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thesis entitled

Developing and Testing a Measurement Model for Perceived Barriers to Condom Use: A Cross-Cultural Study

presented by

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has been accepted towards fulfillment of the requirements for

Master of Arts degree in Communication

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Date 19 November 1996

# DEVELOPING AND TESTING A MEASUREMENT MODEL FOR PERCEIVED BARRIERS TO CONDOM USE: A CROSS-CULTURAL STUDY

By

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A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

MASTER OF ARTS

Department of Communication

1996

ABSTRACT

DEVELOPING AND TESTING A MEASUREMENT MODEL FOR PERCEIVED BARRIERS TO CONDOM USE: A CROSS-CULTURAL STUDY

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A model suggesting that the perceived barriers dimension of the Health Belief Model (Rosenstock, 1974) is second-order unidimensional is presented and tested using confirmatory factor analysis procedures. Subjects were college students ($\underline{N}$ = 365) from two separate cultures (United States $\underline{N}$ = 178; Kenya $\underline{N}$ = 187). The health threat used was contraction of HIV, and the perceived barriers dimension was tested by responses of subjects to items measuring perceived barriers to condom use. The proposed second-order unidimensional model was not consistent with the data. Alternative models were proposed and tested. Implications of understanding the perceived barriers dimensions are discussed in terms of applying such findings to communication campaigns aimed to increase behavior of adoption of a recommended response to a health threat.

This thesis is dedicated to my family: Jule, E. Alan, and Bain Cameron, without whose assistance, guidance, listening ears, support, belief, and love I could not have completed this work.

## ACKNOWLEDGMENTS

I would like to thank my adviser, Dr. Kim Witte, who, in addition to her role as adviser, also provided me the opportunity and the support to attempt a cross-cultural study such as this one. I would also like to thank my committee members, Dr. Franklin J. Boster and Dr. Charles T. Salmon, who provided me invaluable assistance and guidance along the way.

In addition, I would like to thank Betty H. La France, whose assistance in demystifying the various computer programs I used to analyze my data was far past valuable; Janet K. McKeon, who listened patiently to me and provided me with many thoughts on the thesis experience as well as on surviving graduate school; Robb Sinn, whose late-night e-mails urged me to keep going, even in the face of adversity; and Julie Burgess, who now knows more than she ever wanted to about this thesis, but always took the time to listen and to care.

Additional thanks go to Deb Tigner, for her help in ensuring that the questionnaires reached Kenya; to Dr. Charles B. K. Nzoika, of the University of Nairobi; and to Solomon Nzyuko, Dr. David Nyamwaya, and Peter Ormondi, of the African Medical and Research Foundation. I would also like to acknowledge an All-University

Research Initiative Grant awarded by Michigan State University, which funded an earlier project that led to the development of this project.

My greatest thanks go to my family - Mom, Dad, and Bain - they alone know all of the steps that it took to get me where I am today, and they are the ones who made such steps possible.

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# Chapter 1

# INTRODUCTION

The prevalence and spread of Acquired Immune Deficiency Syndrome (AIDS) is a constant threat to society as the number of AIDS cases continues to increase, even in the face of many HIV/AIDS prevention campaigns. Recent epidemiological records show unceasing increases in reported AIDS cases from around the world (World Health Organization, 1995, 1996). As of June 30, 1996, the Weekly Epidemiological Record, published by the World Health Organization (WHO), documented a 19% increase in reported AIDS cases of adults and children since July 1, 1995 (WHO, 1996). Based upon available data obtained from a country-by-country analysis, WHO estimates that there have been over 7.7 million AIDS cases in adults and children worldwide (WHO, 1996). WHO estimates that 21 million adults and 800,000 children are currently living with HIV/AIDS and that approximately 25.5 million adults, in addition to over 2.4 million children, have been infected with HIV since the pandemic had its start in the late 1970s and early 1980s (WHO, 1996). The June 30, 1996 estimate of 21 million adults living with HIV is a 24% increase from the December 15, 1995 report, in which WHO estimated that approximately 17 million adults were infected with HIV (WHO, 1995, 1996).

The majority of HIV cases in the world are currently found in Sub-Saharan Africa, where HIV seroprevalance rates have been suggested to range from less than 1% up to 20% of the adult population (AIDS Analysis Africa, 1993). AIDS was made a "notifiable disease" by the Kenyan government under the Public Health Act in 1987, at which time 1,497 cases had been reported from all of the Kenyan provinces (Agata, Muita, Muthami, Gachihi, & Pelle, 1993; Rachier, 1993). Recent epidemiological reports rank Kenya as the fourth highest country in terms of estimated HIV infection, with current estimates being in excess of 1,000,000 cases of HIV infection within the provinces of Kenya (WHO, 1995).

Current estimates also place the United States (700,000 cases) in the top ten countries of estimated numbers of HIV infections (WHO, 1995). Such reports indicate the increasing effect of HIV/AIDS on populations throughout the world. HIV/AIDS is an issue of global importance; a disease that is not bound by a country's borders. Research is needed to aid the development of prevention campaigns and intervention strategies in order to assess how best to disseminate information about the contraction of HIV, and to alert people to efficacious preventive measures against such contraction.

Many prevention campaigns have been developed in the fight to decrease the spread of HIV/AIDS. However, despite the existence of these campaigns, and the focus of these campaigns on prevention, individuals are continuing to engage in unsafe, and risky, sexual behavior (Manning, Balson, Barenberg, & Moore, 1989; Sereno & Dunn, 1994; Sheer & Cline, 1994). Although current HIV/AIDS prevention campaigns appear to be increasing individuals' levels of knowledge about HIV/AIDS, research reveals that such increased knowledge is not resulting in an apparent increase in condom use, specifically among college students in the United States (Baldwin, Whiteley, & Baldwin,

1990; Sereno & Dunn, 1994; Sheer & Cline, 1994). In addition, as college students appear to often engage in risky behaviors, research suggests that students have a greater probability of contracting HIV/AIDS than the average person (Baldwin & Baldwin, 1988; Sheer & Cline, 1994). Research suggests that the most rapid increase of HIV contraction is expected to be found among young adults (Chesney, 1994). Further, it has been noted that knowledge-based HIV/AIDS programs have not been effective cross culturally in changing behavior: "One of the mistakes that has been made in AIDS programs is the assumption that if you provide a lot of information and improve knowledge, that will affect the epidemic. It has been quite evident that in most countries now, sometimes as high as 90 percent know about AIDS, how it is transmitted and how it can be prevented, but that has not led to people actually changing their behavior and sustaining it" (Novicki, 1992, p. 28). Increasing individuals' knowledge about HIV/AIDS is not leading to a change in their sexual behavior; there do not appear to be increases in the use of condoms as a preventive measure against contraction of HIV.

In the summer of 1988, a brochure, "Understanding AIDS," was sent by the Public Health Service to every household in America (Gerbert & Maguire, 1989; Koop, 1988). This brochure contained a message from then Surgeon General C. Everett Koop. His message encouraged families to talk about AIDS, and to learn more about AIDS. In addition, the message noted the behaviors that place individuals at risk for contraction of HIV, as well as explained how one could use condoms to serve as a protective barrier against contraction of HIV (Koop, 1988). Although public response to this brochure was positive (Gerbert & Maguire, 1989), increased behavior of condom use is still lacking. Thus, if knowledge is not the key to behavior change, we must look for other potential

variables that may be hindering individuals from adopting the recommended preventive action of using condoms. If research is able to identify those factors that are acting as barriers to condom use, such research could then be incorporated into current HIV/AIDS prevention campaigns in an attempt to break down the barriers to condom use.

Using the dimension of perceived barriers from the Health Belief Model (Rosenstock, 1974) as a base, this study (1) will elicit barriers to condom use that individuals perceive to be in existence, (2) will test a proposed factor structure of these perceived barriers to condom use, and (3) will test the proposed factor structure of perceived barriers to condom use cross culturally, using an United States and a Kenyan sample, through administration of a questionnaire focused on perceived barriers to condom use.

Due to the fact that HIV/AIDS infection estimates continue to increase worldwide, there is an urgent need for cross-cultural analysis and research that can be used by health educators to develop culturally-appropriate HIV/AIDS prevention programs. Such a need has been demonstrated by a number of researchers (Marin & Marin, 1990; Peterson & Marin, 1988; Witte & Morrison, 1995; Yep, 1992). This thesis, focusing on perceived barriers to condom use, may offer useful insight into the development of such prevention programs.

## Chapter 2

## LITERATURE REVIEW

### The Health Belief Model

The Health Belief Model (HBM) has served as an organizing framework for much of the work regarding health behavior and compliance (Janz & Becker, 1984). The HBM was developed as an attempt to explain the behavior of people who were not taking advantage of preventive health services offered to them, even when the service was offered at little or no cost (Rosenstock, 1974). In addition, the HBM allowed researchers to study the behavior of individuals who were not suffering from a disabling disease, yet who were suffering from diseases that could be attended to through preventive care (Rosenstock, 1974). Early tests of the HBM focused on diseases such as tuberculosis, cervical cancer, and influenza, among others. Currently, the HBM continues to be used in research regarding individuals' responses to preventive health behavior (Calnan & Rutter, 1986; Yep, 1993).

The five dimensions identified by the HBM that influence preventive health behaviors are: (a) perceived susceptibility (e.g., one's perception of the risk of contracting a condition), (b) perceived severity (e.g., one's beliefs about the seriousness of the

disease), (c) perceived benefits (e.g., one's beliefs regarding the benefits of performing a recommended response), (d) perceived barriers (e.g., one's beliefs about the negative aspects or "costs" of a particular health action), and (e) the dimension of cues to action (e.g., a stimulus triggering the action process) (Janz & Becker, 1984; Kirscht & Joseph, 1989; Rosenstock, 1974; Witte, Stokols, Ituarte, & Schneider, 1993).

In the HBM, perceived benefits and perceived barriers act in tandem to produce a final "cost analysis" (perceived benefits minus perceived barriers), which influences one's likelihood of taking action, along with perceived threat, which is affected by perceived susceptibility, perceived severity, and cues to action (Janz & Becker, 1984; Rosenstock, 1974). Although the dimension of perceived barriers is theorized to be an antecedent to one's likelihood of taking action (Janz & Becker, 1984; Rosenstock, 1974), the conceptualization of this dimension has been vague. Most researchers do not define barriers as a construct; rather, they provide examples of barriers (Clark, 1983). Little is known about this factor of perceived barriers, and suggestions regarding a definitive measurement of this dimension are lacking. Although many researchers have used the dimension of perceived barriers in their work, conceptualizations of perceived barriers have ranged from cultural barriers to a specific health action (Clark, 1983; Ruiz, 1985) to personal barriers hindering an individual's action to take preventive health measures (Sereno & Dunn, 1994).

These numerous and seemingly distinct conceptualizations of various researchers of the perceived barriers dimension cause one to question if there may be multiple dimensions of barriers underlying an overall perceived barriers dimension. Specifically, this study seeks to test the possibility that the perceived barriers dimension suggested by

the HBM is indeed multidimensional, that is, that there may be a number of dimensions or categories of barriers, that are conceptually distinct, yet also can be encompassed under an overall barrier dimension. A multidimensional factor structure can be considered to be analogous to a hierarchy. In this study, the overall dimension of perceived barriers would be at the top of the hierarchy, and various subdimensions (to be explained later) would be subsumed under the overall perceived barriers dimension. Although a review of the literature suggests the possibility of a multidimensional structure, there is a lacuna in the literature testing this possibility. Thus, the goal of this study is to develop and test a multidimensional factor structure of the overall factor of perceived barriers.

Significance of the Perceived Barriers Dimension of the Health Belief Model

Numerous studies have indicated that the perceived barriers dimension of the HBM is often the most significant dimension of the model (Champion, 1992; Janz & Becker, 1984; Sereno & Dunn, 1994). However, as noted, there is a lack of a well-developed conceptualization of the perceived barriers dimension in the literature (Melnyk, 1988). Moreover, a review of recent literature regarding barriers to health care uncovered "considerable confusion regarding the barrier variable both theoretically and empirically, which apparently results from a lack of methodological rigor in defining and operationalizing the concept" (Melnyk, 1988, p. 196).

Barriers specific to the health field and to HIV/AIDS issues have been conceptualized in various ways across a multitude of studies. Researchers have examined the potential negative aspects of a particular health action such as pain or difficulty involved in performing a health action such as receiving an immunization (Janz & Becker, 1984); medication side effects as barriers to patient compliance (Kelly, Mamon, & Scott,

1987); the costs of treatment, in addition to varying cultural meanings of illness (Fabrega, 1977); the costs of money, time, and emotional energy (Jones, Jones, & Katz, 1988); the costs of taking action regarding one's health (Calnan & Rutter, 1986; Witte & Morrison, 1995); lack of access to preventive health measures, such as condoms (Cameron, Witte, Lapinski, & Nzyuko, 1996); racism (Cornely, 1976); a perceived lack of information regarding AIDS (Gerbert, Maguire, Bleecker, Coates, & McPhee, 1991); students' stereotypes of patients as a barrier to clinical decision making (Johnson, Kurtz, Tomlinson, & Howe, 1986); cultural barriers, ranging from cultural heritage (e.g., belief in spiritism or witchcraft), to language barriers (Clark, 1983; Ruiz, 1985); sociocultural barriers (Quesada & Heller, 1977); poverty and social isolation as barriers to effective AIDS prevention (Bowser, 1992); a lack of skills of how to practice safer sex (Chesney, 1994); difficulty in innovation dissemination and implementation (Orlandi, 1987); psychosocial benefits to unsafe sex acting as barriers to safer sex (Sobo, 1993); condom usage as a barrier to sexual fulfillment (Allen et al., 1992); the influence of sensation seeking and the connected desire to take risks while engaging in sexual activity (Sheer & Cline, 1995); negative perceptions toward condoms and condom use, including perceptions of embarrassment or repulsion (Cline, Freeman, & Johnson, 1990; Sheer & Cline, 1994); personal, interpersonal, and social norms barriers acting upon an individuals desire to practice safer sex (Sereno & Dunn, 1994); fears of loss of partner's trust or feelings of embarrassment associated with requesting and using condoms (Choi, Rickman, & Catania, 1994); barriers to condom use seen as hindering or affecting pleasure, intimacy, partner's perception, friends' perceptions, communication, and perceived need of condom use in a

sexual relationship (Wendt & Solomon, 1995); and the role of response and self-efficacy in decisions regarding condom use (Witte, 1992; Witte, Berkowitz, Cameron, & McKeon, 1995). Based upon such studies, it appears as though the dimension of perceived barriers is considered by researchers to be one worthy of study, especially as the HBM dimension of perceived barriers has been repeatedly shown to be significant (Champion, 1992; Janz & Becker, 1984; Sereno & Dunn, 1994). However, what the literature is lacking is a common structure and conceptualization of the dimension of perceived barriers, the dimension that arose from the HBM. Thus, further research investigating a conceptualization or framework of specific barriers to preventive health is warranted.

Numerous studies have examined the effect of perceived barriers to condom use as a safer sex practice (Cameron et al., 1996; Sheer & Cline, 1994, 1995; Sereno & Dunn, 1994; Wendt & Solomon, 1995; Witte, 1992; Witte et al., 1995). Although HIV/AIDS prevention campaigns appear to be increasing knowledge of HIV/AIDS, research indicates that individuals continue to engage in risky sexual practices (Baldwin & Baldwin, 1988; Fisher & Misovich, 1990; Sheer & Cline, 1994, 1995). In an attempt to better understand the dimension of perceived barriers, this study will examine perceived barriers to condom use when engaging in sexual activity. As this dimension of perceived barriers appears to be significant, perhaps a categorization and specified measurement model of perceived barriers can enhance future campaigns so that greater self-protective behavior change results. Indeed, if the perceived barriers dimension is as powerful as it appears to be, perhaps future prevention campaigns should focus more on diminishing perceived barriers to the recommended response than on individuals' perceived susceptibility and perceived severity of the specific disease and perceived benefits of performing the recommended

response. Such a focus on perceived barriers may greatly enhance future campaigns directed at the prevention of health threats and risks.

Proposed Barrier Framework

This study proposed that the dimension of perceived barriers in the HBM is multidimensional; specifically, that there are six separate dimensions underlying the overall construct of perceived barriers. First, a description and conceptualization of each of these six proposed dimensions is offered. Second, a description of second-order unidimensionality, as it will be hypothesized that these six dimensions form a second-order unidimensional factor structure, is presented. Third, a description of how factor analytic procedures may be used to test such a model is offered. Finally, hypotheses regarding the proposed model are presented.

Proposed Barrier Dimensions

Based upon a careful review of the literature, it was determined that the various barriers suggested in past research could be subsumed in six dimensions: perceived individual psychological barriers, perceived relational psychological barriers, physical barriers, knowledge-based/self-efficacy barriers, social norms/cultural values barriers, and structural barriers. These six dimensions are conceptualized as follows. Perceived individual psychological barriers to condom use (hereafter referred to as individual barriers) affect the individual personally at a cognitive level, either through an individual's beliefs and attitudes (e.g., "I am not likely to use a condom because condoms spoil the mood") or through an individual's feelings about him/herself (e.g., "I am likely to use a condom because I am not embarrassed to use a condom"). Past research indicating a focus on such individual barriers includes that of Sheer and Cline (1994, 1995), Choi,

Rickman, and Catania (1994), and Sereno and Dunn (1994). Perceived relational psychological barriers to condom use (hereafter referred to as relational barriers) are either those barriers that focus on the individual's perceptions of the relationship (e.g., "I am not likely to use a condom because my partner will not trust me if I suggest condom use") or perceptions about one's partner (e.g., "I am not likely to use a condom because my partner is not infected"). Choi, Rickman, and Catania (1994), Sereno and Dunn (1994), and Wendt and Solomon (1995) have explored such relational issues as barriers to safer sex. Physical barriers to condom use are those that affect the individual in some physical sense (e.g., "I am not likely to use a condom because condoms reduce sensation"). The work of Allen et al. (1992) and Wendt and Solomon (1995) examines such physical barriers to safer sex practices. Knowledge-based/self-efficacy barriers to condom use are those that affect the individual through the individual's knowledge (or lack of knowledge) and beliefs regarding HIV/AIDS related issues (e.g., "I am not likely to use a condom because condoms carry HIV") and perceived self-efficacy barriers to an individual's use of condoms (e.g., "I am not likely to use a condom because I have never been taught how to use condoms"). Past research focusing on knowledge-based or self-efficacy issues regarding safer sex includes that of Chesney (1994), Gerbert et al. (1991), Witte (1992), and Witte et al. (1995). Social norms/cultural values barriers to condom use are those that address the individual's perceptions of his/her culture and the specific social practices of that culture (e.g., "I am not likely to use a condom because to use a condom would suggest that I am a prostitute"), as well as religious values that the individual may perceive to be social norms (e.g., "I am not likely to use a condom because my religion discourages

the use of condoms"). Researchers who have examined barriers similar to this dimension include Quesada and Heller (1977) and Sereno and Dunn (1994). Finally, structural barriers to condom use are conceptualized as those barriers that exist outside of the individual, yet these barriers hinder the individual's effort to perform the action of engaging in condom use (e.g., "I am not likely to use a condom because condoms break." "I am not likely to use a condom because I cannot afford condoms"). The research of Bowser (1992), Calnan and Rutter (1986), Fabrega (1977), Jones, Jones, and Katz (1988), and Witte and Morrison (1995) has examined such a dimension of structural barriers. Thus, the six proposed dimensions were developed by attending to the various dimensions of perceived barriers that have been studied in past research.

Factor Analysis

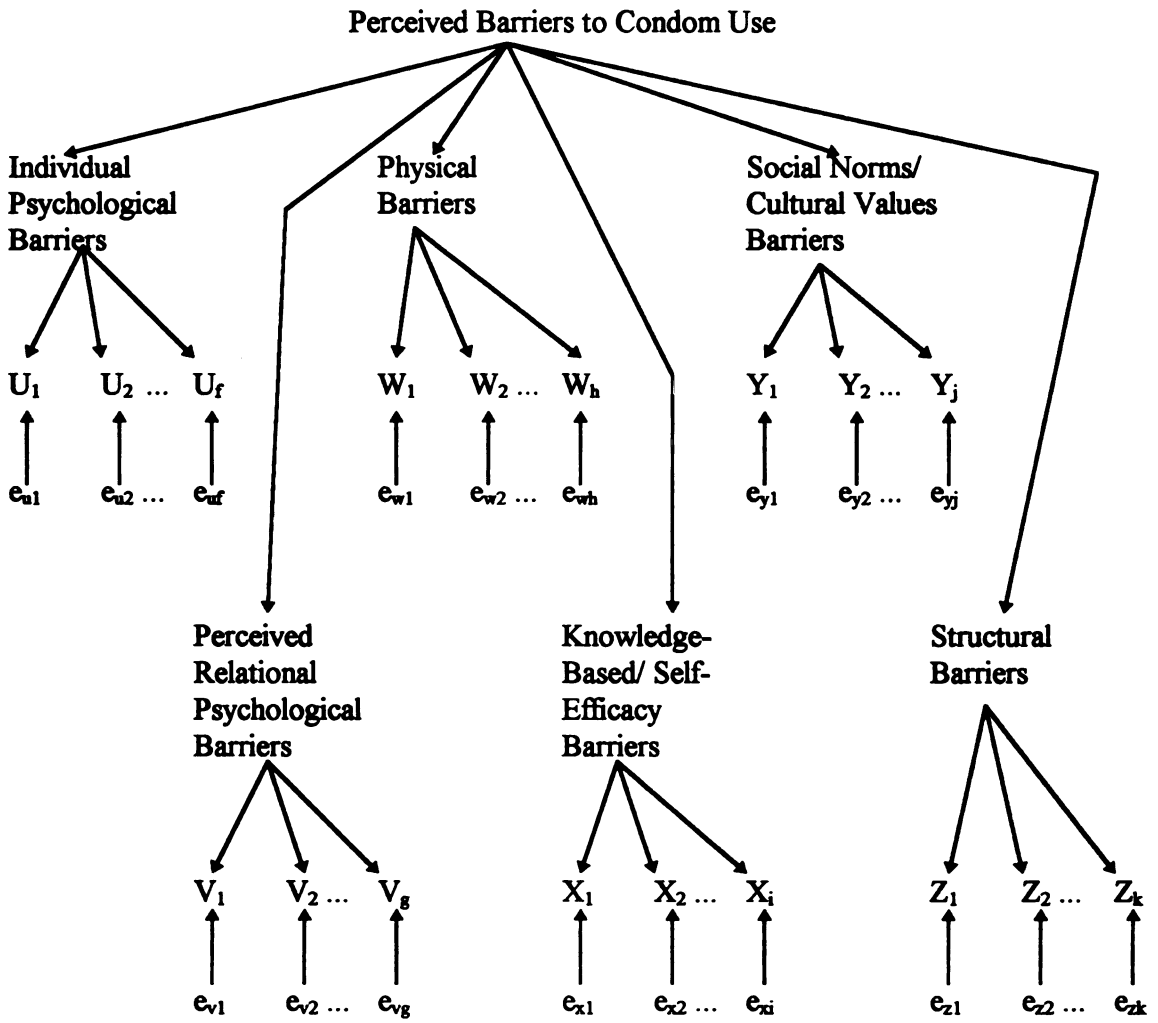
The above six factors of individual barriers, relational barriers, physical barriers, knowledge-based/self-efficacy barriers, social norms/cultural values barriers, and structural barriers are hypothesized to fit a factor structure of second-order unidimensionality (see Figure 1). A second-order unidimensional model is a measurement model which specifies a relationship between the underlying variables and the general construct being measured (Hunter & Gerbing, 1982). In order to understand such a model, one should first be familiar with the idea of a factor structure. A factor can be measured by a number of items. For example, in this study, individual barriers to condom use constitutes a factor. When subjects indicated their individual barriers to condom use, they were asked to respond to multiple items which were intended to measure this factor of individual barriers (specifics regarding the development of the scale are found in Chapter 4). Similarly, multiple items were used to measure each of the six proposed factors of perceived barriers

to condom use. Thus, six scales, each consisting of multiple items, were used to measure these six factors.

Through such a process, six separate factors, all relating to perceived barriers to condom use, were hypothesized to exist. In order to develop a second-order unidimensional model, one must apply the factor analysis procedure to a correlation matrix at a different level (Hunter & Gerbing, 1982). At this level of analysis, one takes the six factors that have been developed and considers each of the factors to be a single item measuring an overall factor (here, the overall factor is perceived barriers to condom use). Specifically, one now uses the correlations between the six factors to assess if each of these factors can be considered to underlie the overall factor of perceived barriers to condom use. Here, the "scale" measuring perceived barriers to condom use consists of six items (the six factors previously established). A second-order unidimensional model is consistent with the data when the correlations among the factors are subjected to confirmatory factor analysis and fit a single-factor model (Hunter & Gerbing, 1982). Thus, these underlying factors are here being treated as items, and are then subjected to confirmatory factor analysis procedures.

Figure 1:

Proposed Second-Order Unidimensional Factor Model of Perceived Barriers to Condom Use



Confirmatory factor analysis is a statistical technique that allows one to assess the validity of a scale through two separate tests: internal consistency and parallelism (Hunter & Gerbing, 1982). Internal consistency is a test used to determine if the obtained correlations between items in the scale (the items measuring the particular factor) are as the factor model would predict (Hunter, 1977). In order to determine internal consistency, one compares the observed correlations with the expected correlations and determines the amount of error (Hunter, 1977). The observed correlations are the correlations among the items that one obtains. The expected correlations are calculated by using the internal consistency theorem and determining the product of the factor loadings (the qualities of the items, or the correlation between the item and its true score in the population) (Hunter, 1977). The larger the difference between the observed and expected correlations, the larger the error. Parallelism is a test to observe the relationships between items and other factors, i.e., factors that the item is not intended to measure. Again, expected and observed correlations are viewed, and error is calculated. Expected correlations, when testing for parallelism, are calculated using the parallelism theorem, where the product of the factor loadings of each of the items is obtained, and then multiplied by the correlation between the two separate factors that each item is purported to measure (Hunter, 1977).

Hypotheses

In this study, it is hypothesized that six factors underlie the overall dimension of perceived barriers to condom use. Therefore, the following hypothesis is advanced:

H1: The proposed factor structure of the perceived barriers dimension suggested by the Health Belief Model will fit a second-order unidimensional factor structure, with the factors of individual barriers, relational barriers, physical barriers, knowledge-based/self-efficacy barriers, social norms/cultural values barriers, and structural barriers underlying the factor of perceived barriers to condom use (see Figure 1).

In addition, it is expected that the proposed factor structure will be replicated in cross-cultural tests; that is, that the model will fit the data when tested through confirmatory factor analysis with two culturally different samples (in this study, the data were obtained from subjects from both the United States and the Kenyan cultures). Therefore, the following hypotheses are proposed:

H2: The proposed factor structure will replicate cross-culturally such that:

H2a: When data from the United States sample only are used, the proposed factor structure will be replicated.

H2b: When data from the Kenyan sample only are used, the proposed factor structure will be replicated.

## Chapter 3

## METHODS

This study will serve as a measurement study to test the proposed second-order unidimensional factor structure of the perceived barriers dimension of the HBM, and to determine if such a factor structure is replicable cross-culturally. The specific concerns of this study, then, are twofold: (1) to determine if the proposed second-order unidimensional factor structure is consistent with the data obtained when these barriers are subjected to factor analysis procedures, and (2) to determine if the proposed second-order unidimensional factor structure is consistent with the data obtained from two culturally distinct samples.

### Participants

The total sample consisted of 365 college students. The subsamples were collected at two large universities: one large university located in the midwestern United States ($N$=178), and one large university located in a major city in Kenya ($N$=187). One hundred and sixty-four males and 200 females participated in this study. The ages of the participants ranged from 19 to 46 ($M$ = 22.03). Due to missing data in a number of the questionnaires (subjects not answering all items in the questionnaire), the average number

of subjects in the analyses used in this study was N=320 (approximately N = 160 for each culture). Students in the United States sample were enrolled in a variety of undergraduate communication classes, both upper and lower levels, and received extra credit for their participation in this study. Students in the Kenyan sample were enrolled in a sociology course and were asked to complete the questionnaire by their instructor. The questionnaires were completely anonymous and confidential, as no personal identification appeared at any place on the questionnaire. After completing the questionnaire, which took approximately 10-15 minutes to complete, the participants were thanked, debriefed, and provided with a handout about HIV/AIDS, which included information about the disease and preventive action that can be taken to avoid contraction of the disease.[1]

Measurement

The questionnaire consisted of 119 items, 76 of which specifically related to perceived barriers to condom use. The remaining items on the questionnaire pertained to demographic information; questions regarding the subjects' sexual experiences and sexual practices; reports of intended and actual condom usage by the participants; items intended to measure subjects' ability to delay gratification; perceptions of susceptibility to and severity of HIV/AIDS, and perceptions of benefits to condom use (the other dimensions of the HBM); questions regarding an individual's exposure to individuals (1) infected with HIV, (2) diagnosed as having AIDS, and (3) having died of AIDS; and an individual's HIV status, including questions as to whether or not the participants had been tested for HIV.

Development of the items for the overall questionnaire. In order to develop the items to be used to assess perceived barriers to condom use, a variety of methods were

used. First, a literature search was performed to become familiar with barriers that other researchers may have addressed when conducting studies that related to existing barriers to condom use. Second, participants at a Health Communication Conference that focused upon "Communicating Health with Unique Populations"[2] were asked to complete a survey that asked them to list reasons that they could think of or that they may have heard voiced by their clients (as many of the participants were actively working in the fields of HIV/AIDS counseling and education) as to why individuals may choose not to use a condom when engaging in sexual encounters.[3] Third, Sexual Health counselors at the midwestern university where a subsample of the data were collected were also asked to complete the above-mentioned survey. Fourth, during an AIDS prevention project in Kenya in the summer of 1995, focus groups were conducted with native Kenyans along the Trans-Africa Highway, and those participants, as well as the health workers with whom we spoke, were asked to provide reasons as to why they may choose not to use condoms during sexual activity.[4]

Following a process suggested by Hunter and Gerbing (1982), after the collection of the numerous barriers items from these cross-cultural groups, the items were placed into *a priori* clusters by the researcher through an evaluation of content of the items. As noted earlier, these categories were developed through careful analysis of the literature.

Culture of participants. For purposes of this study, the culture of the participants was determined to be that culture in which the individuals currently resided. Therefore, those individuals who completed the questionnaire at the large midwestern university were coded as "United States culture" and those who completed the questionnaire at the large university in the major Kenyan city were coded as "Kenyan culture." The questionnaire

did ask for individuals to indicate their citizenship; 91% of those individuals completing the questionnaire in the United States identified "American" or "United States" as their citizenship and 97.3% of those individuals completing the questionnaire in Kenya indicated "Kenyan" as their citizenship.[5] Thus, it was believed that separating those individuals by culture based upon the culture in which they currently resided was warranted.

Pilot testing. Once the barrier items had been solicited from the various sources described above, they were developed into statements to be included in the questionnaire. The questionnaire was then pilot tested to ensure that the individual items were ones that subjects could understand. Five individuals were administered the questionnaire, and were asked to complete the questionnaire as if they were a subject, but also to indicate if any items were confusing or otherwise difficult to comprehend. After completing the questionnaire, each of the pilot subjects spoke individually with the researcher and offered feedback on the questionnaire. The suggestions were discussed, and, when appropriate, the questionnaire was altered to reflect this input from the pilot subjects (e.g., word choice was altered on a few items to ensure that the question would be understood by subjects). In addition, the questionnaire was read by two native Kenyan individuals to ensure that the questionnaire was appropriate for Kenyan subjects. The questionnaire for both samples (United States and Kenyan) was administered in English.[6]

Data analysis

The 76 perceived barriers items were separated into the six *a priori* clusters suggested by this study. These clusters, and the items that were believed to be measures of each of these clusters, had been determined and assigned before the data analysis and

were thus imposed upon the data. Confirmatory factor analysis procedures were used to analyze the data.

For this study, data analysis consisted of four steps: (1) tests of internal consistency of each of the six proposed perceived barriers factors in order to develop an internally consistent scale for each of the six factors, (2) tests of parallelism among the six scales developed to measure each barrier factor, (3) a test of second-order unidimensionality (using the factor correlations between the six factors as the items to measure the overall perceived barriers construct) to complete the test of Hypothesis 1, and (4) testing Hypotheses 2a and 2b to determine if the proposed factor structure is replicable across cultures. Thus, confirmatory factor analysis procedures were used to analyze these data and test the proposed hypotheses.

## Chapter 4

## RESULTS

The results obtained from this data analysis will be presented in order to parallel the data analysis procedures. Specifically, internal consistency of the six proposed underlying factors will be discussed, followed by a discussion of tests of parallelism among these six factors. As will be seen, further analyses were necessary due to the results obtained. These analyses will be discussed and the results are presented.

As noted earlier, the 76 original barrier items were separated into six distinct *a priori* clusters. These clusters are the six distinct factors that have been described above. Following is a description of each cluster, along with a description of the process through which the original 76 items were reduced to 36 total items, which were then used to test the hypotheses of a second-order unidimensional factor structure model to be replicable across cultures.

### Internal Consistency Analysis

Each of the six proposed factors of perceived barriers to condom use were subjected to analyses of internal consistency in order to ascertain that the multiple items were indeed measuring the factor they were intended to measure. Following is a

description of each factor, as well as a description of the process through which the 76 original items were reduced to a 36-item scale.

Individual barriers to condom use. Initially, the proposed scale to measure individual barriers to condom use consisted of 23 items (see Appendix A), generated by practitioners, counselors, students, and other individuals, as noted above. Participants were asked to respond to the statements using a five-point Likert scale, where 1 was "Strongly Disagree" and 5 was "Strongly Agree." Due to the fact that most of the items were phrased negatively (i.e., "I am NOT likely to use a condom because..."), to circle a 5 meant that the participant felt that the item did indeed pose some sort of barrier to condom use. Seven of the original 23 items were recoded as needed so that to strongly agree with an item indicated that one perceived the item to be a barrier to condom use.

When subjected to confirmatory factor analyses, the items that were intended to measure individual barriers to condom use failed in tests of internal consistency, suggesting that the 23 items did not measure only one factor. The items were then analyzed again for content validity, and some items were removed as they did not, in *post hoc* assessment of the items, appear to be a good fit for the factor of individual barriers to condom use. Other items had been questioned as to their meaning by the participants (e.g., item 12, "I am likely to use a condom because using condoms is masculine") and were thus deleted from scale. Finally, using confirmatory factor analysis procedures and observing tests of internal consistency, other items were deleted so that the scale used to measure perceived individual barriers to condom use loaded on one factor (the factor of individual barriers) within sampling error (further discussion of sampling error below). The original 23 items, along with their means and standard deviations are reported in

Appendix A. Following the elimination of items based on the analysis described above, the final scale of perceived individual barriers to condom use consisted of six items (the items are in bold in Appendix A). These six items provided a scale with moderately low reliability ($\alpha = .67$). The scale fit a single-factor model. The errors obtained (by calculating the difference between the expected and observed correlations, as is done for tests of internal consistency) all fell within the range of sampling error. Specifically, the percent of items for which the error was greater than sampling error was 0.00% (see items 1-6 in Table 1 for observed correlations and factor loadings; see items 1-6 in Table 2 for expected correlations and residuals). These six items were then used as the scale in the proposed six-factor model to measure individual barriers to condom use.

Relational barriers to condom use. Using the same procedures as described above regarding individual barriers to condom use, a scale to measure relational barriers to condom use was developed and analyzed. The original scale (using items placed in the *a priori* category of relational barriers to condom use) consisted of 13 items (see Appendix B for a listing of the items, their means, and standard deviations). Three of the original 13 items were recoded as needed. The original 13 items failed to fit a single factor. After further analysis based on content validity and factor analyses, as described above, this scale was reduced to four items (those items in bold in Appendix B). The reliability of this four-item scale measuring relational barriers to condom use was fair at $\alpha = .75$. In addition, these four items also loaded on a single factor with the percent of items for which the error was greater than sampling error again being 0.00% (see items 7-10 in Tables 1 and 2). These four items, then, were used as a scale to measure relational barriers to condom use.

Physical barriers to condom use. The scale to measure physical barriers to condom use was developed using the same procedures. Originally, the scale intended to measure physical barriers to condom use consisted of nine items (see Appendix C for a listing of the items, their means, and standard deviations). Four of the original nine items were recoded as needed. The original nine items failed to fit a single factor. Upon further analysis, using content validity and factor analysis, this scale was reduced to 7 items (those items in bold in Appendix C). The reliability of this seven-item scale measuring physical barriers to condom use was low at $\alpha = .62$. These seven items loaded on a single factor, establishing internal consistency with the percent of items for which the obtained error was greater than sample error being 4.76% (see items 11-17 in Tables 1 and 2). These seven items were then taken to be a scale measuring physical barriers to condom use.

Knowledge-based/self-efficacy barriers to condom use. Originally, the proposed scale to measure knowledge-based/self-efficacy barriers to condom use consisted of nine items (see Appendix D for a listing of the items, their means, and standard deviations). Four of the nine items were recoded. As the nine items failed to fit a single factor, content validity and internal consistency were evaluated, which served to reduce the scale to seven items (those items in bold in Appendix D). The reliability of this seven-item scale measuring knowledge-based/self-efficacy barriers to condom use was low at $\alpha = .65$. These seven items fit a single factor with the percent of items for which the error was greater than sampling error being 0.00% (see items 18-24 in Tables 1 and 2). Thus, the scale to measure knowledge-based/self-efficacy barriers consisted of seven items.

Table 1

The Observed Correlations and Factor Loading Matrix for the Proposed Six-Factor Model*

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 30 | | | | | | | | | | | | | | | | | |
| 2 | 31 | 33 | | | | | | | | | | | | | | | | |
| 3 | 35 | 38 | 43 | | | | | | | | | | | | | | | |
| 4 | 20 | 25 | 25 | 15 | | | | | | | | | | | | | | |
| 5 | 21 | 20 | 31 | 08 | 13 | | | | | | | | | | | | | |
| 6 | 29 | 28 | 28 | 26 | 18 | 26 | | | | | | | | | | | | |
| 7 | 36 | 39 | 50 | 26 | 23 | 36 | 56 | | | | | | | | | | | |
| 8 | 36 | 29 | 39 | 25 | 34 | 32 | 52 | 45 | | | | | | | | | | |
| 9 | 36 | 38 | 42 | 22 | 21 | 37 | 57 | 52 | 61 | | | | | | | | | |
| 10 | 17 | 32 | 29 | 12 | 24 | 24 | 33 | 29 | 37 | 20 | | | | | | | | |
| 11 | 39 | 26 | 27 | 12 | 26 | 20 | 22 | 22 | 29 | 14 | 09 | | | | | | | |
| 12 | -03 | 24 | 12 | 19 | 04 | 00 | 09 | -01 | 12 | 11 | 02 | 08 | | | | | | |
| 13 | 21 | 55 | 35 | 19 | 27 | 24 | 44 | 34 | 35 | 30 | 27 | 27 | 64 | | | | | |
| 14 | 11 | 10 | 10 | 27 | 03 | 17 | 12 | 08 | 10 | 08 | -02 | 12 | 09 | 02 | | | | |
| 15 | 34 | 40 | 37 | 26 | 20 | 30 | 46 | 33 | 43 | 37 | 15 | 24 | 48 | 14 | 39 | | | |
| 16 | 14 | 45 | 29 | 09 | 26 | 25 | 34 | 33 | 30 | 37 | 24 | 19 | 56 | 06 | 34 | 45 | | |
| 17 | 18 | 20 | 27 | 18 | 15 | 27 | 32 | 30 | 29 | 17 | 18 | -05 | 20 | 08 | 21 | 26 | 10 | |
| 18 | 47 | 35 | 29 | 18 | 24 | 19 | 25 | 24 | 18 | 07 | 27 | 07 | 22 | 07 | 27 | 19 | 16 | 24 |
| 19 | 34 | 25 | 36 | 16 | 16 | 27 | 34 | 29 | 26 | 20 | 14 | -03 | 19 | 10 | 25 | 13 | 14 | 22 |
| 20 | 24 | 19 | 17 | 34 | 19 | 21 | 12 | 19 | 08 | 16 | 07 | 09 | 09 | 22 | 18 | 17 | 08 | 22 |
| 21 | 37 | 18 | 33 | 12 | 40 | 31 | 37 | 35 | 32 | 19 | 19 | 01 | 27 | -01 | 25 | 14 | 22 | 21 |
| 22 | 17 | 29 | 20 | 35 | 27 | 29 | 14 | 22 | 24 | 28 | 13 | 24 | 22 | 16 | 29 | 20 | 22 | 24 |
| 23 | 17 | 20 | 15 | 14 | 12 | 25 | 18 | 17 | 27 | 05 | 09 | 08 | 07 | 05 | 33 | 19 | 22 | 18 |
| 24 | 29 | 29 | 34 | 20 | 34 | 27 | 33 | 31 | 33 | 26 | 17 | 00 | 23 | -02 | 34 | 20 | 18 | 26 |
| 25 | 54 | 28 | 46 | 16 | 29 | 25 | 46 | 41 | 35 | 21 | 45 | -04 | 28 | 06 | 30 | 23 | 26 | 33 |
| 26 | 18 | 23 | 19 | 43 | 21 | 25 | 13 | 13 | 15 | 19 | 15 | 18 | 13 | 25 | 24 | 15 | 10 | 19 |
| 27 | 31 | 31 | 32 | 34 | 13 | 28 | 35 | 38 | 47 | 21 | 17 | 16 | 27 | 30 | 42 | 31 | 34 | 18 |
| 28 | 40 | 19 | 23 | 21 | 37 | 40 | 25 | 24 | 35 | 21 | 27 | 06 | 25 | 08 | 29 | 22 | 28 | 29 |
| 29 | 30 | 20 | 33 | 24 | 29 | 21 | 36 | 31 | 37 | 20 | 18 | 02 | 21 | 09 | 28 | 20 | 16 | 17 |
| 30 | 34 | 31 | 38 | 25 | 25 | 30 | 47 | 50 | 60 | 33 | 23 | 02 | 34 | 06 | 35 | 23 | 34 | 10 |
| 31 | 39 | 25 | 37 | 19 | 29 | 30 | 46 | 50 | 45 | 28 | 28 | 01 | 22 | 12 | 27 | 24 | 34 | 25 |
| 32 | 31 | 26 | 34 | 12 | 21 | 22 | 31 | 32 | 26 | 16 | 21 | -02 | 22 | -02 | 23 | 25 | 21 | 31 |
| 33 | 34 | 18 | 22 | 12 | 30 | 25 | 26 | 33 | 38 | 29 | 24 | -04 | 21 | 08 | 18 | 23 | 28 | 16 |
| 34 | 04 | 07 | 11 | 15 | 06 | 12 | 00 | -01 | 08 | 07 | 11 | 20 | 04 | 11 | 14 | 10 | 02 | 08 |
| 35 | 22 | 27 | 30 | 18 | 29 | 28 | 36 | 40 | 39 | 19 | 26 | -13 | 29 | 04 | 21 | 20 | 42 | 27 |
| 36 | 22 | 25 | 32 | 15 | 15 | 28 | 40 | 42 | 41 | 24 | 18 | 06 | 39 | 13 | 19 | 26 | 27 | 14 |
| | | | | | | | | | | | | | | | | | | |
| I | **54** | **58** | **66** | **39** | **37** | **51** | 69 | 64 | 64 | 45 | 49 | 18 | 59 | 26 | 61 | 49 | 41 | 57 |
| R | 47 | 52 | 60 | 32 | 38 | 49 | **75** | **67** | **78** | **45** | 33 | 12 | 54 | 14 | 60 | 51 | 41 | 28 |
| P | 43 | 70 | 56 | 41 | 39 | 46 | 63 | 51 | 60 | 49 | **30** | **28** | **80** | **16** | **62** | **67** | **31** | 40 |
| KB | 64 | 55 | 57 | 46 | 54 | 56 | 54 | 55 | 52 | 38 | 33 | 14 | 40 | 18 | 60 | 38 | 38 | **49** |
| SN | 62 | 45 | 58 | 46 | 46 | 50 | 63 | 62 | 69 | 41 | 44 | 10 | 43 | 24 | 54 | 40 | 46 | 38 |
| S | 56 | 51 | 64 | 36 | 50 | 57 | 66 | 72 | 75 | 47 | 50 | 03 | 57 | 17 | 47 | 52 | 60 | 48 |

Table 1 (continued)

| | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 19 | 15 | | | | | | | | | | | | | | | | | |
| 20 | 17 | 18 | | | | | | | | | | | | | | | | |
| 21 | 29 | 14 | 33 | | | | | | | | | | | | | | | |
| 22 | 07 | 28 | 20 | 18 | | | | | | | | | | | | | | |
| 23 | 10 | 12 | 26 | 13 | 10 | | | | | | | | | | | | | |
| 24 | 24 | 24 | 42 | 27 | 12 | 35 | | | | | | | | | | | | |
| 25 | 30 | 24 | 35 | 20 | 14 | 33 | 33 | | | | | | | | | | | |
| 26 | 18 | 42 | 08 | 35 | 13 | 24 | 17 | 11 | | | | | | | | | | |
| 27 | 27 | 20 | 23 | 23 | 21 | 20 | 31 | 23 | 29 | | | | | | | | | |
| 28 | 19 | 30 | 38 | 24 | 23 | 31 | 30 | 22 | 31 | 33 | | | | | | | | |
| 29 | 21 | 16 | 49 | 20 | 28 | 51 | 33 | 25 | 23 | 38 | 32 | | | | | | | |
| 30 | 33 | 21 | 43 | 21 | 14 | 33 | 43 | 19 | 40 | 37 | 28 | 46 | | | | | | |
| 31 | 28 | 25 | 54 | 21 | 19 | 51 | 40 | 15 | 36 | 36 | 45 | 55 | 48 | | | | | |
| 32 | 26 | 13 | 40 | 15 | 20 | 29 | 43 | 12 | 22 | 18 | 30 | 27 | 30 | 17 | | | | |
| 33 | 21 | 09 | 38 | 14 | 26 | 25 | 28 | 08 | 24 | 31 | 21 | 35 | 30 | 21 | 26 | | | |
| 34 | 10 | 20 | 02 | 23 | 02 | 03 | 01 | 23 | 13 | 09 | 07 | 03 | -08 | -02 | 02 | 00 | | |
| 35 | 24 | 10 | 46 | 23 | 16 | 34 | 30 | 08 | 26 | 33 | 35 | 45 | 52 | 21 | 31 | 04 | 38 | |
| 36 | 20 | 10 | 24 | 15 | 10 | 21 | 25 | 14 | 33 | 20 | 22 | 37 | 29 | 26 | 23 | -05 | 30 | 23 |
| I | 51 | 44 | 56 | 52 | 34 | 57 | 65 | 49 | 56 | 59 | 52 | 60 | 59 | 48 | 46 | 18 | 51 | 45 |
| R | 41 | 21 | 46 | 33 | 25 | 46 | 54 | 23 | 53 | 40 | 47 | 72 | 64 | 40 | 48 | 05 | 51 | 55 |
| P | 29 | 29 | 34 | 47 | 33 | 35 | 49 | 38 | 63 | 46 | 36 | 50 | 47 | 34 | 38 | 23 | 41 | 47 |
| KB | **39** | **42** | **58** | **43** | **31** | **59** | 59 | 50 | 47 | 60 | 63 | 55 | 70 | 54 | 46 | 21 | 56 | 36 |
| SN | 44 | 45 | 63 | 41 | 33 | 61 | **57** | **33** | **54** | **57** | **57** | **68** | **70** | 46 | 45 | 12 | 58 | 45 |
| S | 50 | 31 | 74 | 45 | 37 | 56 | 63 | 32 | 59 | 55 | 57 | 73 | 66 | **41** | **51** | **00** | **61** | **48** |

| | I | R | P | KB | SN | S |
|---|---|---|---|---|---|---|
| I | 100 | 92 | 97 | 109 | 101 | 103 |
| R | 92 | 100 | 84 | 75 | 89 | 99 |
| P | 97 | 84 | 100 | 77 | 83 | 91 |
| KB | 109 | 75 | 77 | 100 | 102 | 106 |
| SN | 101 | 89 | 83 | 102 | 100 | 102 |
| S | 103 | 99 | 91 | 106 | 102 | 100 |

*The underlined numbers in the diagonal show the reliabilities for each item (without decimals). The factor loadings complete the matrix, bolded loadings indicate an item is part of the factor where I = individual barriers, R = relational barriers, P = physical barriers, KB = knowledge-based/self-efficacy barriers, SN = social norms/cultural values barriers, and S = structural barriers.

Table 2

The Expected and Error Correlation Matrix for the Proposed Six-Factor Model*

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | 00 | 01 | 01 | 01 | 01 | 01 | 03 | 03 | 05 | 23 | 18 | 21 | 02 | 02 | 21 | 02 | 19 |
| 2 | 31 | | 00 | 02 | 01 | 02 | 01 | 07 | 03 | 08 | 10 | 08 | 10 | 01 | 05 | 07 | 03 | 04 |
| 3 | 36 | 38 | | 01 | 07 | 06 | 05 | 01 | 05 | 01 | 08 | 05 | 16 | 01 | 03 | 14 | 08 | 06 |
| 4 | 21 | 23 | 26 | | 06 | 06 | 01 | 01 | 06 | 05 | 00 | 08 | 11 | 21 | 03 | 16 | 06 | 03 |
| 5 | 20 | 21 | 24 | 14 | | 01 | 02 | 11 | 06 | 08 | 15 | 06 | 02 | 03 | 02 | 02 | 04 | 04 |
| 6 | 28 | 30 | 34 | 20 | 19 | | 01 | 01 | 00 | 03 | 05 | 14 | 16 | 09 | 01 | 08 | 11 | 08 |
| 7 | 37 | 40 | 45 | 27 | 25 | 35 | | 02 | 01 | 00 | 04 | 09 | 06 | 02 | 07 | 08 | 13 | 02 |
| 8 | 33 | 36 | 40 | 24 | 23 | 31 | 50 | | 00 | 01 | 05 | 17 | 11 | 01 | 02 | 05 | 12 | 01 |
| 9 | 39 | 41 | 47 | 28 | 27 | 37 | 58 | 52 | | 02 | 10 | 06 | 17 | 00 | 03 | 14 | 09 | 11 |
| 10 | 22 | 24 | 28 | 17 | 16 | 21 | 33 | 30 | 35 | | 02 | 00 | 00 | 02 | 13 | 12 | 05 | 10 |
| 11 | 16 | 16 | 19 | 12 | 11 | 15 | 18 | 17 | 19 | 12 | | 06 | 03 | 07 | 04 | 04 | 09 | 15 |
| 12 | 15 | 16 | 17 | 11 | 10 | 14 | 18 | 16 | 18 | 11 | 08 | | 05 | 08 | 07 | 00 | 14 | 04 |
| 13 | 42 | 45 | 51 | 30 | 29 | 40 | 50 | 45 | 52 | 30 | 24 | 22 | | 04 | 02 | 02 | 05 | 08 |
| 14 | 09 | 09 | 11 | 06 | 06 | 08 | 10 | 09 | 10 | 06 | 05 | 04 | 13 | | 04 | 05 | 03 | 01 |
| 15 | 32 | 35 | 40 | 23 | 22 | 31 | 39 | 35 | 40 | 24 | 19 | 17 | 50 | 10 | | 08 | 02 | 04 |
| 16 | 35 | 38 | 43 | 25 | 24 | 33 | 42 | 38 | 44 | 25 | 20 | 19 | 54 | 11 | 42 | | 05 | 06 |
| 17 | 16 | 17 | 19 | 12 | 11 | 16 | 19 | 18 | 20 | 12 | 09 | 09 | 25 | 05 | 19 | 21 | | 04 |
| 18 | 28 | 31 | 35 | 21 | 20 | 27 | 27 | 25 | 29 | 17 | 12 | 11 | 30 | 06 | 23 | 25 | 12 | |
| 19 | 23 | 25 | 28 | 16 | 15 | 22 | 22 | 20 | 23 | 14 | 09 | 08 | 24 | 05 | 18 | 20 | 09 | 19 |
| 20 | 25 | 26 | 31 | 17 | 17 | 23 | 23 | 21 | 25 | 14 | 10 | 09 | 26 | 05 | 20 | 22 | 10 | 21 |
| 21 | 34 | 37 | 41 | 25 | 23 | 33 | 32 | 29 | 34 | 20 | 13 | 12 | 35 | 07 | 28 | 30 | 14 | 28 |
| 22 | 25 | 27 | 31 | 19 | 17 | 24 | 24 | 22 | 26 | 14 | 10 | 09 | 26 | 05 | 21 | 22 | 10 | 21 |
| 23 | 19 | 20 | 22 | 13 | 12 | 17 | 17 | 16 | 18 | 11 | 07 | 07 | 19 | 04 | 15 | 16 | 08 | 15 |
| 24 | 35 | 37 | 43 | 25 | 24 | 33 | 33 | 30 | 35 | 20 | 14 | 13 | 36 | 07 | 28 | 31 | 14 | 29 |
| 25 | 31 | 33 | 38 | 22 | 21 | 29 | 37 | 34 | 39 | 23 | 14 | 13 | 39 | 08 | 29 | 32 | 15 | 29 |
| 26 | 18 | 19 | 22 | 13 | 12 | 17 | 21 | 20 | 23 | 13 | 08 | 08 | 22 | 04 | 17 | 18 | 08 | 16 |
| 27 | 29 | 31 | 36 | 21 | 20 | 28 | 36 | 32 | 37 | 21 | 13 | 13 | 36 | 08 | 28 | 30 | 14 | 27 |
| 28 | 31 | 33 | 38 | 22 | 21 | 29 | 37 | 34 | 39 | 23 | 14 | 13 | 39 | 08 | 29 | 32 | 15 | 29 |
| 29 | 31 | 33 | 38 | 22 | 21 | 29 | 37 | 34 | 39 | 23 | 14 | 13 | 39 | 08 | 29 | 32 | 15 | 29 |
| 30 | 37 | 39 | 45 | 27 | 25 | 35 | 45 | 41 | 47 | 28 | 17 | 16 | 45 | 09 | 35 | 39 | 18 | 34 |
| 31 | 38 | 41 | 46 | 27 | 25 | 36 | 46 | 42 | 49 | 28 | 18 | 17 | 47 | 09 | 36 | 39 | 18 | 35 |
| 32 | 23 | 25 | 28 | 16 | 15 | 22 | 30 | 27 | 32 | 18 | 11 | 10 | 30 | 06 | 23 | 25 | 12 | 21 |
| 33 | 29 | 31 | 34 | 21 | 20 | 27 | 38 | 34 | 40 | 23 | 14 | 13 | 37 | 07 | 29 | 31 | 15 | 27 |
| 34 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 35 | 34 | 36 | 41 | 25 | 24 | 32 | 45 | 41 | 48 | 27 | 16 | 15 | 45 | 09 | 35 | 37 | 17 | 32 |
| 36 | 27 | 29 | 33 | 20 | 19 | 26 | 36 | 33 | 38 | 22 | 14 | 13 | 35 | 07 | 27 | 30 | 14 | 25 |

Table 2 (continued)

| | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 11 | 01 | 03 | 08 | 02 | 06 | 23 | 00 | 02 | 09 | 01 | 03 | 01 | 08 | 05 | 04 | 12 | 05 |
| 2 | 00 | 07 | 19 | 02 | 00 | 08 | 05 | 04 | 00 | 14 | 13 | 08 | 16 | 01 | 13 | 07 | 09 | 04 |
| 3 | 08 | 14 | 08 | 11 | 07 | 09 | 08 | 03 | 04 | 15 | 05 | 07 | 09 | 06 | 13 | 11 | 11 | 01 |
| 4 | 00 | 17 | 13 | 16 | 01 | 05 | 06 | 30 | 13 | 01 | 02 | 02 | 08 | 04 | 09 | 15 | 07 | 05 |
| 5 | 01 | 02 | 17 | 10 | 00 | 10 | 08 | 09 | 07 | 16 | 08 | 00 | 03 | 06 | 10 | 06 | 05 | 04 |
| 6 | 05 | 02 | 02 | 05 | 08 | 06 | 04 | 08 | 00 | 11 | 08 | 05 | 06 | 00 | 02 | 12 | 04 | 02 |
| 7 | 12 | 11 | 05 | 10 | 01 | 00 | 09 | 08 | 01 | 12 | 01 | 02 | 00 | 01 | 12 | 00 | 09 | 04 |
| 8 | 09 | 02 | 06 | 00 | 01 | 01 | 07 | 07 | 06 | 10 | 03 | 09 | 08 | 05 | 01 | 01 | 01 | 09 |
| 9 | 03 | 17 | 02 | 02 | 09 | 02 | 04 | 08 | 10 | 04 | 02 | 13 | 04 | 06 | 02 | 08 | 09 | 03 |
| 10 | 06 | 02 | 01 | 14 | 06 | 06 | 02 | 06 | 00 | 02 | 03 | 05 | 00 | 02 | 06 | 07 | 08 | 02 |
| 11 | 05 | 03 | 06 | 03 | 02 | 03 | 31 | 07 | 04 | 13 | 04 | 06 | 10 | 10 | 10 | 11 | 10 | 04 |
| 12 | 11 | 00 | 11 | 15 | 01 | 13 | 17 | 10 | 03 | 07 | 11 | 14 | 16 | 12 | 17 | 20 | 28 | 07 |
| 13 | 05 | 17 | 08 | 04 | 12 | 13 | 11 | 09 | 09 | 14 | 18 | 11 | 25 | 08 | 16 | 04 | 16 | 04 |
| 14 | 05 | 17 | 08 | 11 | 01 | 09 | 02 | 21 | 22 | 00 | 01 | 03 | 03 | 08 | 01 | 11 | 05 | 06 |
| 15 | 07 | 02 | 03 | 08 | 18 | 06 | 01 | 07 | 14 | 00 | 01 | 00 | 09 | 00 | 11 | 14 | 14 | 08 |
| 16 | 07 | 05 | 16 | 02 | 03 | 11 | 09 | 03 | 01 | 10 | 12 | 16 | 15 | 00 | 08 | 10 | 17 | 04 |
| 17 | 05 | 02 | 08 | 12 | 14 | 04 | 11 | 02 | 20 | 13 | 01 | 16 | 16 | 09 | 13 | 02 | 25 | 13 |
| 18 | 03 | 01 | 07 | 03 | 03 | 03 | 04 | 03 | 09 | 00 | 12 | 24 | 10 | 10 | 11 | 08 | 05 | 11 |
| 19 | | 01 | 06 | 10 | 02 | 01 | 08 | 05 | 06 | 03 | 01 | 05 | 00 | 09 | 00 | 10 | 01 | 00 |
| 20 | 16 | | 10 | 10 | 01 | 01 | 00 | 28 | 03 | 06 | 08 | 09 | 05 | 05 | 13 | 20 | 18 | 12 |
| 21 | 23 | 24 | | 05 | 08 | 08 | 01 | 11 | 09 | 04 | 15 | 03 | 12 | 15 | 06 | 02 | 09 | 06 |
| 22 | 17 | 18 | 25 | | 00 | 02 | 06 | 21 | 00 | 02 | 06 | 09 | 10 | 04 | 09 | 23 | 05 | 07 |
| 23 | 12 | 13 | 18 | 13 | | 06 | 04 | 03 | 04 | 05 | 10 | 07 | 03 | 06 | 09 | 02 | 04 | 06 |
| 24 | 23 | 25 | 34 | 25 | 18 | | 02 | 05 | 13 | 04 | 16 | 08 | 09 | 04 | 07 | 03 | 04 | 10 |
| 25 | 22 | 24 | 34 | 26 | 18 | 35 | | 02 | 00 | 02 | 01 | 04 | 00 | 20 | 02 | 01 | 06 | 04 |
| 26 | 13 | 14 | 19 | 14 | 10 | 19 | 19 | | 05 | 03 | 06 | 03 | 08 | 02 | 09 | 23 | 12 | 02 |
| 27 | 21 | 23 | 32 | 23 | 17 | 33 | 31 | 18 | | 00 | 08 | 03 | 02 | 00 | 05 | 13 | 08 | 06 |
| 28 | 22 | 24 | 34 | 26 | 18 | 35 | 32 | 19 | 31 | | 06 | 02 | 04 | 05 | 01 | 09 | 03 | 09 |
| 29 | 22 | 24 | 34 | 26 | 18 | 35 | 32 | 19 | 31 | 32 | | 11 | 05 | 07 | 09 | 07 | 01 | 07 |
| 30 | 28 | 30 | 40 | 30 | 21 | 41 | 39 | 22 | 37 | 39 | 39 | | 07 | 02 | 01 | 03 | 03 | 03 |
| 31 | 28 | 30 | 42 | 31 | 22 | 42 | 40 | 23 | 38 | 40 | 40 | 48 | | 00 | 07 | 08 | 08 | 06 |
| 32 | 17 | 18 | 25 | 19 | 14 | 25 | 23 | 14 | 22 | 23 | 23 | 29 | 30 | | 00 | 02 | 04 | 06 |
| 33 | 21 | 22 | 32 | 23 | 17 | 32 | 30 | 17 | 29 | 30 | 30 | 36 | 37 | 21 | | 02 | 00 | 02 |
| 34 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | | 04 | 05 |
| 35 | 25 | 28 | 37 | 28 | 20 | 38 | 36 | 20 | 34 | 36 | 36 | 42 | 44 | 25 | 31 | 00 | | 00 |
| 36 | 20 | 22 | 30 | 22 | 16 | 31 | 29 | 16 | 27 | 29 | 29 | 34 | 35 | 20 | 25 | 00 | 30 | |

*In this matrix, the lower diagonal presents the expected/predicted correlations (without decimals) for items of all six factors; the upper diagonal presents the residuals.

Social norms/cultural values barriers to condom use. On the questionnaire, nine items were intended to measure social norms/cultural values barriers to condom use (see Appendix E for a listing of the items, their means, and standard deviations). Three of the original nine items were recoded as needed. These nine items failed to fit a single factor. After analyzing content validity and performing a factor analysis on these nine items, this scale was reduced to seven items (those items in bold in Appendix E). The reliability of this seven-item scale measuring social norms/cultural values barriers to condom use was fair at $\alpha = .77$. These seven items loaded on a single factor, where the percent of those items for which the error was greater than sampling error was 4.76% (see items 25-31 in Tables 1 and 2). Social norms/cultural values barriers to condom use were then measured by this seven-item scale.

Structural barriers to condom use. The scale to measure structural barriers to condom use was developed with the same procedures as outlined above. The original scale consisted of 13 items (see Appendix F for a listing of the items, their means, and standard deviations). Four of the 13 items were recoded as needed. The proposed scale, consisting of the 13 items, failed to fit a single factor. Following analyses of content validity and internal consistency, this scale was reduced to five items (those items in bold in Appendix F). These five items provided a scale with low reliability at $\alpha = .47$. The five-item scale fit a single-factor model with the percent of items for which the error was greater than sampling error being 0.00% (see items 32-36 in Tables 1 and 2). These five items were then used as the scale in the proposed six-factor model to measure structural barriers to condom use.

Analysis for Parallelism

As Hypothesis 1 proposed a second-order unidimensional model, in addition to the tests of internal consistency of the six factors performed above, tests for parallelism of the six-factor model (all 36 barrier items) were performed in order to begin to test Hypothesis 1 (see Appendix G for a listing of the 36 items used for further analyses).

Using the six specified factors, which fit the model in terms of internal consistency, tests of parallelism indicated that the percent of items for which error was greater than sampling error was 21.64%, indicating that the proposed six factor barrier scale failed to fit the model.

As these six dimensions failed to fit a first-order factor structure, it was impossible to complete the analysis for Hypothesis 1, to determine if these items fit a second-order unidimensional factor structure with the six barrier factors underlying the factor of perceived barriers. In order to test that hypothesis, one would take the correlations among the six factors (the factor correlation matrix) and subject that matrix to a factor analysis. In so doing, the individual factors would have replaced the scale items as measures of the overall factor, the procedure that is followed to test a hypothesis of second-order unidimensionality (Hunter & Gerbing, 1982). However, as the 36 items used to test the notion of a six-factor first-order structure failed to fit that model, the test for second-order unidimensionality was rendered irrelevant in this case. Thus, the data were not consistent with the hypothesized model.

Hypotheses 2a and 2b were contingent upon the data being consistent with Hypothesis 1, as Hypotheses 2a and 2b hypothesized that the proposed factor structure

was replicable cross-culturally. Due to the lack of consistency of the data with Hypothesis 1, Hypotheses 2a and 2b were, in effect, rendered irrelevant and could not be tested.

Further Analysis

As none of the hypotheses could be adequately tested based upon the result that a confirmatory factor analysis failed to find the expected first-order factor structure with the proposed six factors, a *post hoc* hypothesis was offered. Although the six-factor model failed in tests of parallelism, the success of the six factors in tests of internal consistency indicate that there may indeed be multiple dimensions underlying the overall perceived barriers dimension. Thus, the *post hoc* hypothesis suggested is a revision of Hypothesis 1:

> *Post Hoc* Hypothesis 1a: The perceived barriers dimension suggested by the Health Belief Model will fit a second-order unidimensional factor structure, with multiple factors underlying the overall factor of perceived barriers to condom use.

In order to test this *post hoc* hypothesis, confirmatory factor analysis procedures were again employed. Upon careful analysis of the six factors originally proposed, it appeared that two of the six proposed factors (physical barriers and knowledge-based/self-efficacy barriers) were causing the model to fail in tests of parallelism. Therefore, after repeated attempts to reduce the number of items from the scales measuring these two factors, it was decided that these two factors would be removed entirely from further tests of the factor model. Following the removal of these two factors, slight alterations were made to the remaining four factors (removal of individual items from these remaining four factors) and a 16-item scale that was consistent with a four-factor model was found to fit the data.

The four remaining factors were those of individual barriers, relational barriers, social norms/cultural values barriers, and structural barriers to condom use. Each of these four factors was measured by four items, thus allowing one to perform tests of both internal consistency and parallelism. The 16 items used in this four-factor analysis, along with their means and standard deviations, are reported in Appendix H.

Internal consistency analysis of the four-factor model. The four items used to measure the dimension of individual barriers to condom use (see Appendix H) provided a scale with low reliability ($\alpha = .60$). The scale fit a single-factor model with the percent of items for which error was greater than sampling error being 0.00% (see items 2, 3, 5, and 6 in Table 3 for observed correlations and factor loadings, and in Table 4 for expected correlations and residuals). These four items were then used as the scale in the four-factor model to measure the dimension of individual barriers to condom use.

The four items used to measure the dimension of relational barriers to condom use (see Appendix H) provided a scale with fair reliability ($\alpha = .75$). The scale fit a single-factor model with the percent of items for which error was greater than sampling error being 0.00% (see items 7, 8, 9, and 10 in Table 3 for observed correlations and factor loadings, and in Table 4 for expected correlations and residuals). These four items were then used as the scale in the four-factor model to measure the dimension of relational barriers to condom use.

The four items used to measure the dimension of social norms/cultural values barriers to condom use (see Appendix H) provided a scale with low reliability ($\alpha = .62$).

Table 3

The Observed Correlations and Factor Loading Matrix for the Four-Factor Model*

| | 2 | 3 | 5 | 6 | 7 | 8 | 9 | 10 | 25 | 26 | 27 | 30 | 32 | 33 | 35 | 36 | I | R | SN | S |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 31 | | | | | | | | | | | | | | | | | | | |
| 3 | 38 | 47 | | | | | | | | | | | | | | | | | | |
| 5 | 20 | 31 | 17 | | | | | | | | | | | | | | | | | |
| 6 | 28 | 28 | 18 | 20 | | | | | | | | | | | | | | | | |
| 7 | 39 | 50 | 23 | 36 | 56 | | | | | | | | | | | | | | | |
| 8 | 29 | 39 | 34 | 32 | 52 | 45 | | | | | | | | | | | | | | |
| 9 | 38 | 42 | 21 | 37 | 57 | 52 | 61 | | | | | | | | | | | | | |
| 10 | 32 | 29 | 24 | 24 | 33 | 29 | 37 | 20 | | | | | | | | | | | | |
| 25 | 28 | 46 | 29 | 25 | 46 | 41 | 35 | 21 | 32 | | | | | | | | | | | |
| 26 | 23 | 19 | 21 | 25 | 13 | 13 | 15 | 19 | 17 | 10 | | | | | | | | | | |
| 27 | 31 | 32 | 13 | 28 | 35 | 28 | 47 | 21 | 31 | 23 | 36 | | | | | | | | | |
| 30 | 31 | 38 | 25 | 30 | 47 | 50 | 60 | 33 | 43 | 19 | 40 | 47 | | | | | | | | |
| 32 | 26 | 34 | 21 | 22 | 31 | 32 | 26 | 16 | 43 | 12 | 22 | 27 | 18 | | | | | | | |
| 33 | 18 | 22 | 30 | 25 | 26 | 33 | 38 | 29 | 28 | 98 | 24 | 35 | 21 | 24 | | | | | | |
| 35 | 27 | 30 | 29 | 28 | 36 | 40 | 39 | 19 | 30 | 08 | 26 | 45 | 21 | 31 | 32 | | | | | |
| 36 | 25 | 32 | 15 | 28 | 40 | 42 | 41 | 24 | 25 | 14 | 33 | 37 | 26 | 23 | 30 | 28 | | | | |
| I | **56** | **69** | **41** | **45** | 70 | 64 | 66 | 52 | 61 | 42 | 50 | 59 | 49 | 45 | 54 | 48 | 100 | 95 | 97 | 97 |
| R | 52 | 60 | 38 | 49 | **75** | **67** | **78** | **45** | 54 | 23 | 53 | 72 | 40 | 48 | 51 | 55 | 95 | 100 | 93 | 96 |
| SN | 52 | 62 | 41 | 50 | 65 | 65 | 72 | 43 | **57** | **32** | **60** | **69** | 48 | 44 | 50 | 50 | 97 | 93 | 100 | 95 |
| S | 48 | 59 | 47 | 51 | 66 | 73 | 71 | 44 | 62 | 21 | 52 | 71 | **43** | **49** | **56** | **53** | 97 | 96 | 95 | 100 |

* The numbers used to identify the items are from Appendix H. The underlined numbers in the diagonal show the reliabilities for each item (without decimals). The factor loadings complete the matrix, bolded loadings indicate an item is part of a factor where I = individual barriers, R = relational barriers, SN = social norms/cultural values barriers, and S = structural barriers.

Table 4

The Expected and Error Correlation Matrix for the Four-Factor Model*

| | 2 | 3 | 5 | 6 | 7 | 8 | 9 | 10 | 25 | 26 | 27 | 30 | 32 | 33 | 35 | 36 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | | 0 | 3 | 3 | 0 | 7 | 4 | 8 | 3 | 6 | 2 | 6 | 3 | 8 | 3 | 4 |
| 3 | 38 | | 3 | 3 | 2 | 5 | 7 | 0 | 8 | 2 | 8 | 7 | 6 | 10 | 7 | 3 |
| 5 | 23 | 28 | | 0 | 6 | 8 | 9 | 7 | 7 | 8 | 11 | 2 | 4 | 11 | 7 | 6 |
| 6 | 25 | 31 | 18 | | 5 | 3 | 4 | 5 | 0 | 11 | 2 | 0 | 4 | 4 | 4 | 5 |
| 7 | 39 | 48 | 29 | 31 | | 2 | 1 | 0 | 7 | 9 | 6 | 0 | 0 | 9 | 3 | 3 |
| 8 | 36 | 44 | 26 | 29 | 50 | | 0 | 1 | 6 | 7 | 1 | 7 | 4 | 1 | 4 | 7 |
| 9 | 42 | 50 | 30 | 33 | 58 | 52 | | 2 | 6 | 8 | 3 | 11 | 7 | 2 | 3 | 2 |
| 10 | 24 | 29 | 17 | 19 | 33 | 30 | 35 | | 3 | 6 | 4 | 4 | 2 | 8 | 5 | 1 |
| 25 | 31 | 38 | 22 | 25 | 39 | 35 | 41 | 24 | | 1 | 3 | 4 | 19 | 1 | 0 | 4 |
| 26 | 17 | 21 | 13 | 14 | 22 | 20 | 23 | 13 | 18 | | 4 | 3 | 1 | 7 | 9 | 2 |
| 27 | 33 | 40 | 24 | 26 | 41 | 37 | 44 | 25 | 34 | 19 | | 1 | 3 | 4 | 6 | 3 |
| 30 | 37 | 45 | 27 | 30 | 47 | 43 | 49 | 29 | 39 | 22 | 41 | | 1 | 4 | 9 | 3 |
| 32 | 23 | 28 | 17 | 18 | 31 | 28 | 3 | 18 | 24 | 13 | 25 | 28 | | 0 | 3 | 3 |
| 33 | 26 | 32 | 19 | 21 | 35 | 32 | 36 | 21 | 27 | 15 | 28 | 31 | 21 | | 4 | 3 |
| 35 | 30 | 37 | 22 | 24 | 39 | 36 | 42 | 24 | 30 | 17 | 32 | 36 | 24 | 27 | | 0 |
| 36 | 29 | 35 | 21 | 23 | 37 | 35 | 39 | 23 | 29 | 16 | 30 | 34 | 23 | 26 | 30 | |

* The numbers used to identify the items are from Appendix H. In this matrix, the lower diagonal presents the expected/predicted correlations (without decimals) for items of the four factors; the upper diagonal presents the residuals.

The scale fit a single-factor model with the percent of items for which error was greater than sampling error being 0.00% (see items 25, 26, 27, and 30 in Table 3 for observed correlations and factor loadings, and in Table 4 for expected correlations and residuals). These four items were then used as the scale in the four-factor model to measure the dimension of social norms/cultural values barriers to condom use.

The four items used to measure the dimension of structural barriers to condom use (see Appendix H) provided a scale with low reliability ($\alpha = .58$). The scale fit a single-factor model with the percent of items for which error was greater than sampling error being 0.00% (see items 32, 33, 35, and 36 in Table 3 for observed correlations and factor loadings, and in Table 4 for expected correlations and residuals). These four items were then used as the scale in the four-factor model to measure the dimension of structural barriers to condom use.

Analysis for parallelism for the four-factor model. An analysis for parallelism revealed that the percent of items for which error was greater than sampling error was 4.17%, indicating that the four-factor model fit the data. Using tests for parallelism allowing for variation in the quality of the items, the factor of individual barriers revealed $\chi^2$ (9, N = 320) = 4.12, $p > .05$, the factor of relational barriers revealed $\chi^2$ (9, N = 320) = 4.89, $p > .05$, the factor of social norms/cultural values barriers revealed $\chi^2$ (9, N = 320) = 6.91, $p > .05$, and the factor of structural barriers revealed $\chi^2$ (9, N = 320) = 1.89, $p > .05$. Thus, confirmatory factor analysis procedures indicated that such a four-factor model fit the data.[7]

Analysis for second-order unidimensionality. In order to test the hypothesis that such a four-factor model was second-order unidimensional, the factor correlation matrix

obtained from confirmatory factor analysis of the four-factor model was entered as the matrix to be use in the subsequent factor analysis. In such a way, by using the correlations of the factors with each other, one is able to test for evidence of second-order unidimensionality (Hunter & Gerbing, 1982). Although each of the factors was highly correlated (see Table 3), they failed to fit a single-factor model, which would be consistent with the hypothesis of second-order unidimensionality. A possibility as to why such strongly correlated factors do not fit a single factor is that the items underlying each factor may constitute a Guttman simplex. Thus, an analysis was performed to determine if there was evidence for a Guttman simplex.

In order to test if the data are consistent with the existence of a Guttman simplex, the mean difference between the variables (the individual items) is correlated with the correlation of the variables (Guttman, 1955; Hunter & Boster, 1987). If a Guttman simplex exists, analysis should show a high negative correlation. No evidence of a Guttman simplex was found in these data, the obtained correlation was -.22.

Thus, although the 16-items used to measure perceived barriers to condom use (four items for each of the four proposed dimensions) fit a four-factor model, they failed to fit a second-order unidimensional model, as suggested by post-hoc Hypothesis 1a. These data were therefore not consistent with post hoc Hypothesis 1a.

As noted, the correlations among the factors in the successful four-factor model (see Table 3), were quite strong. Such strong correlations indicated that the items underlying these four factors are not conceptually distinct; rather, they appear to be alternate indicators of the same factor. In addition, the high correlations between the factors suggest problems of multicollinearity were the factors considered to be separate

factors. Although the four-factor model does fit the data, it appears as though a simpler model may fit the data as well. Thus, a one-factor model was tested.

Analysis of a one-factor barrier model. Using the 16 items used in the successful four-factor analysis, confirmatory factor analysis procedures were used to test whether or not a simpler model (one factor) would fit the data. After the deletion of four of the 16 items, the remaining 12 items (those items in bold in Appendix H) formed a "perceived barrier scale" with good reliability ($\alpha = .85$). The scale fit a single factor model with the percent of items for which error was greater than sampling error being 1.52% (see Table 5 for observed correlations and factor loadings, and Table 6 for expected correlations and residuals).

Cross-cultural analysis of the factor model. As the proposed second-order unidimensional factor models (both the six-factor model and the four-factor model) failed to fit the data, tests of Hypotheses 2a and 2b were not performed on the six- and four-factor models. However, the sample was split and separate factor analysis were performed for the United States data and the Kenyan data to determine if the one-factor model (consisting of 12 items) was replicable in cross-cultural analysis. When data from the United States sample were used, the one-factor analysis (with the 12-item scale providing good reliability, $\alpha = .87$) failed to fit a one-factor model (see Table 7 for observed correlations and factor loadings, and Table 8 for expected correlations and residuals). The percent of items for which error was greater than sampling error was 12.12%. When the subsample consisting of the Kenyan data was analyzed, the one-factor model (with the 12-item scale providing good reliability, $\alpha = .80$) fit a one-factor model of the data (see Table 9 for observed correlations and factor loadings, and Table 10 for

expected correlations and residuals). The percent of items for which error was greater than sampling error was 3.03%.

Therefore, the data were not consistent with the initial hypotheses. Due to this fact, Hypotheses 2a and 2b could not be tested. A *post hoc* hypothesis was offered, as there appeared as though the data may be consistent with the notion of multidimensionality of the perceived barriers dimension. Although a multidimensional solution with four factors was found to fit the data, the same factor model did not fit a second-order unidimensional factor model, as hypothesized. As the correlations among the four factors were quite strong, it appeared that even though the four-factor model fit the data, the items may actually be alternate indicators of the same factor. A simpler, one-factor model was then tested and found to fit the data. This one-factor model was then tested cross-culturally (as suggested by Hypotheses 2a and 2b) and it was found that the one-factor model was not replicated in the United States subsample, but was replicated in the Kenyan subsample.

Table 5

The Observed Correlations and Factor Loading Matrix for the Single-Factor Model*

| | 2 | 3 | 6 | 7 | 8 | 10 | 25 | 27 | 30 | 33 | 35 | 36 | B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 27 | | | | | | | | | | | | 51 |
| 3 | 38 | 38 | | | | | | | | | | | 62 |
| 6 | 28 | 28 | 24 | | | | | | | | | | 49 |
| 7 | 39 | 50 | 36 | 52 | | | | | | | | | 72 |
| 8 | 29 | 39 | 32 | 52 | 48 | | | | | | | | 69 |
| 10 | 32 | 29 | 24 | 33 | 29 | 21 | | | | | | | 46 |
| 25 | 28 | 46 | 25 | 46 | 41 | 21 | 34 | | | | | | 58 |
| 27 | 31 | 32 | 28 | 35 | 38 | 21 | 31 | 29 | | | | | 54 |
| 30 | 31 | 38 | 30 | 47 | 50 | 33 | 43 | 40 | 49 | | | | 70 |
| 33 | 18 | 22 | 25 | 26 | 33 | 29 | 28 | 24 | 35 | 21 | | | 46 |
| 35 | 27 | 30 | 28 | 36 | 40 | 19 | 30 | 26 | 45 | 31 | 29 | | 54 |
| 36 | 25 | 32 | 28 | 40 | 42 | 24 | 25 | 33 | 37 | 23 | 30 | 29 | 54 |
| B | 51 | 62 | 49 | 72 | 69 | 46 | 58 | 54 | 70 | 46 | 54 | 54 | 100 |

* The numbers used to identify the items are from Appendix H. The underlined numbers in the diagonal show the reliabilities for each item (without decimals). The factor loadings complete the matrix; here, the items load on one overall perceived barriers factor (B).

Table 6

The Expected and Error Correlation Matrix for the Single-Factor Model*

| | 2 | 3 | 6 | 7 | 8 | 10 | 25 | 27 | 30 | 33 | 35 | 36 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | | 6 | 3 | 2 | 6 | 9 | 2 | 3 | 5 | 5 | 1 | 3 |
| 3 | 32 | | 2 | 5 | 4 | 0 | 10 | 1 | 5 | 7 | 3 | 1 |
| 6 | 25 | 30 | | 1 | 2 | 1 | 3 | 2 | 4 | 2 | 2 | 2 |
| 7 | 37 | 45 | 35 | | 2 | 0 | 4 | 4 | 3 | 7 | 3 | 1 |
| 8 | 35 | 43 | 34 | 50 | | 3 | 1 | 1 | 2 | 1 | 3 | 5 |
| 10 | 23 | 29 | 23 | 33 | 32 | | 6 | 4 | 1 | 8 | 6 | 1 |
| 25 | 30 | 36 | 28 | 42 | 40 | 27 | | 0 | 2 | 1 | 1 | 6 |
| 27 | 28 | 33 | 26 | 39 | 37 | 25 | 31 | | 2 | 1 | 3 | 4 |
| 30 | 36 | 43 | 34 | 50 | 48 | 32 | 41 | 38 | | 3 | 7 | 1 |
| 33 | 23 | 29 | 23 | 33 | 32 | 21 | 27 | 25 | 32 | | 6 | 2 |
| 35 | 28 | 33 | 26 | 39 | 37 | 25 | 31 | 29 | 38 | 25 | | 1 |
| 36 | 28 | 33 | 26 | 39 | 37 | 25 | 31 | 29 | 38 | 25 | 29 | |

* The numbers used to identify the items are from Appendix H. In this matrix, the lower diagonal presents the expected/predicted correlations (without decimals) for items of the overall perceived barriers factor; the upper diagonal presents the residuals.

Table 7

The Observed Correlations and Factor Loading Matrix for the Single-Factor Model using Data from the United States Sample Only*

| | 2 | 3 | 6 | 7 | 8 | 10 | 25 | 27 | 30 | 33 | 35 | 36 | B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 29 | | | | | | | | | | | | 54 |
| 3 | 42 | 52 | | | | | | | | | | | 72 |
| 6 | 26 | 31 | 24 | | | | | | | | | | 49 |
| 7 | 33 | 63 | 30 | 50 | | | | | | | | | 70 |
| 8 | 29 | 57 | 27 | 73 | 52 | | | | | | | | 72 |
| 10 | 42 | 37 | 28 | 33 | 26 | 25 | | | | | | | 50 |
| 25 | 35 | 50 | 24 | 56 | 67 | 21 | 39 | | | | | | 63 |
| 27 | 31 | 33 | 31 | 33 | 37 | 26 | 32 | 32 | | | | | 57 |
| 30 | 39 | 49 | 29 | 44 | 46 | 30 | 38 | 40 | 46 | | | | 68 |
| 33 | 25 | 40 | 48 | 38 | 39 | 38 | 26 | 40 | 45 | 38 | | | 62 |
| 35 | 34 | 38 | 30 | 35 | 46 | 21 | 40 | 53 | 64 | 42 | 43 | | 65 |
| 36 | 25 | 32 | 27 | 24 | 24 | 36 | 27 | 25 | 23 | 29 | 29 | 19 | 44 |
| B | 54 | 72 | 49 | 70 | 72 | 50 | 63 | 57 | 68 | 62 | 65 | 44 | 100 |

* The numbers used to identify the items are from Appendix H. The underlined numbers in the diagonal show the reliabilities for each item (without decimals). The factor loadings complete the matrix; here, the items load on one overall perceived barriers factor (B).

Table 8

The Expected and Error Correlation Matrix for the Single-Factor Model using Data from the United States Sample Only*

| | 2 | 3 | 6 | 7 | 8 | 10 | 25 | 27 | 30 | 33 | 35 | 36 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | | 3 | 0 | 5 | 10 | 15 | 1 | 0 | 2 | 8 | 1 | 1 |
| 3 | 39 | | 4 | 13 | 5 | 1 | 5 | 8 | 0 | 5 | 9 | 0 |
| 6 | 26 | 35 | | 4 | 8 | 3 | 7 | 3 | 4 | 18 | 2 | 5 |
| 7 | 38 | 50 | 34 | | 23 | 2 | 12 | 7 | 4 | 5 | 11 | 7 |
| 8 | 39 | 52 | 35 | 50 | | 10 | 22 | 4 | 3 | 6 | 1 | 8 |
| 10 | 27 | 36 | 25 | 35 | 36 | | 11 | 3 | 4 | 7 | 12 | 14 |
| 25 | 34 | 45 | 31 | 44 | 45 | 32 | | 4 | 5 | 13 | 1 | 1 |
| 27 | 31 | 41 | 28 | 40 | 41 | 29 | 36 | | 1 | 5 | 16 | 0 |
| 30 | 37 | 49 | 33 | 48 | 49 | 34 | 43 | 39 | | 3 | 20 | 7 |
| 33 | 33 | 45 | 30 | 43 | 45 | 31 | 39 | 35 | 42 | | 2 | 2 |
| 35 | 35 | 47 | 32 | 46 | 47 | 33 | 41 | 37 | 44 | 40 | | 0 |
| 36 | 24 | 32 | 22 | 31 | 32 | 22 | 28 | 25 | 30 | 27 | 29 | |

* The numbers used to identify the items are from Appendix H. In this matrix, the lower diagonal presents the expected/predicted correlations (without decimals) for items of the overall perceived barriers factor; the upper diagonal presents the residuals.

Table 9

The Observed Correlations and Factor Loading Matrix for the Single-Factor Model using Data from the Kenyan Sample Only*

| | 2 | 3 | 6 | 7 | 8 | 10 | 25 | 27 | 30 | 33 | 35 | 36 | B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 19 | | | | | | | | | | | | 43 |
| 3 | 31 | 25 | | | | | | | | | | | 50 |
| 6 | 24 | 20 | 17 | | | | | | | | | | 42 |
| 7 | 36 | 38 | 29 | 46 | | | | | | | | | 68 |
| 8 | 24 | 24 | 28 | 37 | 41 | | | | | | | | 64 |
| 10 | 21 | 22 | 18 | 34 | 30 | 19 | | | | | | | 44 |
| 25 | 22 | 44 | 23 | 44 | 27 | 21 | 36 | | | | | | 60 |
| 27 | 25 | 23 | 20 | 22 | 30 | 17 | 29 | 18 | | | | | 43 |
| 30 | 22 | 27 | 25 | 42 | 46 | 35 | 45 | 34 | 48 | | | | 70 |
| 33 | 09 | 08 | 08 | 17 | 26 | 21 | 28 | 13 | 27 | 11 | | | 33 |
| 35 | 14 | 19 | 19 | 28 | 30 | 14 | 21 | 02 | 30 | 20 | 15 | | 39 |
| 36 | 14 | 22 | 19 | 35 | 44 | 10 | 21 | 24 | 37 | 13 | 20 | 22 | 47 |
| B | 43 | 50 | 42 | 68 | 64 | 44 | 60 | 43 | 70 | 33 | 39 | 47 | 100 |

* The numbers used to identify the items are from Appendix H. The underlined numbers in the diagonal show the reliabilities for each item (without decimals). The factor loadings complete the matrix; here, the items load on one overall perceived barriers factor (B).

Table 10

The Expected and Error Correlation Matrix for the Single-Factor Model using Data from the Kenyan Sample Only*

| | 2 | 3 | 6 | 7 | 8 | 10 | 25 | 27 | 30 | 33 | 35 | 36 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | | 9 | 6 | 7 | 4 | 2 | 4 | 7 | 8 | 5 | 3 | 6 |
| 3 | 22 | | 1 | 4 | 8 | 0 | 14 | 1 | 8 | 9 | 1 | 2 |
| 6 | 18 | 21 | | 0 | 1 | 0 | 2 | 2 | 4 | 6 | 3 | 1 |
| 7 | 29 | 34 | 29 | | 7 | 4 | 3 | 7 | 5 | 5 | 1 | 3 |
| 8 | 28 | 32 | 27 | 44 | | 2 | 11 | 2 | 2 | 5 | 5 | 14 |
| 10 | 19 | 22 | 18 | 30 | 28 | | 5 | 2 | 5 | 6 | 3 | 11 |
| 25 | 26 | 30 | 25 | 41 | 38 | 26 | | 3 | 4 | 8 | 2 | 7 |
| 27 | 18 | 22 | 18 | 29 | 28 | 19 | 26 | | 4 | 1 | 15 | 4 |
| 30 | 30 | 35 | 29 | 47 | 44 | 30 | 41 | 30 | | 4 | 3 | 5 |
| 33 | 14 | 17 | 14 | 22 | 21 | 15 | 20 | 14 | 23 | | 7 | 3 |
| 35 | 17 | 20 | 16 | 27 | 25 | 17 | 23 | 17 | 27 | 13 | | 2 |
| 36 | 20 | 24 | 20 | 32 | 30 | 21 | 28 | 20 | 32 | 16 | 18 | |

* The numbers used to identify the items are from Appendix H. In this matrix, the lower diagonal presents the expected/predicted correlations (without decimals) for items of the overall perceived barriers factor; the upper diagonal presents the residuals.

# Chapter 5

# DISCUSSION

Past research indicates the importance of the dimension of perceived barriers to a recommended response in the face of a health threat (Champion, 1992; Janz & Becker, 1984; Sereno & Dunn, 1994). This study attempted to discern a multi-factor model to explain this important dimension of the Health Belief Model. Were a multi-factor solution to fit the data, such information could prove useful to the development of future communication campaigns that focus on promoting preventive measures (recommended responses) to health threats. This study focused on the recommended response of the use of condoms to prevent contraction of HIV/AIDS. Although the hypothesized six-factor second-order unidimensional model failed to fit the data, the results obtained in this study provide an interesting contribution to the notion of perceived barriers to a response recommended to prevent a health threat.

As can be seen by the extensive amount of research regarding barriers to preventive health actions presented in the literature review, the dimension of perceived barriers is one that has been used in many research projects. Although this study did not succeed in finding the second-order unidimensional factor structure proposed, the data

were consistent with a four-factor model. Perhaps the four factors used in the four-factor model are not as conceptually distinct as hypothesized. A single-factor model did fit the data, yet it did not continue to fit the data when tested cross-culturally. An explanation for the lack of success of any of the models tested in this paper could be predicated on the idea that individuals have various understandings of each of the barriers suggested.

As noted in Chapter 4, some individuals questioned the meaning of some of the barrier items (e.g., "I am likely to use a condom because using condoms is masculine."). Across sexes, this item may have been invalid; females would most likely perceive no need to respond to this item. In addition to the meaning of a particular item for an individual, one could also look to psychological literature regarding the functions of attitudes as an explanation for the varied responses obtained (Katz, 1960). Although Katz focused on studying individuals' attitudes, such a functional approach could be applied to this study, in terms of the individuals' attitudes toward the barrier items to which they responded, and how their attitudes may have influenced their understanding of the various items.

Katz (1960) suggested that there are four functions of attitudes, each of which is aroused by different stimuli. The four functions are instrumental, ego-defensive, value-expressive, and knowledge functions. Instrumental (or adjustive or utilitarian) attitudes are those that are based upon the notion that an individual attempts to maximize rewards and minimize punishments, thus attaining the maximum utility possible from the attitude. An ego-defensive attitude is one that derives from an individual's attempt to protect one's ego from forces that may threaten the ego. The value-expressive function of attitudes addresses the desire of the individual to present a positive self-image and to remain true to

the type of person the individual perceives him/herself to be. The final function suggested by Katz is the knowledge function, which is fueled by an individual's need and want of knowledge that will provide order and meaning so that the individual can "understand" the world in which s/he lives (Katz, 1960).

It is possible that the numerous items developed with the intention of measuring different aspects of perceived barriers to condom use may have been processed by the subjects in various ways, as suggested by the functional approach of attitudes. In addition, each of the barrier items may have served as varying stimuli, producing diverse functional attitudes. Whereas an item such as "I am not likely to use a condom because condoms carry HIV" may have been intended to measure an individual's knowledge about HIV-related issues (i.e., understanding that condoms are not contaminated or infected), an individual may have perceived this item as a threat to one's self and one's health if the individual focused on the aspect of the contamination of condoms. Perhaps such an ego-defensive function is more related to what this researcher conceptualized as being an individual barrier (something that affects the self), and the subject responding to this item may have responded thinking of self-preservation and protecting the self, as opposed to responding from a more rational view of knowledge (i.e., understanding how HIV is and is not transmitted). Thus, perhaps the six factors proposed by the researcher were not consistent with the data due to the individual perceptions of the subjects regarding what function the various barrier items may have stimulated.

As a multidimensional factor structure was consistent with the data regarding a four-factor model, the idea that there may be multiple dimensions underlying the perceived

barriers dimension should not be dismissed. An altered focus, potentially using a framework such as Katz's attitude functions, may be more appropriate in discerning what the multiple dimensions may be.

Further, as this model was tested cross-culturally, it is important to note that a possible explanation of the lack of the success of the model could be due to cultural constraints that were not addressed in this study. The barrier items were developed using input from researchers and other individuals from both the United States and the Kenyan cultures. Attempts were made to address barriers that exist in both cultures. Yet, as the questionnaires were identical across cultures in terms of the barrier items, it is possible that some items included on the questionnaires may have seemed to be confusing or irrelevant to members of one of the two cultures. For example, item number 61, "I am not likely to use a condom because to use a condom would suggest that I am a prostitute" (intended as a social norms/cultural values barrier) may have raised questions in the United States culture, as condom use is promoted by many health organizations, without any connection made to prostitution. It is also possible that the same item may not have been as appropriate as thought, even to the subjects in the Kenyan sample, where prostitutes (commercial sex workers) may actually have great difficulty in obtaining condoms (Cameron et al., 1996).

Another aspect of the cross-cultural nature of this study is worthy of attention. Although HIV/AIDS is a threat across cultures, the impact of the epidemic may be perceived in various ways across cultures. The spread of HIV/AIDS in Kenya is more extreme than the spread in the United States, as can be seen by the number of estimated

cases of HIV infection (see Chapter 1). In addition to the barrier items holding different meanings for members of different cultures, as suggested above, a factor structure itself may take on a different form when applied cross-culturally. Perhaps individuals of one culture will perceive a higher degree of barriers to condom use than individuals in another culture. These perceptions could cause varying potential frameworks of the dimension of perceived barriers to condom use to emerge in different cultures.

A preliminary work using a portion of the data collected for this study analyzed only the two dimensions of individual and relational barriers to condom use (Cameron, 1996). A research question in this preliminary study focused on determining whether or not the variable of culture (United States versus Kenyan) appeared to influence perceived barriers to condom use. Results of two-tailed t-tests indicated that subjects in the Kenyan sample perceived that the barriers to condom use were greater than did those subjects in the United States sample, whether the barriers be individual or relational (Cameron, 1996). These results suggest that culture does play a role in an individual's perceptions of barriers to condom use. Thus, it is possible that a framework of perceived barriers to condom use would not remain constant when tested cross-culturally. Indeed, when the one-factor model presented in this study was tested, the model was not consistent across cultures.

This study, then, has provided a framework of perceived barriers to condom use, albeit a framework that was not consistent with the data. Further research could focus on developing a framework that is applicable within a single culture, and then attempt to test such a model cross-culturally. This study suggests potential dimensions of a perceived

barriers framework, and is consistent with the notion that there may be multiple dimensions underlying the perceived barriers dimensions suggested by the HBM.

Limitations

There are at least four limitations to this study. First, the imposition of a factor structure on the dimension of perceived barriers was not consistent with the data in this study. The six dimensions (individual barriers, relational barriers, physical barriers, knowledge-based/self-efficacy barriers, social norms/cultural values barriers, and structural barriers) were developed through a careful review of the literature, as well as through the solicitation of items from various health professionals. However, in the end, the researcher is the one who suggested these six dimensions. Perhaps there is multidimensionality in the perceived barriers dimension suggested by the Health Belief Model, but the factors suggested and conceptualized in this study may not be appropriate divisions of the perceived barriers dimension.

Second, the hypotheses suggesting second-order unidimensionality may be premature, as no existing factor structure of the dimension of perceived barriers was used to test this hypothesis. Thus, by hypothesizing that there was a second-order unidimensional factor structure, the requirements placed on this study may have been too stringent as a first attempt to further investigate the perceived barriers dimension. A more structured approach, which would include but not be limited to the development of scales measuring various dimensions of the perceived barriers dimension, if the barrier dimension is indeed multidimensional, should first be attempted. After such scales are developed and tested, then research could proceed, in an attempt to determine whether or not those

scales might fit a second-order unidimensional model. In this study, the second-order unidimensionality hypothesis was tested and found to fail.

Third, the reliabilities of the scales that were used to measure the proposed factors were at times quite low. It is possible that the low reliabilities of the scale could provide information about the perceived barriers dimension, for example, it is possible that items used to measure the specific barrier dimension proposed would have been more appropriately placed as a measure of one of the other proposed barrier dimensions.

Fourth, the length of the questionnaire may have contributed to the occurrence of response bias by the participants. Although the 76 perceived barriers items included items to be recoded, it appeared, when looking carefully at the original data, that some individuals simply chose a response and used that response throughout the majority of the questionnaire.

The limitations all suggest that the development of a multi-stage study may be appropriate to measure this phenomenon of perceived barriers to condom use. Ideas as to how such a study may be developed are presented in the following section.

Future Directions

As suggested by the limitations, research regarding the perceived barriers dimension suggested by the Health Belief Model could be enhanced by a carefully developed multi-stage study. As past research has indicated that the perceived barriers dimension of the Health Belief Model is an important one, research regarding this dimension is warranted. Initially, an applicable framework of the perceived barriers dimension needs to be developed. This framework may be developed through various

processes, including but not limited to statistical analyses such as exploratory factor analysis. As noted above in the limitations section, the underlying dimensions suggested here were the product of the researcher, and perhaps there are multiple dimensions to perceived barriers, yet these dimensions may be of a far different ilk than, e.g., individual and relational barriers.

Once an appropriate framework is established, if one does appear to fit the dimension of perceived barriers to a recommended response, then the step of administering the scale to determine if the framework fits a second-order unidimensional model would be appropriate. However, the necessary first step is to determine reliable scales to measure the suggested dimensions of the perceived barriers dimension.

If specific clusters of barriers to a recommended response, here, condom use, can be determined, such information could be incorporated into future prevention campaigns in an attempt to better address barriers to condom use. Such campaigns would then have the potential to not only increase awareness of knowledge of HIV/AIDS, as current campaigns have achieved, but also to promote an increased use of condoms as a preventive measure against contraction of HIV. Current HIV/AIDS prevention campaigns appear to be increasing knowledge about the disease, yet there remain unbroken barriers that are hindering individuals from using condoms to protect themselves against contraction of HIV. If research can determine what these barriers to condom use might be, then further study can determine if such barriers can be addressed in a mass media format, such as communication campaigns, or if other measures need to be taken in order to break down these barriers to condom use.

# Chapter 6

# CONCLUSION

The results of this study suggest that the perceived barriers dimension of the Health Belief Model does not fit a second-order unidimensional factor model. With the final analysis suggesting a one-factor model of barriers to condom use, this study indicated that, although barriers to condom use may appear to be of sharply different foci (e.g., falling into various categories such as individual barriers, physical barriers, etc.), these barriers may not be discernible to individuals as barriers of different ilk. It is also important to recognize that the six barrier dimensions suggested here were imposed upon these data. The six barrier dimensions were developed from a review of the research in an attempt to categorize the numerous barriers found in multiple tests of the HBM. However, the barrier dimensions suggested in this paper were merely one researcher's conception of appropriate categories of barriers, as gleaned from the literature, past studies regarding the HBM, as well as self-reports of individuals who are involved first-hand with HIV/AIDS prevention campaigns and the promotion of safer sex.

The data obtained in this study were not consistent with the hypothesis that the perceived barriers dimension of the HBM forms a second-order unidimensional factor

structure with six underlying dimensions. The lack of consistency of the data with this hypothesis does not preclude the possibility that multiple factors may underlie the perceived barriers dimension. Rather, the results of this study indicate that the particular factors suggested and measured here are not those factors that underlie the perceived barriers dimension. Perhaps with alternate factor structures, a multidimensional model could be developed and tested. This study does indicate that there are barriers to condom use in existence, and that people perceive these barriers as hindering them in practicing safer sex. Understanding what categories of barriers exist may be crucial in developing future communication campaigns to promote condom use. In addition to focusing on one's susceptibility to contraction of HIV, and the severity of the disease, focusing on promoting condom use as an efficacious and possible alternative to unprotected sex may strengthen future HIV/AIDS prevention campaigns.

## ENDNOTES

1. The handout provided to the participants in the United States also included phone numbers of various organizations and hotlines through which participants could receive further information about HIV/AIDS.

2. "Communicating Health with Unique Populations" conference held at Michigan State University, April 8-9, 1995.

3. Conference participants were asked to respond to the following: "Please list any barriers that you are aware of, or that you may have heard individuals voice, regarding reasons an individual would not use condoms to prevent contraction of HIV/AIDS."

4. See Witte, Nzyuko, & Cameron (1996) and Cameron, Witte, Lapinski, & Nzyuko (1996) for further information.

5. In the United States sample there were no respondents indicating Kenyan citizenship. In the Kenyan sample, 1.1% of the respondents indicated United States citizenship.

6. English is one of the national languages of Kenya. The class in which this questionnaire was administered in Kenya was conducted in English.

7. Note that, in confirmatory factor analysis, the null hypothesis is that the model fits the data. Therefore, the desired significance levels are $p > .05$ so that one fails to reject the null hypothesis that the model fits the data.

# APPENDICES

# APPENDIX A

## APPENDIX A

Individual Barriers to Condom Use*

*Note: Individuals were provided with the following directions to answer the 76 barrier items: "Please answer the following questions on a scale of 1 to 5, with 1 meaning "Strongly Disagree," 2 meaning "Disagree," 3 meaning "Neither Agree nor Disagree," 4 meaning "Agree," and 5 meaning "Strongly Agree." Please note that the questions refer to the use of male condoms during sexual intercourse. Please read each question thoroughly and carefully."

| Item | M | SD |
|---|---|---|
| 1. I am NOT likely to use a condom because condoms reduce spontaneity in sexual interactions. | 1.92 | 1.14 |
| 2. I am NOT likely to use a condom because to use a condom suggests that I do not trust my partner. | 1.76 | 1.13 |
| **3. I am NOT likely to use a condom because I do not know how to talk about condom use.** | 1.61 | 0.87 |
| 4. I am NOT likely to use a condom because if I use a condom, people will think that I am infected with HIV. | 1.31 | 0.70 |
| 5. I am NOT likely to use a condom because I do not want to buy them because someone I know might see me and then they will know that I am having sex. | 1.52 | 0.83 |
| 6. I am likely to use a condom because I know that I am NOT invincible. (R) | 2.56 | 1.53 |
| **7. I am NOT likely to use a condom because condoms spoil the mood.** | 2.00 | 1.10 |
| 8. I am NOT likely to use a condom because condoms are inconvenient to use when having repeated sexual intercourse. | 2.32 | 1.27 |
| 9. I am NOT likely to use a condom because I am going to die anyway. | 1.30 | 1.22 |

| Item | M | SD |
|---|---|---|
| **10. I am NOT likely to use a condom because I get a thrill when I take chances.** | 1.63 | 0.89 |
| **11. I am likely to use a condom because I am NOT embarrassed to use condoms. (R)** | 2.16 | 1.29 |
| 12. I am likely to use a condom because using condoms is masculine.(R) | 3.75 | 1.06 |
| 13. I am likely to use a condom because using condoms is an expression of love. (R) | 3.37 | 1.27 |
| 14. I am NOT likely to use a condom because I (or my partner) use another form of birth control. | 2.61 | 1.41 |
| 15. I am likely to use a condom because my friends use condoms. (R) | 3.79 | 1.10 |
| 16. I am NOT likely to use a condom because people might think that I sleep around. | 1.61 | 0.88 |
| 17. I am likely to use a condom because I am vulnerable to contracting a sexually transmitted disease. (R) | 2.28 | 1.46 |
| **18. I am NOT likely to use a condom because I just don't care.** | 1.48 | 0.90 |
| 19. I am NOT likely to use a condom because people might think that I am homosexual. | 1.37 | 0.71 |
| 20. I am likely to use a condom because I am NOT embarrassed to ask my partner to use condoms. (R) | 2.23 | 1.30 |
| **21. I am NOT likely to use a condom because only alternative health practices will protect me against sexually transmitted diseases.** | 1.88 | 1.12 |
| 22. I am likely to use a condom because I feel that I have the power to enforce condom use in my relationship. (R) | 2.50 | 1.34 |
| 23. I am NOT likely to use a condom because condom use reduces intimacy. | 2.12 | 1.14 |

(R) Item was recoded for analysis.
Items in bold are those used in the 36-item scale (Appendix G).

# APPENDIX B

## APPENDIX B

Relational Barriers to Condom Use

| Item | M | SD |
|---|---|---|
| 24. I am NOT likely to use a condom because if I suggest condom use my partner will think that I have been unfaithful. | 1.81 | 1.12 |
| **25. I am NOT likely to use a condom because condom use will encourage my partner to have other partners.** | 1.83 | 1.12 |
| **26. I am NOT likely to use a condom because my partner is too embarrassed to use condoms.** | 1.77 | 1.03 |
| **27. I am NOT likely to use a condom because my partner will not trust me if I suggest condom use.** | 1.75 | 1.01 |
| 28. I am NOT likely to use a condom because if I suggest condom use, my partner will think that I sleep around. | 1.77 | 1.04 |
| 29. I am NOT likely to use a condom because my partner believes that condoms aren't masculine. | 1.72 | 0.92 |
| **30. I am NOT likely to use a condom because my partner is not infected.** | 2.22 | 1.32 |
| 31. I am likely to use a condom because my partner wants to use condoms. (R) | 2.66 | 1.38 |
| 32. I am likely to use a condom because my partner is willing to use condoms. (R) | 2.30 | 1.28 |
| 33. I am NOT likely to use a condom because I know my partner well enough. | 2.44 | 1.41 |
| 34. I am NOT likely to use a condom because I can trust my partner. | 2.44 | 1.38 |

| Item | M | SD |
|---|---|---|
| 35. I am likely to use a condom because using a condom turns my partner on. (R) | 3.70 | 1.04 |
| 36. I am NOT likely to use a condom because my partner will reject me if I suggest condom use. | 1.66 | 0.84 |

(R) Item was recoded for analysis.
Items in bold are those used in the 36-item scale (Appendix G).

# APPENDIX C

## APPENDIX C

Physical Barriers to Condom Use

| Item | M | SD |
|---|---|---|
| **37. I am NOT likely to use a condom because condoms are too small.** | 1.58 | 0.85 |
| **38. I am likely to use a condom because condoms are comfortable. (R)** | 3.55 | 1.07 |
| **39. I am NOT likely to use a condom because condoms reduce sensation.** | 2.24 | 1.20 |
| **40. I am likely to use a condom if I am using drugs. (R)** | 3.30 | 1.47 |
| **41. I am NOT likely to use a condom because condoms are not natural.** | 1.99 | 1.18 |
| **42. I am NOT likely to use a condom because I don't like the feel of condoms.** | 2.33 | 1.18 |
| 43. I am likely to use a condom if I am drunk. (R) | 3.05 | 1.37 |
| **44. I am NOT likely to use a condom because I am allergic to latex.** | 1.91 | 0.99 |
| 45. I am likely to use a condom because condoms enhance pleasure.(R) | 3.78 | 0.94 |

(R) Item was recoded for analysis.
Items in bold are those used in the 36-item scale (Appendix G).

# APPENDIX D

## APPENDIX D

Knowledge-Based/Self-Efficacy Barriers to Condom Use

| Item | M | SD |
|---|---|---|
| **46. I am NOT likely to use a condom because I have never been taught how to use condoms.** | 1.50 | 0.82 |
| **47. I am NOT likely to use a condom because condoms carry HIV.** | 1.35 | 0.74 |
| **48. I am likely to use a condom in order to prevent contraction of potentially fatal diseases. (R)** | 1.88 | 1.34 |
| 49. I am likely to use a condom because I know how to use a condom correctly. (R) | 2.39 | 1.25 |
| 50. I am NOT likely to use a condom because I have never used condoms before. | 1.81 | 1.09 |
| **51. I am NOT likely to use a condom because I do not know where I can obtain condoms.** | 1.44 | 0.74 |
| **52. I am likely to use a condom because sex is risky. (R)** | 2.11 | 1.25 |
| **53. I am NOT likely to use a condom because I have never practiced using condoms.** | 1.93 | 1.95 |
| **54. I am NOT likely to use a condom because whether or not I contract a sexually transmitted disease is out of my control.** | 1.46 | 0.84 |

(R) Item was recoded for analysis.
Items in bold are those used in the 36-item scale (Appendix G).

# APPENDIX E

## APPENDIX E

Social Norms/Cultural Values Barriers to Condom Use

| Item | M | SD |
|---|---|---|
| **55. I am NOT likely to use a condom because I would be stigmatized if I did.** | 1.55 | 0.83 |
| **56. I am likely to use a condom because I am responsible for what happens to my health. (R)** | 1.84 | 1.24 |
| **57. I am NOT likely to use a condom because my religion discourages the use of condoms.** | 1.91 | 1.18 |
| **58. I am NOT likely to use a condom because no one has ever told me that I should use a condom.** | 1.53 | 0.81 |
| 59. I am likely to use a condom because I believe that people whom I respect use condoms. (R) | 3.08 | 1.29 |
| **60. I am NOT likely to use a condom because it is inappropriate for women to suggest condom use.** | 1.53 | 0.78 |
| **61. I am NOT likely to use a condom because to use a condom would suggest that I am a prostitute.** | 1.49 | 0.82 |
| **62. I am NOT likely to use a condom because people may avoid me if I do.** | 1.51 | 0.73 |
| 63. I am likely to use a condom because using condoms is okay with my friends. (R) | 3.07 | 1.13 |

(R) Item was recoded for analysis.
Items in bold are those used in the 36-item scale (Appendix G).

# APPENDIX F

## APPENDIX F

Structural Barriers to Condom Use

| Item | M | SD |
|---|---|---|
| 64. I am NOT likely to use a condom because, in past use, when I used a condom it broke. | 1.78 | 0.99 |
| **65. I am NOT likely to use a condom because, in past use, when I used a condom I (or my partner) got pregnant anyway.** | 1.59 | 0.84 |
| 66. I am likely to use a condom because condoms are easily accessible.(R) | 2.49 | 1.26 |
| **67. I am NOT likely to use a condom because I cannot afford condoms.** | 1.49 | 0.79 |
| 68. I am likely to use a condom because using a condom will protect me against HIV/AIDS. (R) | 1.89 | 1.27 |
| 69. I am NOT likely to use a condom because condoms are too expensive to buy. | 1.53 | 0.82 |
| 70. I am NOT likely to use a condom because, in past use, when I used a condom, I contracted a sexually transmitted disease anyway. | 1.53 | 0.79 |
| 71. I am NOT likely to use a condom because providers refuse to provide me with condoms. | 1.57 | 0.77 |
| 72. I am NOT likely to use a condom because I cannot obtain condoms in an anonymous way. | 1.75 | 0.93 |
| 73. I am likely to use a condom because condoms are reliable. (R) | 2.57 | 1.14 |
| **74. I am likely to use a condom because I can get condoms for free. (R)** | 3.04 | 1.24 |
| **75. I am NOT likely to use a condom because providers are unable to provide me with condoms.** | 1.64 | 0.80 |
| **76. I am NOT likely to use a condom because condoms break.** | 2.18 | 1.07 |

(R) Item was recoded for analysis.
Items in bold are those used in the 36-item scale (Appendix G).

# APPENDIX G

## APPENDIX G

Barriers to Condom Use: The 36 Items Used for the Proposed Six-Factor Model

| Item | M | SD |
|---|---|---|
| 1. I am NOT likely to use a condom because I do not know how to talk about condom use. (I #3)* | 1.61 | 0.87 |
| **2. I am NOT likely to use a condom because condoms spoil the mood. (I #7)** | 2.00 | 1.10 |
| **3. I am NOT likely to use a condom because I get a thrill when I take chances. (I #10)** | 1.63 | 0.89 |
| 4. I am likely to use a condom because I am NOT embarrassed to use condoms. (R) (I #11) | 2.16 | 1.29 |
| **5. I am NOT likely to use a condom because I just don't care. (I #18)** | 1.48 | 0.90 |
| **6. I am NOT likely to use a condom because only alternative health practices will protect me against sexually transmitted diseases. (I #21)** | 1.88 | 1.12 |
| **7. I am NOT likely to use a condom because condom use will encourage my partner to have other partners. (R #25)** | 1.83 | 1.12 |
| **8. I am NOT likely to use a condom because my partner is too embarrassed to use condoms. (R #26)** | 1.77 | 1.03 |
| **9. I am NOT likely to use a condom because my partner will not trust me if I suggest condom use. (R #27)** | 1.75 | 1.01 |
| **10. I am NOT likely to use a condom because my partner is not infected. (R #30)** | 2.22 | 1.32 |
| 11. I am NOT likely to use a condom because condoms are too small. (P #37) | 1.58 | 0.85 |
| 12. I am likely to use a condom because condoms are comfortable. (R) (P #38) | 3.55 | 1.07 |

| Item | M | SD |
|---|---|---|
| 13. I am NOT likely to use a condom because condoms reduce sensation. (P #39) | 2.24 | 1.20 |
| 14. I am likely to use a condom if I am using drugs. (R) (P #40) | 3.30 | 1.47 |
| 15. I am NOT likely to use a condom because condoms are not natural. (P #41) | 1.99 | 1.18 |
| 16. I am NOT likely to use a condom because I don't like the feel of condoms. (P #42) | 2.33 | 1.18 |
| 17. I am NOT likely to use a condom because I am allergic to latex. (P #44) | 1.91 | 0.99 |
| 18. I am NOT likely to use a condom because I have never been taught how to use condoms. (KB #46) | 1.50 | 0.82 |
| 19. I am NOT likely to use a condom because condoms carry HIV. (KB #47) | 1.35 | 0.74 |
| 20. I am likely to use a condom in order to prevent contraction of potentially fatal diseases. (R) (KB #48) | 1.88 | 1.34 |
| 21. I am NOT likely to use a condom because I do not know where I can obtain condoms. (KB #51) | 1.44 | 0.74 |
| 22. I am likely to use a condom because sex is risky. (R) (KB #52) | 2.11 | 1.25 |
| 23. I am NOT likely to use a condom because I have never practiced using condoms. (KB #53) | 1.93 | 1.95 |
| 24. I am NOT likely to use a condom because whether or not I contract a sexually transmitted disease is out of my control. (KB #54) | 1.46 | 0.84 |
| **25. I am NOT likely to use a condom because I would be stigmatized if I did. (SN #55)** | 1.55 | 0.83 |
| **26. I am likely to use a condom because I am responsible for what happens to my health. (R) (SN #56)** | 1.84 | 1.24 |

| Item | M | SD |
|---|---|---|
| **27. I am NOT likely to use a condom because my religion discourages the use of condoms. (SN #57)** | 1.91 | 1.18 |
| 28. I am NOT likely to use a condom because no one has ever told me that I should use a condom. (SN #58) | 1.53 | 0.81 |
| 29. I am NOT likely to use a condom because it is inappropriate for women to suggest condom use. (SN #60) | 1.53 | 0.78 |
| **30. I am NOT likely to use a condom because to use a condom would suggest that I am a prostitute. (SN #61)** | 1.49 | 0.82 |
| 31. I am NOT likely to use a condom because people may avoid me if I do. (SN #62) | 1.51 | 0.73 |
| **32. I am NOT likely to use a condom because, in past use, when I used a condom I (or my partner) got pregnant anyway. (S #65)** | 1.59 | 0.84 |
| **33. I am NOT likely to use a condom because I cannot afford condoms. (S #67)** | 1.49 | 0.79 |
| 34. I am likely to use a condom because I can get condoms for free. (R) (S #74) | 3.04 | 1.24 |
| **35. I am NOT likely to use a condom because providers are unable to provide me with condoms. (S #75)** | 1.64 | 0.80 |
| **36. I am NOT likely to use a condom because condoms break. (S #76)** | 2.18 | 1.07 |

*Note: The code in parentheses refers to the factor that the item is purported to measure and the number of the item on the original 76-item scale. I = individual barriers, R = relational barriers, P = physical barriers, KB = knowledge-based/self-efficacy barriers, SN = social norms/cultural values barriers, S = structural barriers.

(R) Item was recoded for analysis.
Items in bold were used for 16-item four-factor analysis.

# APPENDIX H

## APPENDIX H

Barriers to Condom Use: The 16 Items Used for the Four-Factor Analysis

| Item | M | SD |
|---|---|---|
| **2. I am NOT likely to use a condom because condoms spoil the mood. (I #7)** | **2.00** | **1.10** |
| **3. I am NOT likely to use a condom because I get a thrill when I take chances. (I #10)** | **1.63** | **0.89** |
| 5. I am NOT likely to use a condom because I just don't care. (I #18) | 1.48 | 0.90 |
| **6. I am NOT likely to use a condom because only alternative health practices will protect me against sexually transmitted diseases. (I #21)** | **1.88** | **1.12** |
| **7. I am NOT likely to use a condom because condom use will encourage my partner to have other partners. (R #25)** | **1.83** | **1.12** |
| **8. I am NOT likely to use a condom because my partner is too embarrassed to use condoms. (R #26)** | **1.77** | **1.03** |
| 9. I am NOT likely to use a condom because my partner will not trust me if I suggest condom use. (R #27) | 1.75 | 1.01 |
| **10. I am NOT likely to use a condom because my partner is not infected. (R #30)** | **2.22** | **1.32** |
| **25. I am NOT likely to use a condom because I would be stigmatized if I did. (SN #55)** | **1.55** | **0.83** |
| 26. I am likely to use a condom because I am responsible for what happens to my health. (R) (SN #56) | 1.84 | 1.24 |
| **27. I am NOT likely to use a condom because my religion discourages the use of condoms. (SN #57)** | **1.91** | **1.18** |
| **30. I am NOT likely to use a condom because to use a condom would suggest that I am a prostitute. (SN #61)** | **1.49** | **0.82** |

| Item | M | SD |
|---|---|---|
| 32. I am NOT likely to use a condom because, in past use, when I used a condom I (or my partner) got pregnant anyway. (S #65) | 1.59 | 0.84 |
| **33. I am NOT likely to use a condom because I cannot afford condoms. (S #67)** | **1.49** | **0.79** |
| **35. I am NOT likely to use a condom because providers are unable to provide me with condoms. (S #75)** | **1.64** | **0.80** |
| **36. I am NOT likely to use a condom because condoms break. (S #76)** | **2.18** | **1.07** |

*Note: Numbers used in this Appendix and Tables 3-10 refer to the numbers of the items in the 36-item scale (see Appendix G).
Items in bold were those used for the 12-item single-factor analysis.
(R) Item was recoded for analysis.

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## LIST OF REFERENCES


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