Contemplation	.143	.148
Preparation	.208	.288
Action	.133	.151
Maintenance	.239	.130

Table 2- 6: Tau Parameter Estimates (Transition probabilities) for Model 6 for Women Only

Stage at Time 1	Stage at Time 2				
	PC	C	D	A	M
Precontemplation	.627	.093	.200	.080	
Contemplation	.222	.250	.361	.167	
Preparation	.127	.200	.527	.145	
Action	.154	.154	.256	.282	.154
Maintenance	.129	.100	.157	.157	.457

Table 2- 7: Overall Fit for all 6 Latent Transition Models Tested for Men Only

MODEL #	
1	$G^2(16) = 1005.637$
2	$G^2(13) = 767.106$
3	$G^2(12) = 775.337$
4	$G^2(7) = 406.618$
5	$G^2(4) = 417.988$
6	$G^2(3) = 423.515$

Note: G^2 can be interpreted like a χ^2 value, with smaller values relative to the degrees of freedom preferred.

Table 2- 8: Delta Parameter Estimates (Probability of latent status membership) For Model 4 for Men Only

Stage	Occasion	
	1	2
Precontemplation	.190	.186
Contemplation	.167	.167
Preparation	.233	.303
Action	.157	.168
Maintenance	.252	.177

Table 2- 9: Tau Parameter Estimates (Transition probabilities) for Model 4 for Men Only

Stage at Time 1	Stage at Time 2				
	PC	C	D	A	M
Precontemplation	.536	.250	.214	.176	
Contemplation	.276	.276	.241	.207	
Preparation	.163	.163	.512	.163	
Action		.222	.222	.333	.222
Maintenance			.268	.171	.561

Table 3- 1: Breakdown of Movement Classification by Gender

	Male	Female	Total
Regressed	14 % (N=9)	18 % (N=26)	17 % (N=35)
Stable	71 % (N=45)	65 % (N=96)	67 % (N=141)
Progressed	14 % (N=9)	17 % (N=25)	16 % (N=34)
Total	63	147	210

Table 3- 2: Wald Statistic and Estimated Coefficient Results from the Univariate Logistic Regression Analyses on Progression vs. Stability for All participants (N=175)

Variable	B	S.E.	Wald χ^2	DF	Sig	Exp (B)
Pros	-.1121	.2236	.2515	1		.8939
Cons	-.2850	.3111	.8394	1		.7520
Conf	-.2263	.1740	1.6908	1	*	.7975
PSSA	.0894	.2312	.1495	1		1.0935
NSSA	.0108	.2577	.0018	1		1.0108
Esteem	.3899	.3581	1.1850	1		1.4768
AS	-.2485	.1421	3.0568	1	*	.7800
CC	-.1778	.1592	1.2470	1		.8371
CO	.0196	.1837	.0114	1		1.0198
CR	-.1190	.1701	.4898	1		.8878
DR	-.0334	.1739	.0370	1		.9671
EC	-.4805	.1878	6.5455	1	***	.6185
ER	-.2706	.1584	2.9201	1	*	.7629
HR	.0458	.1882	.0593	1		1.0469
IS	-.2333	.1614	2.0900	1	*	.7919
PS	-.0635	.1476	.1849	1		.9385
RM	-.2871	.2143	1.7942	1	*	.7504
SC	-.1301	.1445	.8102	1		.8780
SL	-.1677	.1788	.8801	1		.8456
SO	-.0413	.2139	.0373	1		.9595
SR	.0479	.1522	.0992	1		1.0491

* p < .2 ** p < .05 *** p < .01 ***** p < .001

Table 3- 3: Wald Statistic and Estimated Coefficient Results from the Main Effects Model on Progression vs. Stability for All participants (N=175)

Variable	B	S.E.	Wald χ^2	Df	Sig	Exp (B)
Conf	-.0698	.2097	.1107	1		.9326
AS	-.0354	.2294	.0238	1		.9652
EC	-.5379	.2789	3.7196	1	*	.5839
ER	.0169	.2505	.0046	1		1.0171
IS	-.0077	.2181	.0012	1		.9923
RM	.1605	.3075	.2723	1		1.1741

* p < .2 ** p < .05 *** p < .01 ***** p < .001

Table 3- 4: Wald Statistic and Estimated Coefficient Results from Final Model on Progression vs. Stability for All participants (N=175)

Variable	B	S.E.	Wald χ^2	Df	Sig	Exp (B)
EC	-.4805	.1878	6.5455	1	**	.6185
* p< .2 ** p< .05 *** p< .01 **** p< .001						

Table 3- 5: Wald Statistic and Estimated Coefficient Results from the Univariate Logistic Regression Analyses on Regression vs. Stability for All Participants (N=176)

Variable	B	S.E.	Wald χ^2	DF	Sig	Exp (B)
Pros	.0631	.2381	.0703	1		1.0651
Cons	.2679	.2745	.9521	1		1.3072
Conf	.1322	.1919	.4747	1		1.1414
PSSA	-.2472	.2062	1.4373	1		.7810
NSSA	.2095	.2395	.7645	1		1.2330
Esteem	.8775	.3280	7.1576	1	***	2.4048
AS	.2774	.1553	3.2756	1	*	1.3197
CC	.3046	.1719	3.1391	1	*	1.3561
CO	.0832	.1854	.2017	1		1.0868
CR	.3279	.1962	2.7950	1	*	1.3881
DR	.5054	.2362	4.5795	1	**	1.6576
EC	-.0489	.1554	.0989	1		.9523
ER	.1876	.1479	1.6100	1	*	1.2064
HR	-.2911	.1759	2.7378	1	*	.7475
IS	-.0280	.1679	.0278	1		.9724
PS	.2303	.1721	1.7914	1	*	1.2590
RM	.1138	.1848	.3795	1		1.1206
SC	.0012	.1358	.0001	1		1.0012
SL	.4718	.2083	5.1301	1	**	1.6029
SO	.3491	.2276	2.3533	1	*	1.4178
SR	.4560	.1830	6.2111	1	*	1.5777

* p < .2 ** p < .05 *** p < .01 **** p < .001

Table 3- 6: Wald Statistic and Estimated Coefficient Results from Main Effects Model Regression vs. Stability for All Participants (N=176)

Variable	B	S.E.	Wald χ^2	DF	Sig	Exp (B)
Esteem	.8367	.3633	5.3046	1	*	2.3088
AS	.1375	.3910	.1236	1		1.1474
CC	-.2318	.4271	.2945	1		.7931
CR	-.2172	.4003	.2945	1		.8048
DR	.4750	.3630	1.7117	1	*	1.6079
HR	-.5871	.2293	6.5579	1	**	.5559
PS	.0080	.3246	.0006	1		1.0080
SL	.3224	.3870	.6939	1		1.3804
SO	.2410	.3133	.5918	1		1.2725
SR	.3783	.3642	1.0787	1		1.4598

* p < .2 ** p < .05 *** p < .01 **** p < .001

Table 3- 7: Wald Statistic and Estimated Coefficient Results from the Final Model Regression vs. Stability for All Participants (N=176)

Variable	B	S.E.	Wald χ^2	DF	Sig	Exp (B)
Esteem	.8485	.3343	6.4397	1	**	2.3361
HR	-.2571	.1812	2.0142	1	*	.7731
* p<.2 ** p<.05 *** p<.01 ***** p<.001						

Table 3- 8: Wald Statistic and Estimated Coefficient Results from the Univariate Logistic Regression Analyses on Progression vs. Stability for Women (N=121)

Variable	B	S.E.	Wald χ^2	DF	Sig	Exp (B)
Pros	.0478	.2779	.0296	1		1.0490
Cons	-.3202	.3893	.6764	1		.7260
Conf	-.0988	.2101	.2212	1		.9059
PSSA	-.1796	.2777	.4184	1		.8356
NSSA	.2333	.2893	.6503	1		1.2628
Esteem	.5971	.4047	2.1766	1		1.8169
AS	-.1918	.1665	1.3269	1		.8254
CC	-.0585	.1911	.0937	1		.9432
CO	.1434	.2260	.4029	1		1.1542
CR	-.0524	.2028	.0669	1		.9489
DR	-.0856	.1994	.1844	1		.9180
EC	-.2953	.2000	2.1805	1	*	.7443
ER	-.1408	.1837	.5876	1		.8686
HR	.2579	.2422	1.1343	1		1.2942
IS	.0061	.2059	.0009	1		1.0061
PS	.0484	.1754	.0760	1		1.0495
RM	-.0653	.2346	.0775	1		.9368
SC	-.0281	.1766	.0254	1		.9722
SL	-.0764	.2151	.1262	1		.9264
SO	.0474	.2648	.0320	1		1.0485
SR	.2047	.1823	1.2601	1		1.2271

* p<.2 ** p<.05 *** p<.01 **** p<.001

Table 3- 9: Wald Statistic and Estimated Coefficient Results for Main Effects Model for Progression vs. Stability for Women (N=121)

Variable	B	S.E.	Wald χ^2	DF	Sig	Exp (B)
Esteem	.2494	.4575	.2971	1		1.2832
AS	-.7350	.3132	5.5059	1	**	.4795
EC	.4245	.2822	2.2620	1	*	1.5288
HR	.8383	.3037	7.6179	1	***	2.3125
SR	-.3454	.2499	1.9103	1	*	.7079

* p < .2 ** p < .05 *** p < .01 **** p < .001

Table 3- 10: Wald Statistic and Estimated Coefficient Results for Final Model on Progression vs. Stability for Women (N=121)

Variable	B	S.E.	Wald χ^2	DF	Sig	Exp (B)
AS	-.7969	.2778	8.2273	1	***	.4507
SR	.8433	.2984	7.9843	1	***	2.3239

* p < .2 ** p < .05 *** p < .01 **** p < .001

Table 3- 11: Wald Statistic and Estimated Coefficient Results from the Univariate Logistic Regression Analyses on Regression vs. Stability for Women (N=122)

Variable	B	S.E.	Wald χ^2	DF	Sig	Exp (B)
Pros	.1756	.2880	.3718	1		1.1919
Cons	.0818	.3550	.0531	1		1.0852
Conf	.4131	.2462	2.8158	1	*	1.5115
PSSA	-.3932	.2608	2.2736	1	*	.6749
NSSA	.2363	.2983	.6273	1		1.2665
Esteem	.8121	.3688	4.8474	1	**	2.2525
AS	.5060	.1997	6.4207	1	**	1.6587
CC	.5896	.2252	6.8567	1	***	1.8033
CO	.2242	.2247	.9954	1		1.2513
CR	.4344	.2356	3.3995	1	*	1.5440
DR	.4788	.2783	2.9606	1	*	1.6142
EC	.0047	.1756	.0007	1		1.0047
ER	.2952	.1795	2.7053	1	*	1.3434
HR	-.1949	.2044	.9094	1		.8229
IS	.9460	.2167	.8068	1		1.2148
PS	.4832	.2368	4.1654	1	**	1.6213
RM	.2012	.2096	.9218	1		1.2229
SC	.2193	.1614	1.8464	1	*	1.2453
SL	.6843	.2602	6.9142	1	***	1.9824
SO	.2694	.2645	1.0374	1		1.3091
SR	.6059	.2219	7.4546	1	***	1.8329

* p < .2 ** p < .05 *** p < .01 **** p < .001

Table 3- 12: Wald Statistic and Estimated Coefficient Results from Main Effects Model on Regression vs. Stability for Women (N=122)

Variable	B	S.E.	Wald χ^2	DF	Sig	Exp (B)
Conf	.0870	.3699	.0554	1		1.0909
PSSA	-.2880	.2946	.9557	1		.7498
Esteem	.8102	.4212	3.7008	1	**	2.2484
AS	.0044	.4892	.0001	1		1.0044
CC	.0998	.5282	.0357	1		1.1050
CR	-.1871	.5149	.1321	1		.8293
DR	.1688	.4759	.1259	1		1.1839
ER	-.1724	.3299	.2730	1		.8417
PS	-.1200	.3933	.0931	1		.8869
SC	-.0193	.2172	.0079	1		.9809
SL	.5201	.5318	.9564	1		1.6822
SR	.3799	.4555	.6956	1		1.4622

* p<.2 ** p<.05 *** p<.01 **** p<.001

Table 3- 13: Wald Statistic and Estimated Coefficient Results from the Final Model on Regression vs. Stability for Women (N=122)

Variable	B	S.E.	Wald χ^2	DF	Sig	Exp (B)
Esteem	.8121	.3688	4.8474	1		2.2525
* p< .2 ** p< .05 *** p< .01 ***** p< .001						

Table 3- 14: Wald Statistic and Estimated Coefficient Results from the Univariate Logistic Regression Analyses on Progression vs. Stability for Men (N=54)

Variable	B	S.E.	Wald χ^2	DF	Sig	Exp (B)
Pros	-.5360	.4143	1.6742	1	*	.5851
Cons	-.1562	.5367	.0847	1		.8554
Conf	-.5144	.3250	2.5044	1	*	.5979
PSSA	.6271	.4573	1.8805	1	*	1.8722
NSSA	-.6417	.5858	1.1998	1		.5264
Esteem	-.4702	.8222	.3271	1		.6248
AS	-.4034	.2765	2.1277	1	*	.6681
CC	-.4484	.2948	2.3136	1	*	.6387
CO	-.2869	.3332	.7417	1		.7506
CR	-.2700	.3150	.7343	1		.7634
DR	.0878	.3540	.0614	1		1.0917
EC	-1.2901	.5578	5.3487	1	**	.2752
ER	-.6472	.3511	3.3982	1	*	.5235
HR	-.4833	.3482	1.9267	1	*	.6168
IS	-1.0321	.3959	6.7958	1	***	.3563
PS	-.3883	.2881	1.8166	1	*	.6782
RM	-1.0129	.5387	3.5358	1	*	.3632
SC	-.3215	.2812	1.3070	1		.7251
SL	-.3692	.3272	1.2739	1		.6913
SO	-.2407	.3681	.4276	1		.7861
SR	-.3759	.2953	1.6212	1		.6866

* p < .2 ** p < .05 *** p < .01 **** p < .001

Table 3- 15: Wald Statistic and Estimated Coefficient Results from the Main Effects Model for Progression vs. Stability for Men (N=54)

Variable	B	S.E.	Wald χ^2	DF	Sig	Exp (B)
Pros	-.4157	.9181	.2051	1		.6598
Conf	-1.3250	.7890	2.8204	1	*	.2658
SSA	1.5194	.8856	2.9434	1	*	4.5696
AS	.6965	.8152	.7299	1		2.0066
CC	-1.4375	1.2940	1.2342	1		.2375
EC	-2.1679	1.2829	2.8556	1	*	.1144
ER	.6741	.8406	.6431	1		1.9622
HR	-1.1333	1.0826	1.0958	1		.3220
IS	-1.6987	.9350	3.3007	1	*	.1829
PS	2.7027	1.6384	2.7212	1	*	14.9196
RM	.8203	1.1173	.5391	1		2.2712

* p<.2 ** p<.05 *** p<.01 **** p<.001

Table 3- 16: Wald Statistic and Estimated Coefficient Results for the Final Model on Progression vs. Stability for Men (N=54)

Variable	B	S.E.	Wald χ^2	DF	Sig	Exp (B)
Conf	-.7559	.5637	1.7977	1	*	.4696
SSA	1.0170	.6837	2.2029	1	*	2.7649
EC	-1.4826	.8284	3.2031	1	*	.2271
IS	-1.2578	.6437	3.8185	1	**	.2843
PS	1.4433	.8568	2.8376	1	*	4.2348

* p < .2 ** p < .05 *** p < .01 **** p < .001

Table 3- 17: Wald Statistic and Estimated Coefficient Results from the Univariate Logistic Regression Analyses on Regression vs. Stability for Men (N=54)

Variable	B	S.E.	Wald χ^2	DF	Sig	Exp (B)
Pros	-.2683	.4282	.3747	1		.7647
Cons	.7515	.4860	2.3911	1	*	2.1203
Conf	-.5489	.3585	2.3434	1	*	.5776
PSSA	-.1009	.3728	.0733	1		.9040
NSSA	.2435	.4192	.3375	1		1.2758
Esteem	1.0806	.7204	2.2503	1	*	2.9466
AS	-.2522	.2750	.8411	1		.7771
CC	-.2773	.2866	.9363	1		.7578
CO	-.3215	.3532	.8288	1		.7250
CR	.0571	.3614	.0249	1		1.0587
DR	.5314	.4480	1.4070	1		1.7013
EC	-.1992	.3298	.3649	1		.8194
ER	-.0589	.2762	.0455	1		.9428
HR	-.6686	.3798	3.0987	1	*	.5124
IS	-.7186	.3695	3.7816	1	**	.4874
PS	-.2948	.2869	1.0557	1		.7447
RM	-.1008	.3917	.0662	1		.9041
SC	-.4990	.2789	3.2002	1	*	.6072
SL	-.0435	.3596	.0146	1		.9575
SO	.5879	.4785	1.5095	1		1.8001
SR	.0308	.3350	1.7203	1		1.0313

* p < .2 ** p < .05 *** p < .01 **** p < .001

Table 3- 18: Wald Statistic and Estimated Coefficient Results from the Main Effects Model on Regression vs. Stability for Men (N=54)

Variable	B	S.E.	Wald χ^2	DF	Sig	Exp (B)
Cons	1.0180	.6667	2.3315	1	*	2.7676
Conf	.0796	.4602	.0299	1		1.0828
Esteem	1.0958	.8313	1.7374	1	*	2.9915
HR	-.5598	.5033	1.2374	1		.5713
IS	-.0653	.4974	.0173	1		.9367
SC	-.4934	.3573	1.9067	1	*	.6106

* p<.2 ** p<.05 *** p<.01 **** p<.001

Table 3- 19: Wald Statistic and Estimated Coefficient Results from the Final Model Regression vs. Stability for Men (N=54)

Variable	B	S.E.	Wald χ^2	DF	Sig	Exp (B)
Cons	1.0780	.5960	3.2714	1	*	2.9388
Esteem	1.2068	.7864	2.3550	1	*	3.3428
SC	-.5391	.3006	3.2164	1	*	.5833

* p < .2 ** p < .05 *** p < .01 **** p < .001

Table 4- 1: Factor Loadings from Final Model for All Constructs at Baseline

Construct	Item Parcel ¹	Factor Loading ²
Pros	1	.380***
	2	.751***
	3	.462***
	4	.323***
	5	.304***
Cons	1	.374***
	2	.181*
	3	.413***
	4	.864***
	5	.866***
Confidence	1	.679***
	2	.798***
	3	.851***
	4	.773***
	5	.738***
Positive Sexual Self Acceptance	1	.526***
	2	.645***
	3	.721***
Negative Sexual Self Acceptance	1	.653***
	2	.649***
	3	.635***
Esteem	1	.632***
	2	.748***
	3	.700***
	4	.869***
	5	.831***

Note 1: All construct items were placed into item parcels except for the two Sexual Self Acceptance Scales which used single item indicators.

Note 2: * = $p < .05$; **= $p < .01$; ***= $p < .001$

Table 4- 2: Factor Loadings from Final Model for All Constructs at Follow-up

Construct	Item Parcel ¹	Factor Loading ²
Pros	1	.380***
	2	.751***
	3	.462***
	4	.323***
	5	.304***
Cons	1	.560***
	2	.410***
	3	.577***
	4	.798***
	5	.876***
Confidence	1	.727***
	2	.843***
	3	.876***
	4	.787***
	5	.804***
Positive Sexual Self Acceptance	1	.534***
	2	.625***
	3	.757***
Negative Sexual Self Acceptance	1	.503***
	2	.755***
	3	.601***
Esteem	1	.657***
	2	.690***
	3	.683***
	4	.882***
	5	.887***

Note 1: All construct items were placed into item parcels except for the two Sexual Self Acceptance Scales which used single item indicators.

Note 2: * = $p < .05$; **= $p < .01$; ***= $p < .001$

Figure 1- 1: Confirmatory Factor Analysis on Sample 2

Figure 1- 2: Profiles of the 4 Cluster Solution on Sample 1 (N-167)

Figure 1- 3: Profiles of the 4 Cluster Solution on Sample 2 (N-153)

Figure 2- 1: Latent Transition Models of Stage Transitions

Figure 2- 2: Latent Transition Models of Stages of Condom Use On All Participants

Figure 2- 3 : Latent Transition Models of Stages of Condom Use for Women Only

Women Only Model 5 $G^2 (3) = 414.248$

Figure 2- 4: Latent Transition Models of Stages of Condom Use for Men Only

Men Only - Model 4 $G^2 (7) = 406.618$

Figure 4- 1: SEM Model of All Constructs Within Each Timepoint

Figure 4- 2: SEM Single Construct Longitudinal Models

Figure 4- 3: Sample SEM Subset Longitudinal Cross-Lag Model

Figure 4- 4: Final Structural Equation Model

Appendix 1: Consent Form

CONSENT FORM FOR RESEARCH Quantitative Methods For Assessing Change: Condom Use Application University of Rhode Island

You have been asked to take part in the research project described below. The researcher will explain the project to you in detail. If you have any questions, please feel free to call Kerry Evers (874-5565), the person mainly responsible for this study.

You have been asked to take part in a study of attitudes and behaviors related to condom use by completing a pencil and paper survey. The items will focus on your attitudes and behavior. Responses to these items will be collected from students at the University of Rhode Island. You will be contacted again in one month and asked to fill out another pencil and paper survey.

1. YOU MUST BE AT LEAST 18 YEARS OLD TO BE IN THIS RESEARCH PROJECT.

2. Purpose: The purpose of this research is to learn more about the process of condom use adoption and behavior change over time among college men and women over 18 years old.

3. Procedures: You will be asked to answer questions about your current use of and attitudes towards condoms. This will take between 20-30 minutes. In approximately one month you will be contacted again and asked to fill out another survey pertaining to my condom use and attitudes.

4. Risks: There are no known risks to being in this study. Although you may feel some embarrassment answering questions about private matters, you understand that this information is important for research purposes and will be kept confidential (see below). The researcher will provide a list of resources in case you have any questions that arise from filling out the questionnaire.

5. Benefits: Being in this study could benefit you by increasing your knowledge and awareness of healthy reproductive choices and behaviors. This research could yield important information about the use of condoms. Your honest answers to all questions are important. By completing the first survey, your name will be entered into a lottery for four \$25 prizes. In addition, by completing the second survey, you will be entered into an additional lottery for four \$50 prizes.

6. Confidentiality: All information obtained during this study is confidential. That means your answers to all questions are private. Your name will never be linked to your identification code or your answers to the survey. Scientific reports will be based on group data and will not identify you or any individual as being in this project.

7. Your Rights: The decision to participate in this research project is up to you. You do not have to participate and can refuse to answer any questions. However, understand that it would be helpful to answer all questions in order to better assess my condom use and attitudes.

If you have any more questions or concerns about this study, you may contact Kerry Evers, M.A., Project Coordinator, at the University of Rhode Island at (401) 874-2830, or you may contact the Vice Provost for Research at the University of Rhode Island at (401) 874-2635.

I have read the consent form and my questions have been answered to my satisfaction. Completing and returning the attached survey means that you understand the information, are at least 18 years old, and voluntarily agree to be in this study.

Signature of Participant

Date

Signature of P.I.

Date

Typed / Printed Name

Typed / Printed Name

**CODE-For researcher use
only**

Study on Attitudes and Behaviors Related to Condom Use

The following information will NOT be linked to your answers to the survey questions or your identification code. This data will be used for two purposes:

1. To include you in the cash lottery at the end of each timepoint.
2. To contact you for participation in the second timepoint.

This information is very important for your participation in the study. Please answer the following questions.

Name: _____

Telephone Number: _____

Mailing address: _____

E-Mail Address: _____

Date

CODE-For researcher use only

Study on Attitudes and Behaviors Related to Condom

Use

Second Survey

The following information will NOT be linked to your answers to the survey questions or your identification code. This data will be used to include you in the cash lottery at the end of this timepoint. By providing this information, you will be eligible for one of four \$50 cash awards! This information is very important for your participation in the study.

Name: _____

Appendix 4: List of Resources Provided to Participants

These numbers are provided for you in case you have any questions after filling out this questionnaire.

AIDS Hotline **1-800-726-3010**

URI Health Services **874-2246**

URI Speak Easy **874-5964**
(Human Sexuality)

URI Women's Clinic **874-5151**

URI Counseling Services **874-2288**

Appendix 5: Baseline and Follow-up Survey

Please:

**** Fill in each circle completely.**

*** Erase all changes completely.**

CODE-For researcher use only

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Participant ID					
Please provide the following information, which will be used as an identification number.					
First Letter of your Last Name	First Letter of your First Name	Last Four Digits of Your Social Security Number			
A ○	A ○	0 ○	0 ○	0 ○	0 ○
B ○	B ○	1 ○	1 ○	1 ○	1 ○
C ○	C ○	2 ○	2 ○	2 ○	2 ○
D ○	D ○	3 ○	3 ○	3 ○	3 ○
E ○	E ○	4 ○	4 ○	4 ○	4 ○
F ○	F ○	5 ○	5 ○	5 ○	5 ○
G ○	G ○	6 ○	6 ○	6 ○	6 ○
H ○	H ○	7 ○	7 ○	7 ○	7 ○
I ○	I ○	8 ○	8 ○	8 ○	8 ○
J ○	J ○	9 ○	9 ○	9 ○	9 ○
K ○	K ○				
L ○	L ○				
M ○	M ○				
N ○	N ○				
O ○	O ○				
P ○	P ○				
Q ○	Q ○				
R ○	R ○				
S ○	S ○				
T ○	T ○				
U ○	U ○				
V ○	V ○				
W ○	W ○				
X ○	X ○				
Y ○	Y ○				
Z ○	Z ○				

Demographic Information

Instructions: Please answer the following questions based on your present situation.

1. Gender:		2. How old are you? (Please write in your age)
Female ☐	Male ☐	_____ years

3. What year are you in school?			
☐ Freshman ☐ Sophomore	☐ Junior ☐ Senior	☐ Non-matriculated ☐ Part-time	☐ Other _____

4. What is your marital status? (Please read all choices)		
☐ Married ☐ Not married	☐ Divorced ☐ Engaged	☐ Separated ☐ Widowed

5. What is your race? (Please read all choices)		
☐ Caucasian / White ☐ African American / Black	☐ Native American, American Indian, Alaskan Native ☐ Asian, Pacific Islander	☐ Other (please specify) _____

6. Are you of Spanish/Hispanic origin?	☐ No	☐ Yes
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7. What is your family's annual income?		
☐ Less than \$10,000 ☐ \$10,000 to 19,999	☐ \$20,000 to 34,999 ☐ \$35,000 to 50,000	☐ over \$50,000

8. What is your religion?			
☐ Baptist ☐ Catholic	☐ Jewish ☐ Muslim	☐ Protestant ☐ Eastern	☐ None ☐ Other

9. How often have you felt stressed out over the last 3 months?		
☐ Never	☐ Sometimes	☐ Almost always
☐ Not often	☐ Often	
10. Does your mother or father live with you now?		
☐ No	☐ Yes, my father only	
☐ Yes, my mother only	☐ Yes, both my mother and father live with me	
11. Does your partner live with you now?		
☐ I don't have a partner now ☐ No, he/she does not live with me now ☐ Yes, he/she lives with me now		
12. How long have you been dating (or did you date) your most recent partner?		
<div style="text-align: right;">_____ years</div> <div style="text-align: right;">_____ months</div> <div style="text-align: right;">(If less than a month) _____ weeks</div>		
13. Do (or Did) you and your most recent partner go out / date other people?		
☐ No, we only go (went) out with each other. ☐ Yes, we both agree (agreed) to see or date other people ☐ I don't know. We did not talk about it.		

CONDOM USE

Now, here are some questions about sex. Here, "sex" means vaginal sex (penis in vagina) or anal sex (penis in anus), but NOT oral sex. Here "partner" means any person you have sex with. Remember, your responses here are private.

According to the definition of sex described, please answer YES or NO for the following questions...

14. Have you and your current partner ever had sex?	☐ No ☐ Yes
15. Have you ever had sex?	☐ No ☐ Yes
16. Are you planning to have sex in the next 30 DAYS?	☐ No ☐ Yes
17. Do you think you will have sex in the next 6 MONTHS?	☐ No ☐ Yes
18. How close are (were) you and your most recent partner to having sex?	
☐ Not at all close ☐ Not very close	☐ Somewhat close ☐ Very close
☐ Extremely close (or having sex already)	
19. At the present time, how would you describe yourself?	
☐ Primarily Heterosexual	☐ Primarily Homosexual
☐ Bisexual	

If you are not sexually active, please continue to answer the questions based on your current situation.

20. Are you planning to use birth control <u>every time</u> you have sex in the NEXT 30 DAYS?	☐ No ☐ Yes
21. Are you thinking about using birth control <u>every time</u> you have sex in the NEXT 6 MONTHS?	☐ No ☐ Yes
22. Have you been using birth control every time you have sex for the PAST 6 MONTHS?	☐ No ☐ Yes
23. Are you planning to use condoms <u>every time</u> you have sex within the NEXT 30 DAYS?	☐ No ☐ Yes

24. Are you thinking about starting to use condoms every time you have sex within the NEXT 6 MONTHS?		☐ No ☐ Yes
25. How many people have you ever had sex with? (Fill in the blank with a number)		_____ People
26. How many people have you had sex with in the LAST 30 DAYS? (Fill in the blank with a number) (If your answer is zero, please skip to question #30)		_____ People
27. How many times in the LAST 30 DAYS have you had sex? (Fill in the blank with a number)		_____ Times
28. How many times in the LAST 30 DAYS have you used condoms when you had sex? (Fill in the blank with a number)		_____ Times
29. When you had sex in the LAST 30 DAYS, how often did you use condoms?		
☐ Every Time ☐ Almost every time	☐ Sometimes ☐ Almost never	☐ Never
30. How many people have you had sex with in the LAST 3 MONTHS? (Fill in the blank with a number)		_____ People
31. How many times in the LAST 3 MONTHS have you had sex? (Fill in the blank with a number)		_____ Times
32. How many times in the LAST 3 MONTHS have you used condoms when you had sex? (Fill in the blank with a number)		_____ Times
33. When you had sex in the LAST 3 MONTHS, how often did you use condoms?		
☐ Every Time ☐ Almost every time	☐ Sometimes ☐ Almost never	☐ Never

34. How long have you been using condoms <u>every time</u> you have sex?		
☐ 30 days or less	☐ 7-11 months	☐ I do not use condoms every time I have sex
☐ 1-6 months	☐ 1 year or more	
35. In the last 6 months, have you tried to use condoms <u>every time</u> you had sex?		☐ No ☐ Yes
36. IN THE LAST 6 MONTHS, how many times did you seriously try to use condoms <u>every time</u> you had sex?		
☐ 1 times	☐ 3 times	☐ 6 or more times
☐ 2 times	☐ 4-5 times	
37. When you did try, what was the longest time period you were able to use condoms <u>every time</u> you had sex?		
☐ Less than 3 days	☐ 1 -2 weeks	☐ 5 weeks or more
☐ 4 - 6 days	☐ 3 -4 weeks	
38. How willing has your partner been to use condoms?		
☐ Not at all willing	☐ Somewhat willing	☐ I don't know-we did not talk about using condoms
☐ Not very willing	☐ Extremely willing	
39. When you have sex, who has the final say about using condoms?		
☐ My partner has more say	☐ I have more say	☐ I don't know
☐ We have equal say	☐ We don't talk about it	
40. When you have sex, how often is some type of birth control used?		
☐ Every time	☐ Sometimes	☐ Never
☐ Almost every time	☐ Almost never	

41. What is your current MAIN METHOD of birth control?		
☐ Birth control pills ☐ Spermicidal foams, cremes, and/or jellies	☐ Diaphragm, sponge, or cervical cap ☐ Depo Provera (the shot)	☐ Condoms ☐ Other _____
42. How old were you when you first had sex?		_____ years
43. Has anyone ever pushed you to have sex after you said NO?		☐ No ☐ Yes
44. Have you ever gotten a test for HIV / AIDS?		
☐ No, and I do not plan to ☐ No, but I am planning to have a test in the next 6 months	☐ No, but I plan to have a test in the next 30 days ☐ Yes, I got a test in the past 6 months	☐ Yes, I got a test more than 6 months ago
45. If you have had an HIV / AIDS test, did you use a home test kit?		
☐ Yes, I used a home test kit ☐ No, I went to a clinic or doctor's office to have the test done.		
46. If you are planning to have an HIV / AIDS test, will you use a home test kit?		
☐ Yes, I would use a home test kit ☐ No, I will go to a clinic or doctor's office to have the test done.		

Methods of Birth Control

	No 1	Yes 2	Don't Know 3
1. Have you and your partner ever used male condoms (rubbers)?			
2. Have you and your partner ever used female condoms?	☐	☐	☐
3. Have you and your partner ever used birth control pills?			
4. Have you and your partner ever used spermicidal foams, cremes, and/or jellies?	☐	☐	☐
5. Have you and your partner ever used a diaphragm, sponge, or cervical cap?	☐		
6. Have you and your partner ever used Depo Provera (the shot)?	☐	☐	☐
7. Have you and your partner ever used Norplant (implant in the arm)?	☐		

SELF-ESTEEM

	Strongly Agree	Agree	Disagree	Strongly Disagree
	1	2	3	4
8. I feel that I am a person of worth, at least on an equal basis with others.	☐	☐	☐	☐
9. I feel that I have a number of good qualities.	☐	☐	☐	☐
10. All in all, I am inclined to feel that I am a failure.	☐	☐	☐	☐
11. I am able to do things as well as most other people.	☐	☐	☐	☐
12. I feel I do not have much to be proud of.	☐	☐	☐	☐
13. I take a positive attitude toward myself.	☐	☐	☐	☐
14. On the whole, I am satisfied with myself.	☐	☐	☐	☐
15. I wish I could have more respect for myself.	☐	☐	☐	☐
16. I certainly feel useless at times.	☐	☐	☐	☐
17. At times I think I am no good at all.	☐	☐	☐	☐

The following items are about **USING CONDOMS EVERY TIME YOU HAVE SEX** with **YOUR PARTNER**. Please rate how much you **AGREE** or **DISAGREE** with each of the following statements.

	Strongly Disagree 1	Somewhat Disagree 2	Neutral 3	Somewhat Agree 4	Strongly Agree 5
18. In the past I didn't always use a condom, but I'm thinking about doing better in the future.	☐	☐	☐	☐	☐
19. I am beginning to use condoms every time I have sex.	☐	☐	☐	☐	☐
20. I don't have time to think about using a condom every time I have sex.	☐	☐	☐	☐	☐
21. I am going to start using condoms all the time soon.	☐	☐	☐	☐	☐
22. Using condoms whenever I have sex has been part of my routine for quite a while.	☐	☐	☐	☐	☐
23. I'm thinking about always using condoms when I have sex.	☐	☐	☐	☐	☐
24. Although I sometimes use condoms, I plan to do better in the next month.	☐	☐	☐	☐	☐
25. I've managed to always use a condom for more than 6 months.	☐	☐	☐	☐	☐
26. I get too "turned on" to stop to use a condom.	☐	☐	☐	☐	☐
27. I make an effort to always use condoms.	☐	☐	☐	☐	☐
28. I think it may be a good idea for me to start using condoms.	☐	☐	☐	☐	☐
29. Having sex without a condom is not that big a deal.	☐	☐	☐	☐	☐
30. I recently started to use condoms all the time.	☐	☐	☐	☐	☐
31. I don't always use condoms, but I plan to work on this.	☐	☐	☐	☐	☐

	Strongly Disagree 1	Somewhat Disagree 2	Neutral 3	Somewhat Agree 4	Strongly Agree 5
32. Consistently using condoms has been an important part of my routine for quite awhile					
33. I plan to begin using condoms every time I have sex in the next month.	☐	☐	☐	☐	☐
34. I think I should start using condoms in the next 6 months.					
35. I never have sex without a condom.	☐	☐	☐	☐	☐
36. I don't worry about having sex without using a condom.					
37. Using condoms all the time is beginning to become part of my life.	☐	☐	☐	☐	☐
38. I use condoms sometimes and plan to do better soon.					
39. I have started to always use condoms and I'm going to continue.	☐	☐	☐	☐	☐
40. I don't always use condoms, and I really think I should work on this.					
41. I have been using condoms all the time for over 6 months, and I plan to continue.	☐	☐	☐	☐	☐
42. As far as I'm concerned, I don't need to use condoms.					
43. I haven't been able to use condoms all the time, but I am planning to soon.	☐	☐	☐	☐	☐
44. I don't use condoms and I don't care.					
45. I have been using condoms whenever I have sex for over 6 months.	☐	☐	☐	☐	☐
46. Consistent condom use is beginning to become part of my sex life.					
47. I have been thinking more about using condoms.	☐	☐	☐	☐	☐

PROS AND CONS OF CONDOM USE

Here are some good and bad things about using condoms. HOW IMPORTANT is each one TO YOU in YOUR decision to use condoms or not? If I used condoms, HOW IMPORTANT to me is it that...?

	<div>Extremely important 5</div> <div>Very important 4</div> <div>Somewhat important 3</div> <div>Slightly important</div> <div>Not at all important</div>				
IF I USED CONDOMS, HOW IMPORTANT TO ME IS IT THAT...?					
48. I would fear sexual diseases (like gonorrhea, chlamydia, AIDS,...) less.	☐	☐	☐	☐	☐
49. My partner would object.	☐	☐	☐	☐	☐
50. I would feel more responsible.	☐	☐	☐	☐	☐
51. Asking my partner to use condoms would be too embarrassing.	☐	☐	☐	☐	☐
52. It would build trust in our relationship.	☐	☐	☐	☐	☐
53. My partner would think I don't trust them.	☐	☐	☐	☐	☐
54. Pregnancy would be less likely.	☐	☐	☐	☐	☐
55. Sex would feel less natural.	☐	☐	☐	☐	☐
56. Condoms would protect both of us.	☐	☐	☐	☐	☐
57. It would be too much trouble.	☐	☐	☐	☐	☐
58. My partner would feel respected.	☐	☐	☐	☐	☐
59. Sex would be less enjoyable.	☐	☐	☐	☐	☐
60. Condoms help prevent cervical cancer.	☐	☐	☐	☐	☐
61. My partner would feel insulted.	☐	☐	☐	☐	☐
62. I would feel safer.	☐	☐	☐	☐	☐
63. Sex would be less exciting.	☐	☐	☐	☐	☐
64. Condoms are easily available.	☐	☐	☐	☐	☐
65. I would have to rely on my partner's co-operation.	☐	☐	☐	☐	☐
66. Condoms help men last longer during sex.	☐	☐	☐	☐	☐
67. My partner would think that I 'play around'.	☐	☐	☐	☐	☐

CONFIDENCE

HOW CONFIDENT OR SURE are you that YOU WOULD USE CONDOMS in these situations, even when...?

	Extremely Sure 5	Very Sure 4	Somewhat Sure	Not very Sure	Not at all Sure
68. I am a little drunk or high.	☐	☐	☐	☐	☐
69. My partner pressures me to take a chance this time.	☐	☐	☐	☐	☐
70. I really want sex.	☐	☐	☐	☐	☐
71. I am upset.	☐	☐	☐	☐	☐
72. There's not much risk of disease.	☐	☐	☐	☐	☐
73. I am affected by alcohol or drugs.	☐	☐	☐	☐	☐
74. My partner gets annoyed about using condoms.	☐	☐	☐	☐	☐
75. I am really sexually excited.	☐	☐	☐	☐	☐
76. I feel depressed.	☐	☐	☐	☐	☐
77. The disease risk seems low.	☐	☐	☐	☐	☐

PSYCHOSEXUAL ATTITUDES

For the next questions, think about the past 6 months. How often have you felt this way?

	Always 5	Most of the time 4	Sometimes 3	Rarely 2	Never 1
78. Sex is a positive part of my life.	☐	☐	☐	☐	☐
79. I do not like some parts of my sex life.	☐	☐	☐	☐	☐
80. I have control of my sex life.	☐	☐	☐	☐	☐
81. I feel powerless in sex situations.	☐	☐	☐	☐	☐
82. I like the way my sex life is going.	☐	☐	☐	☐	☐
83. I have little or no say about my sex life.	☐	☐	☐	☐	☐

CONDOM USE: PROCESSES

Here are some thoughts and experiences that can affect people's condom use.
HOW OFTEN in the last month did you do, feel, or think...?

	Never 1	Not Often 2	Sometimes 3	Often 4	Very Often 5
84. I refuse to have sex if condoms aren't available.	☐	☐	☐	☐	☐
85. When I am tempted to have sex without condoms, I think about the unhealthy results.	☐	☐	☐	☐	☐
86. I talk about condom use with my partner.	☐	☐	☐	☐	☐
87. I think about how to use condoms to keep us both safe.	☐	☐	☐	☐	☐
88. Stories about people like me who get AIDS really scare me.	☐	☐	☐	☐	☐
89. I find ways to make using condoms sexy.	☐	☐	☐	☐	☐
90. I remind myself that I'll set a good example for others if I use condoms regularly.	☐	☐	☐	☐	☐
91. I have someone I can count on to support my decision to practice safer sex.	☐	☐	☐	☐	☐
92. I would only have sex with someone who wanted to use condoms too.	☐	☐	☐	☐	☐
93. My partner shows caring for me by using condoms.	☐	☐	☐	☐	☐
94. I am rewarded by others when I use condoms.	☐	☐	☐	☐	☐
95. I keep condoms available to remind me to use them.	☐	☐	☐	☐	☐
96. I promise myself to use condoms every time.	☐	☐	☐	☐	☐
97. I find society changing in ways that make condom use easier.	☐	☐	☐	☐	☐
98. I feel bad about myself if I have sex without condoms.	☐	☐	☐	☐	☐

	Never 1	Not Often 2	Sometimes 3	Often 4	Very Often 5
99. I insist on condom use with a partner before I will have sex.	☐	☐	☐	☐	☐
100. Instead of risky sex, I engage in other safer sex activities.	☐	☐	☐	☐	☐
101. My partner listens to me when I want to talk about using condoms.	☐	☐	☐	☐	☐
102. I think about all the benefits of condom use.	☐	☐	☐	☐	☐
103. Warnings about the risks of sex without condoms scare me.	☐	☐	☐	☐	☐
104. I find creative ways to include condoms in what we do.	☐	☐	☐	☐	☐
105. I want to set a healthy example for my friends by using condoms myself.	☐	☐	☐	☐	☐
106. I have someone who listens when I need to talk about condom use.	☐	☐	☐	☐	☐
107. I avoid sex partners who might pressure me to have sex without condoms.	☐	☐	☐	☐	☐
108. My partner supports our using condoms together.	☐	☐	☐	☐	☐
109. I say or do something nice for myself when I use condoms regularly.	☐	☐	☐	☐	☐
110. I check on my supply of condoms to make sure that I don't run out.	☐	☐	☐	☐	☐
111. I tell myself that I can choose to use condoms during sex.	☐	☐	☐	☐	☐
112. I notice condom use being discussed openly.	☐	☐	☐	☐	☐
113. I feel like a more responsible, caring person when I use condoms regularly.	☐	☐	☐	☐	☐
114. If a partner does not want to use condoms, I insist that we do.	☐	☐	☐	☐	☐

	Never 1	Not Often 2	Sometimes 3	Often 4	Very Often 5
115. When I am tempted to have sex without condoms, I remind myself how much better I will feel later if we use condoms.	☐	☐	☐	☐	☐
116. My partner and I talk about using condoms together.	☐	☐	☐	☐	☐
117. I think about how to protect myself from sexual diseases.	☐	☐	☐	☐	☐
118. Hearing about the risks of sex without condoms worries me.	☐	☐	☐	☐	☐
119. I make using condoms fun.	☐	☐	☐	☐	☐
120. I remind myself that I can do my part to help stop the spread of diseases by using condoms.	☐	☐	☐	☐	☐
121. I know at least one person who I can turn to for advice about sex and condom use.	☐	☐	☐	☐	☐
122. I look for sex partners who support safer sex.	☐	☐	☐	☐	☐
123. My partner supports my decision to use condoms when we have sex.	☐	☐	☐	☐	☐
124. I reward myself with something when I use condoms.	☐	☐	☐	☐	☐
125. I keep condoms with me so that I'll use them when I have sex.	☐	☐	☐	☐	☐
126. I make a commitment to avoid risky sexual situations.	☐	☐	☐	☐	☐
127. I notice that sex partners are more aware of the need for condom use.	☐	☐	☐	☐	☐
128. I feel good about myself when I use condoms regularly.	☐	☐	☐	☐	☐

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